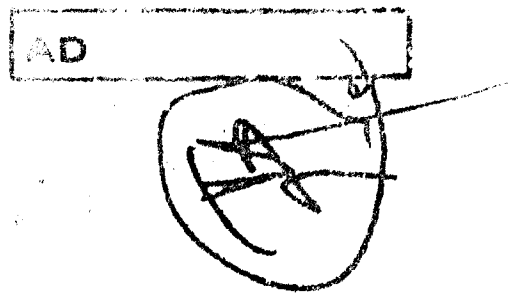
HUMAN FACTORS ENGINEERING BIBLIOGRAPHIC SERIES

VOLUME 5, 1967 LITERATURE

TUFTS UNIVERSITY

PREPARED FOR
HUMAN ENGINEERING LABORATORY

MARCH 1976



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1967 LITERATURE

Prepared by

THE PROJECT STAFF
DEPARTMENT OF DEFENSE
HUMAN FACTORS ENGINEERING INFORMATION ANALYSIS CENTER

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Tufts University

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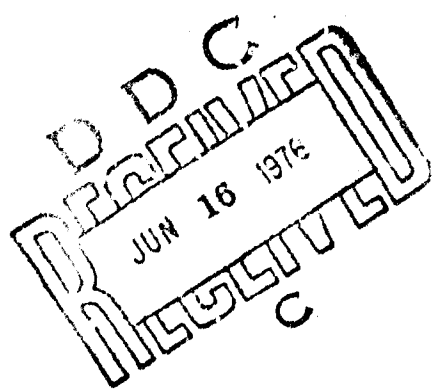

March 1976

U. S. ARMY HUMAN ENGINEERING LABORATORY

Aberdeen Proving Ground, Maryland

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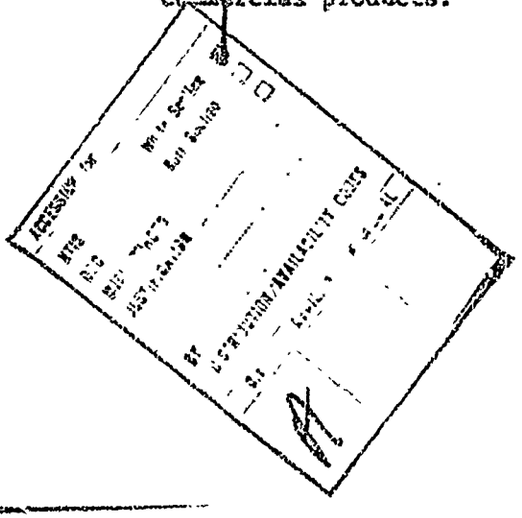

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REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) HUMAN FACTORS ENGINEERING BIBLIOGRAPHY 1967 VOLUME 5	5. TYPE OF REPORT & PERIOD COVERED Bibliography 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Paul G. Ronco Stanley Lippert	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Human Engineering Information and Analysis Service Institute for Psychological Research Tufts University, Medford, Massachusetts	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Human Engineering Laboratory Aberdeen Proving Ground, Maryland 21005	12. REPORT DATE March 1976 13. NUMBER OF PAGES 294
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Human factors engineering bibliography

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This document is the fifth in a series of bibliographies covering the human factors engineering literature. It covers most of the journal target articles for the year 1967.

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HEL BIB VOL 5

HUMAN FACTORS ENGINEERING
BIBLIOGRAPHIC SERIES
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Prepared by

Paul G. Ronco, Ph.D.

and

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DEPARTMENT OF DEFENSE

HUMAN FACTORS ENGINEERING INFORMATION ANALYSIS CENTER

Institute for Psychological Research

Tufts University

March 1968

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Aberdeen Proving Ground, Maryland 21005

FOREWORD

The Department of the Army was assigned responsibility, effective 1 October 1965, for the development and maintenance of a Human Factors Engineering Information Analysis Center in accordance with the provisions of the Department of Defense Scientific and Technical Information program (DoD Instruction 5100.45). The Information Analysis Center at Tufts University, under the technical guidance of the U. S. Army Human Engineering Laboratories prepared four volumes until the operation was terminated in 1968. The citations and abstracts then in work have been saved and additional work accomplished without Laboratory support to make Volume 5 for the 1967 literature. Volume 5 contains mostly journal articles planned earlier for Volume 5, but does not cover the report literature. Approximately, half the 1967 literature was covered at the Tufts University contract termination. Nearly 1400 references are included in this present document.

Human Engineering Information and

Analysis Service Project Staff

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Introduction

This document is the fifth in a series of bibliographies covering the human factors engineering literature. The first volume, HEL BIB VOL 1, covered the 1940 through 1959 literature. The second bibliography contained material, for the most part, from the time period 1960 through 1964. The third volume dealt primarily with the 1965 literature. The fourth covered the 1966 literature. The present volume covers most of the journal target articles for the year 1967.

As in the past, the project staff was influenced by several considerations in the selection of references for inclusion in the bibliography. First, there was an attempt to select those references which reflected the broad spectrum of revealed interests of human factors personnel. Second, the documents had to be available to the project staff for examination prior to coding and abstracting. If the document was not among the acquisitions of the project, it was not included in the bibliography.

A cumulative coded index covering the first four volumes has been prepared. A first author index has also been prepared. Limited privare publication of both indices is planned for scholarly purposes.

Stanley Lippert
University of Massachusetts
March 1976

Instruction in the Use of the Present Bibliography

General

The user should examine the index (Part I) thoroughly before attempting to locate references on a specific topic. Familiarization with the terms is essential if effective retrieval is to be realized. After examining its content, the user should be able to enter the index with the terms which are descriptive of, or synonymous with his query. Documents have been coded only to those terms or descriptors which are underlined. Having noted the terms of interest he should then go to Part II (Facsimile of Subject Matter File) and under the appropriate terms find the accession numbers of those documents which have been coded to that term. Noting these numbers he can then go to Part III (Citations and Abstracts) to find the actual references.

Index Changes

There have been some slight modifications in the index published in the first two volumes of this series. These changes are reflected in the present index. However, no major changes have been made and the user should have no trouble going from the index in Volume III to the present one. As mentioned previously, an updated and cumulative Part I and II will be published in the near future.

The Index and Its Use

The accessions are only coded to those terms which are underlined and in the cases of subheading, are coded to the lowest subcategory (i.e., to the secondary or tertiary heading, if there is one). For example, if the reader will note the category Aging, Effects of, he will find a number of secondary categories, such as vision; motor performance; etc. No references have been coded to Aging, Effects of, as such, but only to the secondary headings. In the case of Radar and other CRT Displays the reader will note the secondary heading screen and under this, various tertiary headings, such as size and shape. Relevant documents, for example those dealing with the shape of radar screens or scope faces, have been coded to the lowest subcategory, in this case size and shape. No references have been coded to screen alone.

The index can, of course, be used as a hierarchical system or a coordinate index. For example, if a user were interested in articles dealing with drugs and their effects, he would examine the references listed in the category Drugs. Similarly, if he were interested in articles dealing with man's tolerance to acceleration, he would go to the category Motion, Effects of/ acceleration and deceleration/ tolerance. However, if he were interested in the effects of drugs on man's tolerance to acceleration forces, rather than go through all the references in the above mentioned categories, the reader should note only those accession numbers common to both categories. The loose leaf notebook form should facilitate this coordinate search.

The reader is advised to look through the various general categories in making a search. These categories contain not only references of a general nature, books, bibliographies, etc., but in some cases miscellaneous articles which could not be readily coded elsewhere. Occasionally, the reader will note a secondary heading "other." These categories contain references to equipment, methods, topics, etc., not specifically listed under the main heading.

An index of this nature develops through use. All relevant terms and descriptors cannot be anticipated in its initial development and are often incorporated only after the index has been in use for some time. Therefore, if the user cannot find terms specifically descriptive of his problem he should attempt to find synonymous terms. As mentioned previously, the user should examine the whole index thoroughly before attempting to locate specific topics.

Facsimile of Subject Matter File

Part II contains those categories to which documents have been coded along with the accession numbers of the documents. In essence, it represents the index stripped to the bare essentials, i.e., minus all cross headings and notes. The user will note that there are several categories with only a few or no references coded to them. These categories were left in the index because it is known that in the later bibliographies, there will be a number of references coded to them.

Citations and Abstracts

Part III contains the actual citations and abstracts listed in numerical order by accession number. This section was compiled by filming the actual 5x8 citation and abstract cards from the files of the PEIAS.

The format of the citations is generally in keeping with the recommendations of the Publication Manual of the American Psychological Association. In some instances, however, variation in the amount and type of information in the original document has introduced some variation in the final citation. The content of the citation tries to maximize the amount of information to assist the user in acquiring a copy of the document.

The letter code R found at the end of the abstract refers to the number of references found in the articles (e.g., R-7 means that 7 references were cited). A list of abbreviations used in the abstracts is given on the next page.

The documents cited are not available from Tufts University.

KEY TO ABBREVIATIONS

a.c.	alternating current
AD	average deviation
AFQCT	Armed Forces General Classification Test
AGCT	Army General Classification Test
AIAA	American Institute of Aeronautics & Astronautics
AL	adaptation level
amp	ampere
API	Army Psychology Instrument Program
ANOVA	analysis of variance
AP	action potentials
APR	acoustic reflex
AVID	Advanced Visual Information Display
bit	unit of information
BMR	basal metabolic rate
C	centigrade
ca	circa, approximately
cc	cubic centimeter
CCC	Command Control Center
CFF	critical flicker frequency
CIC	Combat Information Center
clo	measure of protective value of fabrics
cm	centimeter
CNS	central nervous system
CO	carbon monoxide
CO_2	carbon dioxide
cpm	cycles per minute
cps	cycles per second
CR	critical ratio
CRT	cathode ray tube
cu ft	cubic foot
db	decibel
dc	direct current
df	degrees of freedom
DL	difference limen
E, Es.	experimenter, experimenters
EEG	electroencephalogram
e.g.	for example
EKG or ECG	electrocardiogram
EMG	electromyogram
ERG	electroretinogram
et al	and others
etc.	and so forth
Exp.	experiment
f	frequency
F	fahrenheit, F-ratio
ft	foot
ft-c	foot-candle
ft-L	foot-Lambert
ft-lbs	foot-pounds
ft/sec	feet per second
g	acceleration of normal pull of gravity
G	gravitational force acting upon an object
GCA	Ground Control Approach
GSR	galvanic skin response
Hg	mercury
hr.	hour
I	intensity
IBM	International Business Machine
i.e.	that is
ILS	Instrument Landing System
in.	inch
IQ	Intelligence Quotient
j.n.d.	just noticeable difference
kc	kilocycle
kg	kilogram
KR	knowledge of results
L	lambert
LL	loudness level
lb	pound
m	meter
M	mean
Ma	millisapare
Mc	megacycle
Mdn	median
mg	milligram
mi	mile
min.	minute
mL	millilambert
mm	millimets.
MOS	Military Occupational Specialty
mph	miles per hour
msec	millisecond
mμ	millimicron
μsec.	microsecond
N	number of
°	degree
O, Os.	observer, observers
O_2	oxygen
OCS	Officers' Candidates School
OR	Operations Research
p	probability level
PB	phonetically balanced
PERT	Program Evaluation and Review Technique
PGR	psychogalvanic skin response
PI	photo interpretation
PPI	Planned Position Indicator

KEY TO ABBREVIATIONS (Cont'd)

pps	pulses per second
psi	pounds square inch
PSS	Personnel Subsystem concept (USAF)
PED	Personnel and Equipment Data file
HE	verifying Human Engineering Design Standards
QQPRI	Qualitative and Quantitative Personnel Requirements Information
PSTE	Personnel Subsystem Test and Evaluation
TC	Training concepts
TED	Training Equipment Development program
TEPI	Training Equipment Planning Information
TOTM	Technical Orders and Manuals
TP	Training Plans
r	roentgen, correlation coefficient
rad	absorbed dose of radiation
REM	rapid eye movement
RBE	relative biological effectiveness
ROTC	Reserve Officers Training Corps
rpm	revolutions per minute
RT	reaction time
S, Ss	subject, subjects
SAGE	Semi Automatic Ground Environment
SD	standard deviation
SDT	signal detection theory
sec.	second
S/N	signal-to-noise ratio
SPL	sound pressure level
S-R	stimulus-response
SUBIC	Submarine Integrated Control
t	t-test
TTS	temporary threshold shift
vs	versus
VTOL	Vertical Takeoff and Landing Aircraft

SYMBOLS:

χ^2	chi square
%	per cent
>	more than
<	less than
=	equal
ΔI	change in intensity
μ	micron
σ^2	variance

FACSIMILE OF SUBJECT MATTER FILE

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32629 *****

31,959
Shephard, R.J. THE PREDICTION OF "MAXIMAL" OXYGEN CONSUMPTION USING A NEW PROGRESSIVE STEP TEST. Ergonomics, Jan. 1967, 10(1), 1-15. (Physiological Hygiene Dept., University of Toronto School of Hygiene, Toronto, Ontario, Canada).

A description is given of a "progressive" step test where the speed of ascent of two 9 in. steps is progressively increased. The validity of this test is established in terms of a) the rate of approach to a steady-state, b) a comparison of measured variables in the "steady-state" and "progressive" tests, and c) a comparison of data for "maximal" oxygen intake with predictions from the "progressive" and "steady-state" step tests. The 9 in. step is subjectively more comfortable than an 18 in. step test. The efficiency of working is independent of step height over the range 9-18 in., but varies with the speed of stepping. Variations in efficiency are no greater than for the bicycle ergometer at comparable rates of working. Methods of predicting "maximal" oxygen uptake are critically reviewed. The pulse rates during performance of the 9 in. progressive step test agree quite well with Astrand's findings at comparable levels of oxygen consumption.
R 39

31,960
Ward, Joan S. & [illegible], M.S. ANTHROPOMETRY OF ELDERLY WOMEN. Ergonomics, Jan. 1967, 10(1), 17-23. (Ergonomics & Cybernetics Dept., Loughborough University of Technology, Loughborough, England).

Anthropometric dimensions of 100 elderly Birmingham women, measured in 1964, are compared with similar dimensions measured by Roberts in 1960 (HEIAS No. 17,309) on elderly women in the Home Counties. Satisfactory agreement was found between the two sets of data. It is concluded that, from a practical design viewpoint, the body dimensions of both groups of subjects are similar.
R 2

31,961
Grieve, June I. DAILY ACTIVITIES OF HOUSEWIVES WITH YOUNG CHILDREN AND ESTIMATION OF ENERGY EXPENDITURE. Ergonomics. Jan. 1967, 10(1), 29-33. (Human Physiology Div., National Institute for Medical Research, London, England).

The daily activities of 45 housewives living at home with young children were studied. A 24-hour diary technique was used to record the various activities concerned with running the home, caring for the children, and leisure. Classification of each diary entry leads to calculation of times for specific activities. An estimate of the average daily energy expenditure was then computed using values for the caloric cost of each activity obtained from the literature.
R 21

31,962
Brenton, P. & Grayson, G. AN EVALUATION OF TRAIN SEATS BY OBSERVATION OF SITTING BEHAVIOUR. Ergonomics, Jan. 1967, 10(1), 35-51. (Furniture Industry Research Association, Stevenage, Herts., England & Research Projects Limited, London, England).

To establish a naturalistic basis for the evaluation of train seats, the sitting behaviour of train travellers was recorded by two techniques. First, 5000 observations of sitting postures were made during five-hour journeys using a rapid coding method. Second, time-lapse films were taken of a selected sample of 18 subjects travelling on the same route. By using the same code it was possible to compare the results of the two techniques, and high correlations between them were found. Two types of seat were studied and significant differences in behaviour were found. Frequency of occurrence, duration and sequences of postures were used to arrive at quantitative comparisons.
R 15

31,963
Bennett, P.B., Poulton, E.C., Carpenter, A. & Catton, M.J. EFFICIENCY AT SORTING CARDS IN AIR AND A 20 PER CENT OXYGEN-HELIUM MIXTURE AT DEPTHS DOWN TO 100 FEET AND IN ENRICHED AIR. Ergonomics, Jan. 1967, 10(1), 53-62. (Royal Naval Physiological Lab., MRC, Alverstoke, Hants., England).

Eighty men sorted packs of cards twice, once at the surface, and once at a depth of 33 or 100 ft (2 ats or 4 ats abs) or at the surface, breathing the equivalent partial pressure of oxygen at these depths. The gases breathed were air and 20 per cent oxygen in helium. Significantly more errors were made at a depth of 100 ft in air than at the surface in air ($p<0.02$). No such effect was found when breathing air at 33 ft or 20 per cent oxygen in helium at either depth. The oxygen-enriched mixtures breathed at the surface also showed nothing. On the first trial all groups working at depth sorted faster and less accurately on average than all groups working at the surface ($p<0.05$). There was also a carry-over of the rate of work from the first trial to the second ($p<0.05$). A similar carry-over was found in a previous experiment, but in this the men normally worked more slowly in proportion to the depth. The increased rate of work reported here may be attributed to an increase in the level of arousal at depth.
R 19

31,964
Newman, M. MEASURES FOR THE EFFICIENCY OF SIMULATORS AS TRAINING DEVICES. Ergonomics, Jan. 1967, 10(1), 61-66. (Applied Psychology Research Unit, MRC, Cambridge, England).

The difficulties of selecting suitable measures for the efficiency of simulator training devices are discussed, and some of the pitfalls are pointed out. Several formulae are discussed in the light of what a potential user would wish to know; and some are recommended for use.
R S

31,965
Michon, J.A. & van Doorne, H. A SEMI-PORTABLE APPARATUS FOR THE MEASUREMENT OF PERCEPTUAL MOTOR LOAD. Ergonomics, Jan. 1967, 10(1), 67-72. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

A device is described which makes it possible to record the intervals produced by a subject in a method for measuring perceptual motor load. The system is specially adapted for field work and operation under difficult electrical conditions.
R 3

31,966
Ergonomics. THE HUMAN OPERATOR IN COMPLEX SYSTEMS. Ergonomics, March 1967, 10(2), 154pp. (Papers given at a joint meeting of the Industrial Section of the Ergonomics Research Society and The Applied Psychology Centre, The University of Aston, Birmingham, England). (Singleton, Easterby & Whitfield (Eds.), 1967. Taylor & Francis Ltd., London, England).

Much of the early work in the Ergonomics Research Society was of an academic nature and involved efforts to get the several contributing disciplines on talking terms with each other. This approach was not sufficient to affect design at the appropriate time for economic incorporation of ergonomic principles. The systems point of view as it developed in the United States seemed to offer a useful approach to an expanded and more effective ergonomics activity. The first aim of the Conference on "The Human Operator in Complex Systems" was to describe and illustrate the human factors oriented system approach to design for the benefit of research workers and potential industrial users. On the other hand, the system approach in the United States did not seem to be flourishing, so a second objective of the conference was to act as a focal point for the more recent ideas about systems ergonomics and to try to give the whole subject a new impetus. Note: This issue of Ergonomics was also published as a book. Articles in the book are the same as in Ergonomics, except the book has an extended preface. Book is: The Human Operator in Complex Systems, edited by W.T. Singleton, R.S. Easterby and D.C. Whitfield. Taylor and Francis, Ltd., London, 1967.

31,967
Jones, J.C. THE DESIGNING OF MAN-MACHINE SYSTEMS. Ergonomics, March 1967, 10(2), 101-111. (University of Manchester Institute of Science & Technology, Manchester, England). (cf. HFIAS No. 31,966)

This article describes a personal approach to the idea of a system in which doubts and criticisms are sorted out in a way which might explain the weaknesses of existing systems and the practical difficulties of system designers. In this approach, attention has been directed toward the physical and organizational incompatibilities between mechanical, biological, social and other elements of which a real system is composed.

31,968
Lowan, N.M. THE IMP IN THE SYSTEM. Ergonomics, March 1967, 10(2), 112-119. (Dunlap & Associates, Inc., Darien, Conn.).

One cannot be successful in utilizing the resources of man in a system until one accepts the fact that he contributes a qualitatively different form of operation in comparison to machine elements. A person operates adaptively and has the capability of managing whatever resources the system affords him to meet the challenges of the situation. Seldom are the challenges completely anticipated. There always seems to be an element of bootstrap operation, and it is man who appreciates what the new demands are and marshals whatever resources he has to meet them. The overall implication is that one must avoid strapping a man into a rigid functional mode, rather study the degree of license that it is desirable for man to have without compromising the basic system processes. These functional concerns are quite closely tied to the matters of the motivational involvement of man, where it is becoming increasingly obvious that the type of engagement of man into a system in terms of the variety, purposefulness, and room for personal contributions toward improvement of systems operation can have profound effects upon systems effectiveness. The interest in man-man systems, that is social systems, also reflects the same kind of concern while being a natural extension of the system method into new fields. The system method of deriving the particular from the general, of placing purpose before function, of ensuring integration between specifics and, above all with respect to human factors, of ensuring the orderly incorporation of man into the system, is now institutionalized. One no longer needs to fight this battle; rather one has to ensure a growing effectiveness of his practices.

31,969
Singleton, W.T. THE SYSTEMS PROTOTYPE AND HIS DESIGN PROBLEMS. Ergonomics, March 1967, 10(2), 120-124. (Aston University, Birmingham, England). (cf. HEIAS No. 31,966)

The range of human behaviour and, correspondingly, the range of man-made systems are such that we cannot hope to accumulate sufficient knowledge in the form of cook-book answers to design problems or in relevant integrated evidence about human performance by random search. The solution to both these problems is to have a structure or framework which the investigator recognizes as a discipline and uses as a navigational aid for his thinking. For the designer we have the philosophy of design; for the research worker there is emerging a generalized functional dynamic theory which incorporates servo theory, information theory and decision theory, and which may be the complement of systems theory in that it forms the basis of all the procedures and concepts needed to solve the functional problems which the systems theory identifies.

31,970
Garner, K.C. EVALUATION OF HUMAN OPERATOR COUPLED DYNAMIC SYSTEMS. Ergonomics, March 1967, 10(2), 125-138. (Aeronautics College, Cranfield, Bedford, England). (cf. HEIAS No. 31,966)

It is worth emphasizing the effect of the environment on the human operator in order to discourage loose talk of the 'human operator transfer function' without qualifying it with a description of the machine in which the operator is coupled. While a mathematical function is conceptually an exceedingly concise and nice way of describing a dynamic system or a human operator, it may be that we shall have to become used to describing these complex systems in terms of computer programmes or analogue configurations in the future.

31,971
Edwards, E. COMMUNICATION THEORY. Ergonomics, March 1967, 10(2), 139-153. (Loughborough University of Technology, Loughborough, England). (cf. HEIAS No. 31,966)

Applications of the Theory of Communication to the description of human performance followed upon the publication in 1948 of Shannon's classic paper. Independent, but closely related, theoretical work was published around the same time. A very brief outline of the theory is presented here. The language of communication theory has acted as a fruitful catalyst in the area of experimental psychology. The concepts in Shannon's theory cannot, however, be precisely aligned with meaningful parameters of the human operator. In as far as some small fraction of Shannon's theory provides a new statistical measure, it is applicable to the analysis of human performance even in situations which do not necessarily involve the notion of communication per se. An attempt is made to enumerate some principles which deserve consideration when the human operator is being used as a component in a man-machine system. In some cases a stated principle may be interpreted independently of communication theory and may be supported by evidence not involving informational analysis. However, the principles stated have been selected using the criteria that communication language seems appropriate, or that at least some of the evidence occurs in terms of informational measurements. Other attempts at listing have previously been published: Information is Processed at a Constant Rate; Rate is Dependent upon the Nature of the Input; Rate is Dependent upon the Nature of the Output; Rate is Dependent upon Stimulus-Response Compatibility; Rate is Dependent upon Range of Signals; Rate is Maximal when only Gross Judgments are Required; Rate is Related to Distance between Signals; Information should be Available Prior to the Moment of Decision; Redundancy can be Used to Combat Noise; Noise Levels should be Minimized.

31,972
Whitfield, D. HUMAN SKILL AS A DETERMINATE OF ALLOCATION OF FUNCTION. Ergonomics, March 1967, 10(2), 154-160. (Aston University, Birmingham, England). (cf. HEIAS No. 31,966)

This paper emphasizes the importance of the allocation of functions in systems design and reviews some of the criteria used in deciding upon the allocations, with particular reference to the implications of human skill.

31,973
Corkindale, K.G. MAN-MACHINE ALLOCATION IN MILITARY SYSTEMS. Ergonomics, March 1967, 10(2), 161-166. (Royal Aircraft Establishment, Farnborough, Hants, England). (cf. HEIAS No. 31,966)

There are certain areas of the man-machine allocation problem which should, in the foreseeable future, become clearer for, perhaps, three main reasons. Firstly, the growing awareness of the concept of cost-effectiveness is leading to a broadening of system criteria and to greater emphasis on considering all possible criteria early in the development of a system. Secondly, the need for behavioural data to be in a form readily applicable to engineering problems is now generally accepted. One can hope that this realization of a need will lead to appropriate action. Thirdly, the concept of man-machine complementary rather than man-machine comparability has changed the basic philosophy of task allocation in a potentially useful manner. This article discusses briefly the steps in allocation of functions between men and machines.

31,974
Miller, R.B. TASK TAXONOMY: SCIENCE OR TECHNOLOGY? Ergonomics, March 1967, 10(2), 167-176. (International Business Machines Corporation, New York, N.Y.). (cf. HEIAS No. 31,966)

The objective of the taxonomy is to assist in making design decisions and predictions. It is intended as a heuristic instrument, modifiable in the course of its use.

31,975
Belshon, M.J. PROBLEMS OF TASK DESCRIPTION IN PROCESS CONTROL. Ergonomics, March 1967, 10(2), 177-186. (Psychology Dept., University of Bristol, Bristol, England).

Task descriptions need to be organized in relation to the hierarchical nature of task structures. Where explicit rules for the performance of sub-tasks are available little difficulty arises in constructing task descriptions, but where cognitive processes are involved, especially in control skills, there is a lack of suitable techniques for either analysis or description. Activity graphs and signal-flow graphs are two methods which can be used in control skills and have been tried successfully in several industrial studies. Simulations are also valuable as a technique for discovering operating strategies and can be useful for lower level, more detailed task descriptions.
(cf. HEIAS No. 31, 966)

31,976
McKendry, J.M. & Enderwick, T.P. JUDGMENTALLY DERIVED INFORMATION UTILITY ESTIMATES. Ergonomics, March 1967, 10(2), 187-194. (HRB-Singer, Inc., State College, Penn.).

Male undergraduate students were tested in a simulated ASW situation. Their task was to 'sink' a fixed number of submarines operating within a well defined three-dimensional space. Before each game, subjects were given some number of valid intelligence bulletins which gave indications of the submarines' tactical deployment strategy, their patrol pattern, manoeuvring capability, and vulnerability to various ASW weapons available. While subjects do not particularly enjoy making judgments of value, they respond without protest when the rating task places comparatively simple demands upon them. One way to accomplish this is to require simple ordinal value judgments for a limited number of specific single items of information. Later, by appropriate statistical treatment these can be converted to value numbers for each item. It also appears feasible in some cases to collect direct numerical estimates from subjects after they have ranked a set of items. In at least some cases an aggregate information value index can be used to predict actual performance. A second experimental check was also run on the model's predictive power. Results of the experiment were consistent with those of the first study. At the present stage of progress it would appear that the use of direct subjective value measures has more practical potential than appears evident at first glance. If this encouraging trend continues, a valuable contribution might be made to training programmes aimed at enhancing the proficiency of individuals working in military information systems.
(cf. HEIAS No. 31,966)

31,977
Easterby, R.S. PERCEPTUAL ORGANIZATION IN STATIC DISPLAYS FOR MAN/MACHINE SYSTEMS. Ergonomics, March 1967, 10(2), 195-205. (University of Aston, Birmingham, England).

The examination of some of the perceptual organization aspects of display design has led to the conjunction of three distinct but related approaches--the semantic/syntactic model based on language models, the uncertainty/structure model based on multivariate information theory, and an attempt to relate some fundamental aspects of form recognition to display design based on gestalt theory. The views are in many ways conjectural and as yet unsubstantiated by any direct experimental evidence. They do, however, have the merit of having as their basis a considerable body of laboratory experimental work, particularly in respect of Garner's multivariate uncertainty model. They have not as yet been extended or extrapolated to applied problems of the human operator in complex systems, except in so far as the examples quoted have been successful in application, giving some support to the utility of these notions. The following is thus emphasized in relation to the design of display for man-machine system. The importance of language models for static displays should not be overlooked. Structure, both internal and external, is fundamental to display design and more investigation is needed into the applied aspects of structure. In terms of the operator's perceptual organization, the form of signification--geographical, operational or functional--must be carefully related to his task, particularly in regard to S-R (stimulus response) or concept task training. It is to the unified theories of perception that one must look for developing principles of systems display design. This, in conjunction with the language and information theory models, should enable some rational and more powerful tools for systems display analysis and synthesis.
(cf. HEIAS No. 31,966)

31,978
Tilley, K.W. FAULT DIAGNOSIS TRAINING FOR MAINTENANCE PERSONNEL. Ergonomics, March 1967, 10(2), 206-213. (RAF Technical Training Command, Brampton, England). (cf. HEIAS No. 31,966)

Adopting a system approach to training involves six main steps: job analysis, job specification, definition of training requirements, development of appropriate training methods, evaluation of the training course and retention of the acquired knowledge and skill. To test these steps for training maintenance personnel, an experimental fault finding test was devised. It was found that individuals varied considerably in their ability to diagnose faults, that the best men in training were not necessarily the best diagnosticians, that improvements that came with experience tend to be specific rather than general in character. From these findings it appeared that critical training requirements were the need for detailed knowledge about the signal flow of the equipment, the need for knowledge about effective methods of searching in structured systems, and the need for improved opportunities to practice fault diagnosis. (HEIAS)

31,979
Vandenberg, J.D. IMPROVED OPERATING PROCEDURES MANUALS. Ergonomics, March 1967, 10(2), 214-220. (Lockheed Electronics Company, Plainfield, N.J.). (cf. HEIAS No. 31,966)

This article discusses some of the attributes that a good operating procedures manual should possess. It also considers some of the practical problems that must be solved for technical improvements to be realized, and indicates how these problems might be dealt with. (HEIAS)

31,980
Craft, P.C.R. DESIGN METHODS FOR NUCLEAR POWER PLANT SYSTEM DESIGN. Ergonomics, March 1967, 10(2), 221-224. (English Electric Company, Leicester, England). (cf. HEIAS No. 31,966)

Commercial design work for the Wylfa Nuclear Power Station started in 1962; by 1968 it should be delivering some 1200 Mw to the national grid. Wylfa was the last of a series of magnox reactor stations, and the third of its type to be built by the English Electric-Babcock and Wilcox-Taylor Woodrow consortium. The innovations in the plant design for this station included the change from steel to concrete for the reactor pressure vessels, from a pond to a dry store for the spent irradiated fuel, and from a crane to remotely controlled vehicles for transporting the reactor fuelling and servicing machines. However, most of the plant design proceeded by the application of established techniques to the problems involved in the design of similar but larger plant. The control system for the station, on the other hand, embodies a substantial departure from previously established practice. The control of the station is almost entirely centralized within a single central control room, and an elaborate computer system is used for data processing and control. Although the 'computerization' process is still incomplete, in that some residual back-up of conventional instrumentation, and some analogue control loops, are provided, the design represents a clear step in the direction of a highly automatic station based on full exploitation of the digital computer. Problems of design associated with a systems oriented ergonomics approach are discussed with reference to controls, displays and data processing are noted. The interactions with other members of the design team are also discussed.

31,981
Sell, R.G. & Pulsford, H.E. THE OPERATION OF THE NATIONAL GRID SYSTEM. Ergonomics, March 1967, 10(2), 225-232 (Central Electricity Generating Board, London, England).

In operating a power system, a balance must be maintained between the constantly varying consumer demand for electricity and the generation from the machines in the power stations supplying the demand. With a nationwide interconnected system a central control organization is required to carry out this function. This article is concerned with the work of National Control in London which is the coordinating agency of the system. Present functions are described, and the control and display problems of a new system designed to meet future requirements are discussed. (HEIAS)
(cf. HEIAS No. 31,966)

31,982
Conrad, R. DESIGNING POSTAL CODES FOR PUBLIC USE. Ergonomics, March 1967, 10(2), 233-238. (Applied Psychology Research Unit, MRC, Cambridge, England). (cf. HEIAS No. 31,966)

This article discusses some of the problems of devising a brief mail code for England. (HEIAS)

31,983
Crawford, A. ON IDENTIFYING THE CRITICAL ELEMENTS OF INDUSTRIAL INFORMATION SYSTEMS. Ergonomics, March 1967, 10(2), 239-250. (J. Lyons & Co., Ltd., London, England).

As things are in industry at present, the organization memory is vested in separate individuals and the overlap between individual memories is at best haphazard. Personal sub-goals are manifest and in the majority, since there will be several per individual. Some of these will accord with the departmental sub-goals which themselves may converge to the organization's goal only for short periods of time. Conflict and organizational inefficiency are endemic to the present structure of management organizations. This is very largely because of irrelevant scoring systems, an inadequate memory and lack of the accessories for recall, recombination and selection. In the future, with the proper integration of the computer into the business, the human will be left to choose the overall organizational goal, control the system operation and serve as the point of contact at policy level with other such organizations both within and outside the business. Managers will spend less and less of their effort running the business (taking decisions and making sure they are implemented) but will spend more and more time answering the question as to why it runs the way it does.
(cf. HEIAS No. 31,966)

31,984
Shackel, B., Beavis, D. & Anderson, D.H. ERGONOMICS IN THE AUTOMATION OF MEAT HANDLING IN THE LONDON DOCKS. Ergonomics, March 1967, 10(2), 251-265. (Ergonomics Lab., E.M.I. Electronics Ltd., Hayes, Middlesex, England). (cf. HEIAS No. 31,966)

This article illustrates by a case study of meat handling the relevance of human factors knowledge and methods as a basic part of designing an automation system. (HEIAS)

31,985
Lacy, B.A. THE DESIGN OF THE OPERATORS' TASKS IN A TEA BLENDING PLANT. Ergonomics, March 1967, 10(2), 266-270. (J. Lyons & Co., London, England).

The ergonomic problems associated with the design of a new tea blending plant are described in this paper. The objective was to receive chests of tea in random order and to bring together prescribed sets; to process the tea in each of these sets and to maintain the separate identity of each set. The system is complex because of the large number of chests to be processed daily and the need for serial and parallel operations so as to match the speeds of available plant and human performance speeds. It was required that human work should be reduced to an economic minimum, and the human tasks which were made part of the system should be designed to minimize strain. Errors introduced into the system by the operators should be minimized and serious errors should be rejected by the system or at least be detectable at a rectifiable stage. The control information required and the design of operator tasks are discussed. No modifications to the operator's tasks or control concept have been necessary since commissioning the plant. The operators who were unused to automatic plant were able to perform their tasks with minimal training.

31,986
Johnson, E.A. TOUCH DISPLAYS: A PROGRAMMED MAN-MACHINE INTERFACE. Ergonomics, March 1967, 10(2), 271-277. (Royal Radar Establishment, Malvern, England).

A very large number of so-called automatic data-processing systems require the co-operation of human operators to achieve satisfactory operation. In many of these systems it is necessary to reduce operator reaction time to a minimum, which in turn demands an arrangement where the man-machine communications are optimized. This requires that the methods of presenting information to, and receiving instructions from, the operator should be rapid and easy. The idea of the Touch Display was conceived in an attempt to overcome the limitations in man-machine communications indicated above. It was originally put forward in the context of an Air Traffic Control Data-processing System for which it has clear application, but it is felt that the arrangement has much wider application; in fact, to the whole field of data-processing systems. A number of models of the Touch Display have been built for evaluation and, as a result of experiments comparing their use with more conventional keyboards it has been shown clearly that the use of the Touch Display provides both a faster and more accurate means of communicating between an operator and a data-processing system.

31,987
Chaillet, R.F. HUMAN FACTORS REQUIREMENTS FOR THE DEVELOPMENT OF U.S. ARMY MATERIEL. Ergonomics, March 1967, 10(2), 275-286. (USA Human Engineering Labs., Aberdeen Proving Ground, Md.).

This article outlines human factors engineering obligations of a contractor who performs work for the United States Army Materiel Command.

31,988
Ergonomics. BIBLIOGRAPHY. Ergonomics, March 1967, 10(2), 287-292.

This is a combined bibliography for HEIAS No. 31,986 (whole), i.e. 31,967 - 31,987 inclusive.
R Many

31,989
Åstrand, Irma. DEGREE OF STRAIN DURING BUILDING WORK AS RELATED TO INDIVIDUAL AEROBIC WORK CAPACITY. Ergonomics, May 1967, 10(3), 293-303. (National Institute of Occupational Health, Stockholm, Sweden).

This study establishes a definite relationship between aerobic work capacity as measured in the laboratory and the occupational work-load level spontaneously chosen by the individual. This level corresponds to about 40 percent of the individual maximal capacity. Persons with a large capacity are probably more productive than those with a small capacity.
R 18

31,990
Whitley, J.D. THE INFLUENCE OF STATIC AND DYNAMIC TRAINING ON ANGULAR STRENGTH PERFORMANCE. Ergonomics, May 1967, 10(3), 305-310. (University of California, Riverside, Calif.).

Three groups of subjects were involved in a ten-week training programme designed to increase arm strength. There were 26 subjects in each group, those in the experimental group, static and dynamic, exercised twice weekly in the test range, while the control group remained unexercised. Pre- and post-training static strength scores were obtained at six equidistant points (12° apart) in the middle one-third (60°) of the 180° range of movement of the fully extended right arm in the forward horizontal plane. Reliability coefficients were high. The strength increases for both static and dynamic training were significant; however, this did not obtain for the control group. The results of an analysis of covariance show that the strength gain associated with static training is significantly greater than that following dynamic training. The significant strength increases resulting from both programmes were evenly distributed over the angular range investigated.
R 5

31,994
Davies, C.T.M. & Shirling, D.S. THE RAPID SAMPLING, STORAGE AND ANALYSIS OF EXPIRED AIR. Ergonomics, May 1967, 10(3), 349-359. (Environmental Physiology Research Unit, London School of Hygiene & Tropical Medicine, London, England & Physiology Dept., University of Edinburgh, Edinburgh, Scotland).

The methods which are commonly used in work physiology for rapid sampling, laboratory storage and analysis of expired air have been examined. The rapid fractional sampling of expired air from both a mixing chamber and a side arm sampling device produces significant differences in $\dot{V}_{O_2}$ values when compared to the standard Douglas method. However, provided the volume of the mixing chamber is above 4 litres, the differences are small for this technique; (29·3 ± 18·1 ml/s) compared with the side arm technique (263·4 ± 62·9 ml/s), and introduce negligible error into the estimation of energy expenditure. The selective loss of CO_2 from butyl rubber bladders, Douglas bags and syringes was found to be 0·1 per cent/hr., 0·2 per cent/hr. and 0·007 per cent/hr. respectively during the 8 hr. period. Loss of CO_2 during the first 30 min was high in the case of the bladders and they were found to be very unsatisfactory storage containers. Douglas bags showed a negligible loss of CO_2 during the first 2 hours, but the concentration began to fall shortly thereafter. Syringes, on the other hand, showed no appreciable decline of CO_2 until after the 8th hour of storage. Samples collected in glass tonometers by mercury siphoning and displacement of acidulated water still maintained their concentrations of O_2 and CO_2 after 56 days of storage. The Pauling (Beckman E_2) analyser was found to be an accurate, simple and fast method of estimating the O_2 concentration in expired air. The discrepancy between the methods was found to be of the order of ±0.15 vol per cent when compared with the conventional Haldane gas analysis method.
R 9

31,995
Corlett, E.N., Davies, B.T., Knight, A.A., Rowe, R., et al. AN INVESTIGATION INTO THE ERGONOMICS OF OPEN-FRONTED PRESSES. Ergonomics, July 1967, 10(4), 389-398. (Engineering Production Dept., University of Birmingham, Birmingham, England).

A group of open-fronted power presses was studied to determine what ergonomic improvements could be brought about in their design. The press dimensions, operating forces required on pedals and guards and positions adopted by seated operators were recorded and analysed. From these data and the technical requirements of press operation, proposals for press dimensions to provide an adequate operator/machine relationship are given. These are supported by a discussion of the effects which the changed dimensions would bring about and by a small pilot experiment. Long-term validation trials, both in the laboratory and the factory, are still in progress.
R 2

31,996
Ward, E.J. & Underwood, C.R. THE EFFECT OF POSTURE ON THE SOLAR RADIATION AREA OF MAN. Ergonomics, July 1967, 10(4), 399-409. (Human Physiology Div., National Institute for Medical Research, London, England).

This paper deals with the direct radiation areas of the human body to solar radiation. The radiation area of the body in a variety of postures has been measured by a photographic technique and the results compared with those found earlier for the erect posture. Some of the implications of the results are mentioned and a nomogram is given which enables the direct radiation areas of the body to be quickly computed for a range of body size and solar altitude.
R 10

31,997
Ulich, E. SOME EXPERIMENTS ON THE FUNCTION OF MENTAL TRAINING IN THE ACQUISITION OF MOTOR SKILLS. Ergonomics, July 1967, 10(4), 411-419. (Psychologisches Institut, Universität München, Munich, Germany).

The experiments reported here concern different methods of learning in motor performance with particular reference to mental training. These studies are part of research on different variables in the acquisition of motor skills under laboratory and industrial conditions.
R 11

31,998
Dickinson, J. & Leonard, J.A. THE ROLE OF PERIPHERAL VISION IN STATIC BALANCING. Ergonomics, July 1967, 10(4), 421-429. (Psychology Dept., University of Nottingham, Nottingham, England).

A study was made to determine the role of peripheral vision in static balancing. Three groups of Ss were tested under sighted and blindfold conditions, and also under a minimal cues condition. One of these groups was trained in the use of peripheral vision and after 5 days achieved sighted competence under the minimal cues condition. A second group had no training, but practised for a similar period and showed no such improvement. The third group was tested with progressively decreasing amounts of peripheral vision, and the stage at which deterioration in performance occurred was noted. The results are discussed in relation to the use of peripheral vision, and in the relevance of this work to the training of the blind.
R 4

31,999
Gibbs, C.B. COMMENTS ON 'AN INVESTIGATION INTO THE COMPARATIVE SUITABILITY OF FOREARM, HAND AND THUMB CONTROLS IN ACQUISITION TASKS' BY HAMMERTON AND TICKNER (1966). Ergonomics, July 1967, 10(4), 431-432. (Control Systems Lab., National Research Council, Ottawa, Ontario, Canada).

This comment comprises a comparison of the experimental procedures used by Hammerton and Tickner with those used by Gibbs.
R 6

32,000
Hammerton, M. & Tickner, A.H. REPLY TO COMMENTS BY C.B. GIBBS. Ergonomics, July 1967, 10 (4), p.433. (Applied Psychology Research Unit, MRC, Cambridge, England).

This reply takes issue with the experimental interpretations of Gibbs(MEIAS 31,999) on the interpretations of different tracking experiments.
R 3

32,001
McGhie, D.W. & Whitfield, D. HYSSA - AN APPARATUS FOR INVESTIGATING THE ACQUISITION OF HIGH-SPEED SKILLS. Ergonomics, July 1967, 10(4), 435-440. (College of Aeronautics, Cranfield, Bedford, England & University of Aston, Birmingham, England).

This note describes an apparatus which allows the automatic preperation and analysis of particular sets of stimuli and responses. It was designed specifically for research into the acquisition of high-speed skills, but two major parts of the system are capable of more general application. The input part of the system is a general-purpose input device for experiments which require up to eight channels of decimal data, or any combination thereof, to be presented to a S. The output part is a time and event recorder which can cope with up to four decimal channels of event information. Details of the electronic logic system are given.

32,002
Monod, H. LA VALIDITÉ DES MESURES DE FRÉQUENCE CARDIAQUE EN ERGONOMIE. Ergonomics, Sept. 1967, 10(5), 485-537. (Laboratoire de Physiologie du Travail du Centre National de la Recherche Scientifique, France).

The use of heart rate measurement as an ergonomic method is justified by present knowledge of factors varying the pulse frequency; in general variations result from the operation of simple physiological reflexes. Mean resting heart rate is considered first, followed by the effect of different types of activity, these being local and general muscular work, digestion, posture, altitude, environmental temperature, noise, and psychosensory activity. Knowledge of the effects of all these factors is required for a proper understanding of observed alterations in heart rate. Emphasis is placed on deductions of practical value. The importance of heart rate measurement has led to the production commercially of many measuring devices, usually employing electrocardiography or photoplethysmography. Telemetric methods giving full freedom of movement to the Ss are available. Continuous records of pulse rate and the total number of heart beats can now be obtained over long periods of time. The different devices and the choice of apparatus for use in various situations are considered. Heart rate studies in the laboratory and at work play a great part in the understanding of human adaptations to working situations. Being objective, they can be used to assess both individual work capacity and the stress presented by a given working situation. They can indicate those parts of a task requiring the greatest effort, and thus can be used in the development of new working methods at lower levels of stress.
R 137

32,004
Singleton, W.T. ERGONOMICS IN SYSTEM DESIGN. Ergonomics, Sept. 1967, 10(5), 541-548. (Applied Psychology Dept., University of Aston, Birmingham, England).

The relationship between ergonomics and systems design is defined and its importance is stressed. The origins of systems ergonomics are described and it is suggested that the technology of ergonomics now depends primarily on the science of psychology with some importance still attached to anatomy but with physiology now of marginal relevance. The differences in approach and objectives between systems ergonomics and classical ergonomics are summarized and, although it is admitted that our expertise in these fields is not adequate for our practical responsibilities, it is concluded that the progress of science and technology in both engineering and human factors are now inter- and cross-dependent.
R 4

32,005
Easterby, R.S. ERGONOMICS CHECKLISTS: AN APPRAISAL. Ergonomics, Sept. 1967, 10(5), 549-556. (Applied Psychology Dept., University of Aston, Birmingham, England).

An attempt is made to clearly define the utility of the checklist technique in relation to the necessary skills of the ergonomics practitioner. It is pointed out that it is a technique, not a methodology, and as such is a valuable job aid to many forms of ergonomic analysis, task description, job specification, etc. Its limitations, it is suggested, are that it is at best an analytical tool, not one for synthesizing a new phase of development, and that its use in practice is limited by its inherent verbal characteristics. A good checklist, it is considered, should be brief, pungent and should elucidate as much numerical data as possible.
R 20

32,006
Chapanis, A. THE RELEVANCE OF LABORATORY STUDIES TO PRACTICAL SITUATIONS. Ergonomics, Sept. 1967, 10(5), 557-577. (Psychology Dept., Johns Hopkins University, Baltimore, Md.).

By their very nature laboratory experiments are at best only rough and approximate models of any real-life situation. First of all the possible independent variables that influence behaviour in any practical situation, a laboratory experiment selects only a few for test. As a result, hidden or unsuspected interactions in real-life may easily nullify, or even reverse, conclusions arrived at in the laboratory. Second, variables always change when they are brought into the laboratory. Third, the effect of controlling extraneous or irrelevant variables in the laboratory is to increase the precision of an experiment but at the risk of discovering effects so small that they are of no practical importance. Fourth, the dependent variables (or criteria) used in laboratory experiments are variables of convenience. Rarely are they selected for their relevance to some practical situation. Last, the methods used to present variables in the laboratory are sometimes artificial and unrealistic. The safest and most honest conclusion to draw from all these considerations is that one should generalize with extreme caution from the results of laboratory experiments to the solution of practical problems.
R 21

32,007
de Jong, J.R. THE CONTRIBUTION OF ERGONOMICS TO WORK STUDY. Ergonomics, Sept. 1967, 10(5), 579-588. (Ir B.W. Berenschot Co., Amsterdam, Netherlands).

In the course of this century work study has come to concern itself more and more intensively with all kinds of work systems and, after the one-sided stress placed initially on motion study and work measurement, has gradually given an increasing measure of attention to all systems elements. As is evident, among other things, from the textbooks on work study, training course syllabi and examination requirements, interest in ergonomics has shown a marked increase of recent years. Considering the desirability of giving ergonomics the widest possible application, it is recommended that this subject be included in all work study training courses, with particular emphasis not so much on the imparting of knowledge, as on effective ways of putting it into practice and on the use that can be made of ergonomics data.
R 19

32,008
Pulgram, J.T. THE ERGONOMICS OF OFFICE [illegible] Ergonomics, Sept. 1967, 10(5), [illegible]. (Robnett and Associates, Inc., Darien, Conn.).

Following an overview of the objectives and scope of the field of ergonomics, as applied to offices, the question of the role and requirements of the white-collar worker of the future is raised. What will be the impact of advances in automation, electronic data-processing and communication on the job of the planner/decision-maker: the man behind the desk? How should his needs be determined and vollicated? What measurements are involved and what should be the criteria for interpreting the measurements? Do office equipment and furnishings have an impact on job performance and job satisfaction? These are some of the questions considered and discussed in the context of a pilot study involving an evaluation of a unique group of office furnishings: the Herman Miller Action Office.

32,009
Walraven, P.L. FUTURE RESEARCH NEEDS IN MARITIME OPERATIONS. Ergonomics, Sept. 1967, 10(5), 607-609. (Institute for Perception RVO-TNO, Soesterberg, Netherlands).

The ergonomics needs in maritime operations are governed by the tendency towards increasing automation. Automation means in the future central traffic control in harbours, which in turn involves ergonomics studies of information handling in these centres. Secondly, automation, in particular remote engine control, will make the navigation bridge the central controlling point of the ship. Ergonomics studies of the display and handling of the control devices are needed. Standardisation of nautical instruments is a must. The need for building a full scale mock-up of a complete bridge or apparatus is emphasized.
R 6

32,010
Bowen, H.M. & Miller, J.W. MAN AS AN UNDERSEA INHABITANT AND WORKER. Ergonomics, Sept. 1967, 10(5), 611-615. (Dunlap and Associates, Inc., Darien, Conn. & USN Office of Naval Research, Department of the Navy, Washington, D.C.).

Man is operating increasingly within the ocean either as a swimmer or as a component of submersible systems. As a diver, man is effective but much less effective than on dry land. To increase his effectiveness, research is required in the areas of psychophysiology of diving, the effects of diving on sensory and motor functions, methodology of measuring performance underwater, ergonomics, personal equipment, undersea dwellings, and the selection, training and personality functions of divers. Both laboratory and field studies are required; the latter to assess, in particular, the effects of real stress factors on human performance.
R 3

32,011
Lippert, S. ERGONOMICS NEEDS IN DEVELOPING COUNTRIES. Ergonomics, Sept. 1967, 10(5), 617-626. (Human Engineering Information & Analysis Service, Tufts University, Medford, Mass.).

A formal literature on ergonomics in developing countries is practically non-existent in the publications of the various ergonomics and human factors societies. Other professional groups have been active in ways that may prove helpful to ergonomists. The works of these other groups provide examples which indicate the need for a global approach to the complex problem of applying ergonomics to the needs of developing countries. Detailed needs must be stated. The relevance of existing ergonomics knowledge to these needs must be determined. Then new information must be developed to cover the difference between needs and present knowledge.
R 17

32,012
Shackel, B. ERGONOMICS RESEARCH NEEDS IN AUTOMATION. Ergonomics, Sept. 1967, 10(5), 627-632. (Ergonomics Lab., E.M.I. Electronics Ltd., Hayes, Middlesex, England).

From the basis of a somewhat longer study in 1966, some subjects are selected which are believed to be important areas for future research. These subjects are discussed under the headings of planning and programming, operating, and the public. Some other topics are listed as relevant but are not discussed, such as taxonomic problems, personnel aspects, related social sciences studies, and systems design and the systems designer.
R 11

32,013
Leonard, J.A., Newman, R.C., Hill, G. & Garner, J. LOOKING, SEQUENTIAL REDUNDANCY, TRANSFER, AND AGE IN EARLY KEYBOARD LEARNING. Ergonomics, Nov. 1967, 10(6), 633-647. (Medical Research Council, London, England).

Groups of older and younger subjects were given one-hour sessions on a simple keyboard task. In the first experiment the major variable was the extent to which subjects could see what they were doing while carrying out a 5- or 10-alternative task. In the second experiment subjects performed the task with a positional or an alphabet in-line display; [illegible] random or a structured input sequence. In the third experiment the effect of pre-training on a positional display on subsequent performance with an alphabet in-line display was examined. It was found that both older and younger subjects made more errors when they could not see either the keyboard or their hands; that older subjects could take advantage of sequential redundancy only when using an alphabet in-line display; and that older subjects did not benefit from positional display pre-training.
R 11

32,014
Wiener, E.L. TRANSFER OF TRAINING FROM ONE MONITORING TASK TO ANOTHER. Ergonomics, Nov. 1967, 10(6), 649-658. (Industrial Engineering Dept., University of Miami, Coral Gables, Fla.).

Two experiments were performed to determine whether groups trained on a visual watch-watching task with knowledge of results (KR) would detect more signals than a control group trained without KR in a later session in which a different watchkeeping task was used. The transfer tasks in the two experiments consisted of detecting a brief interruption of a) a continuously illuminated light, and b) a pure tone mixed with continuous white noise. The group trained with KR did significantly better ($p<0.05$) when transferred to the other visual task. Results on the transfer to auditory task were not significant at the 0.05 level, but the combined results of the two experiments were significant at the 0.025 level. No difference was found in commissive errors (false reports) in either experiment.
R 30

32,015
Simon, J.R. CHOICE REACTION TIME AS A FUNCTION OF AUDITORY S-R CORRESPONDENCE, AGE AND SEX. Ergonomics, Nov. 1967, 10(6), 659-664. (Psychology Dept. & Industrial & Management Dept., University of Iowa, Iowa City, Iowa).

This study was concerned with the effect of a reversal in auditory stimulus-response (S-R) correspondence on the reaction time (RT) of disparate age groups; a younger group between 18 and 25 and an older group between 65 and 86. The task involved depressing the correct one of two finger keys upon onset of a 1000 cps, 85 db monaural tone presented through earphones. Subjects performed on two blocks of trials; one block involving uncrossed reactions (responding with hand ipsilateral to ear stimulated) and the other block involving crossed reactions (responding with hand contralateral to ear stimulated). Results revealed significant differences in RT as a function of age, sex and S-R correspondence. Reversal of the S-R relationship produced significantly greater slowing for older than for younger subjects and for females than for males.
R 16

32,016
Brown, I.D. MEASUREMENT OF CONTROL SKILLS, VIGILANCE, AND PERFORMANCE ON A SUBSIDIARY TASK DURING 12 HOURS OF CAR DRIVING. Ergonomics, Nov. 1967, 10(6), 665-673. (Applied Psychology Research Unit, MRC, Cambridge, England).

Eight subjects were given short driving tests at 0700, 1000, 1300, 1400, 1700 and 2000 hours on two days: a) under experimental conditions of continuous driving and b) under control conditions in which they carried on with their normal work between tests. Car control skills and performance on a subsidiary task of time-interval production were measured on a 2.2 mile test circuit in city traffic. Pulse rate and oral temperature were also recorded. Vigilance was measured during main-road driving on the experimental day by scoring time taken to respond to a light signal. Vigilance improved significantly during the spell of prolonged driving. Time-interval production was reliably more variable under experimental conditions than under control, but this difference was independent of the duration of the driving period. Differences in car-control skills between conditions were slight and statistically unreliable. These results support previous findings that a virtually continuous 12 hour period of driving during the normal working day need not affect either perceptual or motor skills adversely. The apparent discrepancy between present findings, that performance on the subsidiary task was worse on the day of prolonged driving, and previous findings, that it tended to be better, is briefly discussed in relation to the general problem of measuring performance by the dual-task method.
R 15

32,017
Weddle, A. MOTOR VEHICLE HANDLING PROPERTIES AND DRIVER CONTROL. Ergonomics, Nov. 1967, 10(6), 675-682. (Ergonomics & Cybernetics Dept., Loughborough University of Technology, Loughborough, England).

An experiment was carried out in which 24 drivers controlled the direction of a motor vehicle, at a particular constant speed, around a corner. Two values of vehicle velocity were used and three values of vehicle 'stability margin'. Vehicle lateral acceleration and steering wheel displacement were the dependent variables.
R 3

32,018
Schales, H., Groh, H., Baumann, W. & Kubeth, F. ÜBER DIE ABSTOSSKRÄFTE DES FUSSBALLES BEI GANG UND LAUF. Ergonomics, Nov. 1967, 10(6), 683-687. (Orthopädische Abteilung, Klinikhospital, Saarbrücken, Germany).

Measurements of the rebound forces of the ball of the foot in walking and running were carried out with 8 male subjects aged between 18 and 25 years. The use of a telemetric device made it possible to measure the rebound forces of any given number of steps. These data were then transmitted to a recording oscillograph. The oscillograph showed the force as a function of time while the ball of the foot was in contact with the ground. The following results were observed: a) The force of the ball of the foot on the ground is directly correlated to the body weight. Maximum values registered are about 300 kgf (kilogram force). b) The force increases with the increasing speed of the type of sport. It exceeds the body weight in fast walking by 40 per cent, in a slow run by 112 per cent, in a medium fast run by 140 per cent, in a fast run by 153 per cent and in a jumping-run by 176 per cent. c) The duration of the rebound process is 0,14 sec in a fast run and 0,21 sec in a fast walk. d) A direct correlation exists between the rebound forces and the body weight. Maximum values of 10-25 kfg/sec were recorded in a jumping-run. On the average the correlation of these impulses in walking, running and a jumping-run is 1:2:3. e) With fast running the speed of the foot as it strikes the ground is reduced in a reflex-like manner. The duration of this slowing-down impulse was about 0,01 sec; the amplitude was 15-30 per cent of the maximum rebound force in each case.
R 7

32,019
James, D.G. & Murrell, K.F.H. THE DESIGN OF SCALES FOR TEST INSTRUMENTS. Ergonomics, Nov. 1967, 10(6), 707-712. (Research on Human Performance in Industry Unit, Welsh College of Advanced Technology, Cardiff, Wales).

Experimental evidence on which to base scale designs for test instruments was sought. Four types of scale were investigated requiring differing interpolations of scale spacing, readings being made under accuracy instructions. Results indicate that the scale design requiring interpolation to one-half of the scale spacing is read with the greatest accuracy, apart from having various other advantages.
R 2

32,020
Poulton, E.C. SKIMMING (SCANNING) NEWS ITEMS PRINTED IN 8-POINT AND 9-POINT LETTERS. Ergonomics, Nov. 1967, 10(6), 713-716. (Applied Psychology Research Unit, MRC, Cambridge, England).

Fifty housewives searched for particular words in paragraphs of text printed in 8-point and 9-point Times New Roman without leading in lines of 2.2 inches. To prove that they had found a word they had to write down the following word. The 9-point print was scanned 7 per cent faster than the 8-point ($p<0.05$). The method appears to be more sensitive to small changes in the visibility of print than methods involving comprehension.
R 4

32,021
Swets, J.A. & Birdsall, T.G. DEFERRED DECISION IN HI" ". SIGNAL DETECTION: A PRELIMINARY EXPERIMENT. Perception & Psychophysics, Jan. 1967, 2(1), 15-28. (Bolt Beranek & Newman, Inc., Cambridge, Mass. & University of Michigan, Ann Arbor, Mich.).

The deferred-decision task in signal detection represents many practical detection tasks and everyday perception more accurately than does the fixed-observation task commonly used in psychophysics. The deferred-decision task provides a framework for studying the trading relationship between time and accuracy of performance--a relationship largely ignored in experimental psychology though central to most sensory, cognitive, and motor performances. The data of this preliminary experiment show human observers to be capable of using the optimal observation processes, though a less efficient process is used under certain conditions of initial training. The results also show that human observers are capable of using the optimal decision processes, though they give consistent evidence of a particular decision bias. It is clear that the optimal models available for the deferred-decision task are sufficiently good approximations to human behavior to warrant more investigation in psychophysics of their detailed, quantitative predictions. Furthermore, the quantitative deviations of human from optimal behavior that have already been observed are sufficiently reliable within and among observers to justify application of the models and experimental results in practical detection situations.
R 8

32,022
Bzendolet, E. & Kalselman, H.L. GUSTATORY QUALITY CHANGES AS A FUNCTION OF SOLUTION CONCENTRATION. Perception & Psychophysics, Jan. 1967, 2(1), 29-33. (University of Massachusetts, Amherst, Mass.).

Four selected female subjects were instructed to respond with the qualities of either bitter, salty, sour, sweet or no taste to solutions of LiCl, KCl, Li_2SO_4, or K_2SO_4 which varied in concentration from 0.0040 to 0.050 M for the first two salts, and 0.0020 to 0.025 F for the last two. Mean percentages of each quality, with sweet combined with the no taste response, when plotted against concentration, gave functions in which one quality predominated within a given concentration range. This quality was superseded by another over a higher concentration range. These results are explained in terms of an inhibition phenomenon.
R 11

32,023
Elfner, L.F. & Homick, J.L. CONTINUITY EFFECTS WITH ALTERNATELY SOUNDING TONES UNDER DICHOTIC PRESENTATION. Perception & Psychophysics, Jan. 1967, 2(1), 34-36. (Kent State University, Kent, Ohio).

An experiment is reported in which ten subjects possessing normal hearing were required to make discriminations of continuity or interruption in a longer less intense signal (Tone A) which alternated in time with a shorter more intense signal (Tone B). The signals were presented dichotically with Tone A at the right ear. Three Tone B frequencies of 300, 1000, and 4000 cps and five Tone A frequencies somewhat near each of the Tone B frequencies were employed. The results demonstrated that as Tone A was nearer to Tone B in frequency, continuity thresholds in Tone A occurred at longer durations of Tone B. The results are discussed in terms of a central neural model.
R 6

32,024
McLaughlin, S.C. & Webster, R.G. CHANGES IN STRAIGHT-AHEAD EYE POSITION DURING ADAPTATION TO WEDGE PRISMS. Perception & Psychophysics, Jan. 1967, 2(1), 37-44. (Visual Perception lab., Tufts University, Medford, Mass.).

If a subject is instructed to look straight ahead before adapting to laterally displaced vision, he does so without noticeable error. After adapting, however, in response to the same instruction, he may rotate his eyes as much as 8° toward the displaced visual target. This is the change in judgment of the direction of gaze which Helmholtz identified in 1867 as an important physiological mechanism in adaptation to prisms. It leads to more accurate reaching behavior by causing the subject to make a visual judgment that the target is closer to straight ahead than it was when he first looked through the prisms. This type of adaptive change (change in judgment of the direction of the gaze, oculomotor change) can be measured either by manual judgments (difference between successive "straight ahead" and "visual target" judgments) or by changes in straight-ahead eye position. It may be described as a parametric adjustment in the oculomotor control system, and is closely analogous to the eye movement which subserves the recovery of binocular fusion in prism vergence.
R 18

32,025
Sternberg, S. TWO OPERATIONS IN CHARACTER RECOGNITION: SOME EVIDENCE FROM REACTION-TIME MEASUREMENTS. Perception & Psychophysics, Feb. 1967, 2(2), 45-53. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

Theories of the recognition of a visual character may be divided into three sets, defined by the way in which the stimulus is encoded before being compared to a memorized target character. A character-classification experiment was performed in which the test stimuli were characters that were either intact or degraded by a superimposed pattern. Analyses of reaction-times in the experiment lead to the rejection of two of the three sets of theories. There appear to be at least two separate operations in the recognition or classification of a character. The first encodes the visual stimulus as an abstracted representation of its physical properties. The second, which may occur more than once, compares such a stimulus representation to a memory representation, producing either a match or a mismatch. A theory of high-speed exhaustive scanning in memory underlies the experiment and is given new support. The method of reaction-time analysis that is introduced, an elaboration of the Helmholtz-Donders subtraction method, may be applicable to the general problem of the invariance of perceived form under certain transformations of the stimulus.
R 21

32,026
Morgan, B.B., Jr. & Alluisi, E.A. EFFECTS OF DISCRIMINABILITY AND IRRELEVANT INFORMATION ON ABSOLUTE JUDGMENTS. Perception & Psychophysics, Feb. 1967, 2(2), 54-58. (University of Louisville, Louisville, Ky.).

The effects of irrelevant information (0,1,2, or 3 bits/stimulus) on absolute judgments of size were measured at different levels of discrimination difficulty. The stimuli were 7 small circular spots of light of different sizes, selected from an equal-discriminability scale, and arranged into 6 pairs that represented different levels of stimulus dissimilarity. Three of the pairs comprised a low-dissimilarity (LD) subgrouping in which different levels of dissimilarity and discriminability were confounded, whereas the remaining three pairs comprised a high-dissimilarity (HD) subgrouping in which different levels of dissimilarity occurred at a single high level of discriminability. Different colors were used to provide the four levels of irrelevant information; 240 subjects (10 in each of the 24 experimental conditions) made absolute judgments of size under the classical procedure for the method of single stimuli. Separate analyses of errors, reaction times, and rates of information transmission indicated that irrelevant information had an increasingly detrimental effect on absolute judgments as discrimination difficulty was increased (in the LD subgroup), but essentially no effect where discriminations were easily made (in the HD subgroup).
R 11

32,027
Mack, A. THE ROLE OF MOVEMENT IN PERCEPTUAL ADAPTATION TO A TILTED RETINAL IMAGE. Perception & Psychophysics, Feb. 1967, 2(2), 65-68. (Yeshiva University, New York, N.Y.).

Perceptual adaptation to prismatically created tilt of the retinal image was measured after three conditions of exposure: active, passive and no movement of the observer. No difference in magnitude of effect was found between the two movement conditions. The effects of no movement were considerably less than those obtained with movement, thus indicating the effectiveness of movement-produced information for adaptation. An explanation is suggested for the no movement effect in terms of a Wertheimer righting-of-the-field.
R 8

32,028
Brosgole, L. INDUCED AUTOKINESIS. Perception & Psychophysics, Feb. 1967, 2(2), 69-73. (USN Training Device Center, ONR, Port Washington, N.Y.).

The egocentric location of a fixated stimulus was shifted away from the apparent median plane through induced movement. When the stimulus appeared to lie in the periphery of vision, the inducing frame was occluded resulting in autokinesis toward the phenomenally straight-ahead position. The effect was termed "induced autokinesis." It was used in demonstrating that apparent egocentric displacement is sufficient for initiating autokinesis.
R 7

32,029
Thurlow, W.R. & Melamed, L.E. SOME NEW HYPOTHESES ON THE MEDIATION OF LOUDNESS JUDGMENTS. Perception & Psychophysics, Feb. 1967, 2(2), 77-80. (University of Wisconsin, Madison, Wisc.).

A new solution to the problem of relating equal-interval and ratio scales is proposed. It is shown that it is also possible, with the type of theory proposed, to predict results of cross-modality matching experiments.
R 19

32,030
Parducci, A. & Haugen, Ruth. THE FREQUENCY PRINCIPLE FOR COMPARATIVE JUDGMENTS. Perception & Psychophysics, Feb. 1967, 2(2), 81-82. (University of California, Los Angeles, Calif.).

This experiment supplements a recent study of the effects of an interpolated weight upon memory for a standard (Parducci, Marshall, & Degner, 1966--HUMAN RES. NO. 28,865). The earlier data suggested that the stimulus-averaging approach as represented by the theory of adaptation level should be modified to incorporate the principle that subjects use alternative categories with equal frequency. The present data support this modification by demonstrating that even when the stimulus mean is held constant, judgments are affected by the relative frequencies of the comparison stimuli.
R 3

32,031
Crovitz, H.F. & Lockhead, G.R. POSSIBLE MONOCULAR PREDICTORS OF BINOCULAR RIVALRY OR CONTOURS. Perception & Psychophysics, Feb. 1967, 2(2), 83-85. (US Veterans Administration Hospital, Durham, N.C. & Duke University, Durham, N.C.).

An analysis of contour disappearances in conflicting patterned stereograms is made from the knowledge of two monocular events: contrast effects associated with contours and phasic local adaptation. It is argued that the percepts resulting from these monocular processes are combined simply by some more central process and that a suppression mechanism may not be necessary to account for contour rivalry. Predictions were tested in three experiments and the results tend to support the argument given.
R 1

32,032
Zusne, L. STIMULUS CORRELATES OF VISUAL PATTERN DISCRIMINATION AND THE PROBLEM OF GRAIN. Perception & Psychophysics, Feb. 1967, 2(2), 86-87. (University of Tulsa, Tulsa, Okla.).

A recent paper by V.J. Polidora (Perception & Psychophysics, 1966, 1, 405-414) is criticized on the basis that the experimental design did not provide an adequate test of the usefulness of 15 visual form parameters, mainly because of differences in the grain of the matrices used to construct and measure stimuli.
R 5

32,033
Gregson, R.A.M. & Matterson, Helen H. PSYCHOPHYSICAL PARAMETERS OF THE PERCEPTION OF ORALLY-RETAINED LIQUID BULK. Perception & Psychophysics, March 1967, 2(3), 89-90. (University of Canterbury, Christchurch, New Zealand).

Bulk of liquid held in the mouth may be judged on its subjective volume. Over the range 1 ml - 31 ml, scaling by the constant method and by ratio estimation yielded a Weber fraction which was not constant and decreased with stimulus magnitudes and a psychophysical power function with an exponent of 0.36. A "negative Threshold" effect is reported.
R 6

32,034
Markowitz, J. & Swets, J.A. FACTORS AFFECTING THE SLOPE OF EMPIRICAL ROC CURVES: COMPARISON OF BINARY AND RATING RESPONSES. Perception & Psychophysics, March 1967, 2(3), 91-100. (Bolt Beranek & Newman, Inc., Cambridge, Mass.).

Receiver operating characteristics (ROC curves) were obtained at six signal-to-noise ratios, with two response procedures, in each of three detection paradigms. In all three paradigms--one-interval and two-interval simple detection, and two-interval pedestal--a binary response produced ROC curves with slopes near unity at all signal levels, and a category-rating response led to ROC curves whose slopes decreased with increasing signal strength. This result is thought to be attributable to the varying a priori probability of signal presentation associated with the binary response procedure. The index of detectability taken from the negative diagonal of the ROC space was found to be invariant despite the differences in slope.
R 17

32,035
Kahneman, D. & Beatty, J. PUPILLARY RESPONSES IN A PITCH-DISCRIMINATION TASK. Perception & Psychophysics, March 1967, 2(3), 101-105. (Cognitive Studies Center, Harvard University, Cambridge, Mass. & Human Performance Center, University of Michigan, Ann Arbor, Mich.).

Pupils were measured while observers made pitch judgments under the method of constant stimuli. A substantial dilation occurs immediately after the presentation of the comparison tone, and the size of this response is closely correlated to the difficulty of the discrimination. Baseline changes occur within each block of trials, but have little effect on the magnitude of dilations. Responses to redundant stimuli, including the standard itself, decrease during the experimental session. The results support the validity of pupillary measurements as an index of processing load.
R 17

32,036
Butchke, N. & Lin, H. TEMPORAL AND INTERACTIONAL EFFECTS IN SHORT-TERM STORAGE. Perception & Psychophysics, March 1967 2(3), 107-114. (Stanford University, Stanford, Calif.).

The operation of temporal and interactional processes in short-term storage was studied under conditions which require that information about all items presented be stored and the relative retention of all be evaluated concurrently, but preclude further interference after presentation by testing or retrieval effects. Random sequences of twelve two digit numbers from a known set of thirteen were presented visually at 1, 2, or 4 per sec. for full interval and .25 sec. presentation durations to 15 subjects who reported the missing number that was not presented from the set. For 1/sec. full duration presentations the missing item serial position error distribution shows a linear decrease in errors from first through last presented items. As rate of presentation increases there is a linear increase in total errors, a linearly increasing primacy effect, and an increase of errors over at least the last half of the sequence such that the error distribution remains linear with the same slope. These findings are incompatible with the operation of time dependent interactional and perceptual processes in short-term storage but not with autonomous decay.
R 19

32,037
Uttal, W.R. & Krissoff, Madelon. ON THE REFRACTORINESS OF SOMESTHETIC TEMPORAL ACUITY. Perception & Psychophysics, March 1967, 2(3), 115-118. (University of Michigan, Ann Arbor, Mich.).

Preconditioning with a burst of electrical pulse stimuli elevates the threshold for temporal acuity as measured with a technique requiring the subject to detect a short gap in an otherwise regular burst of similar stimuli. Only a small amount of backward inhibition can be observed. The temporal duration of the inhibitory effect (up to 700 msec.) suggests that repetitive after-discharges of second-order afferents in the spinal cord may underlie this behavioral measure by actually filling in the intervals which are used by the subject to make the judgment. The phenomenon is thus thought to be a disruption of a true temporal judgment rather than one indirectly mediated by an amplitude judgment, and as such it represents a significant datum on the temporal resolving power of time dimensions of neural coding.
R 9

32,038
Hadsworth, N.H. A STAND CAMERA FOR LINE-OF-SIGHT RECORDING. Perception & Psychophysics, March 1967, 2(3), 119-127. (Harvard University, Cambridge, Mass.)

The paper describes a method that has been extensively used to superpose a spot marking the position of the line-of-sight on photographs of stimulus scenes. The spot, reflected from the cornea, determines the line-of-sight with an accuracy of plus or minus 1°. Some of the useful measurements that can be made of fixation patterns are described. Two basic themes have guided the experimental applications: the relation between attention and the line of sight, and the association between peripheral and central vision. Comparisons among age groups have also demonstrated the erratic and piecemeal nature of children's visual input. Comparisons among scenes have shown that certain areas of a picture, judged highly informative, receive most of the visual fixations. More than 20 other laboratories have also used the camera in a wide range of research on perception, cognition, and psycholinguistics.
R 36

32,039
Payne, M.H. COMPARISON OF SENSITIVITY OF PSYCHOPHYSICAL AND ELECTROPHYSIOLOGICAL MEASURES OF SCOTOPIC THRESHOLDS IN THE VICINITY OF THE BLIND SPOT. Perception & Psychophysics, March 1967, 2(3), 128-130. (USN Electronics Lab., Bureau of Ships, San Diego, Calif.).

A section of the blind spot was mapped by obtaining detection and averaged electroencephalograph (EEG) threshold measurements using three stimulus light intensities. It was found that averaged EEG and detection measures of the blind spot were equally sensitive when the two highest stimulus intensities were used, although more observations of the stimulus were required with averaged EEG. Detection thresholds were superior to averaged EEG measures with the dimmest stimulus.
R 4

32,040
Dainoff, M. & Haber, R.N. HOW MUCH HELP DO REPEATED PRESENTATIONS GIVE TO RECOGNITION PROCESSES? Perception & Psychophysics, April 1967, 2(4), 131-136. (University of Rochester, Rochester, N.Y.).

A recent experiment by Haber and Hershenson (Haber, R.N. & Hershenson, M. THE EFFECTS OF REPEATED BRIEF EXPOSURES ON THE GROWTH OF A PERCEPT. J. exp. Psychol., 1965, 69, 40-46.) had shown that in a recognition task one long look at a stimulus was always superior to two or more shorter looks summing to the same total presentation time. In order to explore this more fully and to account for opposite results in a different type of recognition task, as well as in a serial learning task, an improved replication of the earlier study was carried out using very short durations and single letters as stimuli. The same non-reciprocity was found, again strongly favoring duration over repetition as a determinant of clarity of a percept, even though repetition alone was also shown to be a significant independent variable. As a subsidiary finding, an error analysis showed that when a letter was misnamed it was nearly always confused with one that looked like it rather than one that sounded like it. Some discussion was offered as to the role of an auditory information storage in low memory load tasks such as this one, as well as some general implications for information processing analyses of the non-reciprocity of duration and repetition.
R 21

32,042
Kraft, Amy L. & Winnick, Wilma A. THE EFFECT OF PATTERN AND TEXTURE GRADIENT ON SLANT AND SHAPE JUDGMENTS. Perception & Psychophysics, April 1967, 2(4), 141-147. (Queens College, Flushing, N.Y.).

The experiment reported was designed to explore the relationship between gradient of texture and monocular slant-shape perception. The effects of instructional set and order of slant and shape judgments were studied in interaction with four patterns differing in regularity of texture. Judgments of slant and shape were made by the same subjects for all patterns at 20°, 45°, 60° slant for slant judgments and 0°, 20°, 45°, 60° for width judgments. There were three instructional groups. Within each group one half of the subjects made slant judgments first, the other half shape judgments first. For all patterns, accurate perception of the slant of patterned material resulted in increased compensation in width judgments. Apparent width was found to be a function of pattern and also subject to instructional manipulation.
R 10

32,043
Woods, P.J., Griffith, Beverly A., Pego, Ruth P. & Rodier, Patricia M. HUMAN RESPONSES TO VARIOUS CONDITIONS OF WATER TEMPERATURE. Perception & Psychophysics, April 1967, 2(4), 157-160. (Hollins College, Hollins College, Va.).

Skin-surface temperatures on the human hand were obtained immediately following six exposure times ranging from 5 to 60 sec, for water temperatures varying in 5° increments from 10° to 40° C. The surface of the skin was found to respond rapidly and regularly to both the temperature and time of exposure. In a second study 30 subjects exposed a hand for 5 or 30 sec. to water temperatures ranging from from 10° to 45°C, and made ratings on scales of pain and comfort as well as attaching a verbal label (cold, cool, tepid, etc.) to each experience. The experience of cold became more intense over these time intervals while the experience of warmth became less, and with the threshold constant taken into account the sensations of pain and discomfort were found to follow a psychophysical power law. The usefulness of these sorts of data for interpreting the effects of noxious stimuli in basic learning studies is discussed.
R 11

32,044
Baird, J.C. & Biersdorf, W.R. QUANTITATIVE FUNCTIONS FOR SIZE AND DISTANCE JUDGMENTS. Perception & Psychophysics, April 1967, 2(4), 161-166. (USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.).

A psychophysical approach was used to obtain judgments of visual extent under three conditions. In two conditions a comparison stimulus at each of two distances was matched in size to a standard which varied in distance. Stimuli were presented on a well-lighted table and were judged by two observers under objective instructions. Both the standard and comparison were located in either a frontal or longitudinal plane. In a third condition relative distance estimates were given of two stimuli which varied in their relative positions along the table. The mean results for all conditions were described as a power function of physical stimulus measures. The exponent was greater than 1.0 for frontal size and usually less than 1.0 for flat size and distance. The position of the comparison affected the magnitude of the exponents to a lesser degree. These findings have relevance for interpretations of size and distance judgments.
R 24

32,045
Stone, H., Pryor, G. & Colwell, Judith. OLFACTORY DETECTION THRESHOLDS IN MAN UNDER CONDITIONS OF REST AND EXERCISE. Perception & Psychophysics, April 1967, 2(4), 167-170. (Stanford Research Institute, Menlo Park, Calif.).

Detection thresholds for seven odorants were measured under conditions of rest and exercise. The test panel comprised six males with previous experience in odor detection. Exercise was maintained constant by using a modified bicycle positioned within the context of an air-dilution olfactometer. The effects of exercise were idiosyncratic for subjects: odor sensitivity was increased in some subjects, decreased in some, and not changed in others. Results of these experiments are discussed in terms of intra-subject variance within sessions and from session to session. In addition, two test techniques--one a fixed series and the other a tracking procedure--were evaluated for rapid estimation of an odor threshold. The tracking procedure facilitated prompt detection of changes in sensitivity for individual subjects.
R 18

32,046
Cogan, Rosemary & Goldstein, A.G. THE STABILITY OF BINOCULAR RIVALRY DURING SPACED AND MASSED VIEWING. Perception & Psychophysics, April 1967, 2(4), 171-174. (University of Missouri, Columbia, Mo.).

The purpose of the study was consideration of the stability of binocular rivalry rates during extended periods of spaced and massed viewing by untrained observers. In Experiment I no relationship was found between eyeblink rates and rivalry rates, and a visual vigilance task reported simultaneously with rivalry reporting proved to be a useful indicator that subjects maintained attention during the viewing period; the vigilance task did not disrupt rivalry data. In Experiment II subjects reported rivalry during 10 min. of continuous or 10 min. of non-continuous viewing on each of three consecutive days. The vigilance task was presented to all subjects. After the first minute of viewing, during which conditions were alike for all subjects and rivalry rates differed only slightly, the rates of the Spaced Groups increased while the rates of the Massed Groups showed little variation.
R 5

32,047
McBurney, D.H., Kantschau, R.A. & Bogart, L.M. THE EFFECT OF ADAPTATION ON TASTE JNDS. Perception & Psychophysics, May 1967, 2(5), 175-178. (University of Tennessee, Knoxville, Tenn.).

The jnd for 0.1 molar (M) sodium chloride (NaCl) was measured for three subjects, using the ascending method of limits, under two different adapting conditions. Following adaptation to water the jnd was 0.009 M and after adaptation to 0.1 M NaCl it was 0.18 M. This result indicates that the jnd in the taste modality is a function of adaptation. The implications of this change in sensitivity with differing adaptation for Beidler's theory are discussed.
R 14

32,048
Brosgole, L. & Cristal, R.M. THE ROLE OF PHENOMENAL DISPLACEMENT ON THE PERCEPTION OF THE VISUAL UPRIGHT. Perception & Psychophysics, May 1967, 2(5), 179-188. (USN Training Device Center, ONR, Port Washington, N.Y.).

Tilt invariably involves the factor of displacement. A clockwise rotation of a rod, for example, results in the top being displaced to the right and the bottom to the left. The question was raised as to which is primary, displacement or tilt. Through a series of six experiments, apparent tilt was found to be the perceptual outcome of phenomenal displacement. In addition, gravity seemed to play no significant role in determining the visual upright. Therefore, the conventionally accepted field theory of apparent verticality was rejected and the visual upright was interpreted according to principles which govern the perception of motion and radial direction.
R 17

32,049
Stevens, J.C. BRIGHTNESS INHIBITION AT SIZE OF SURROUND. Perception & Psychophysics, May 1967, 2(5), 189-192. (Psychophysics Lab., Harvard University, Cambridge, Mass.).

The amount by which the apparent brightness of a visual field is inhibited by a surrounding field depends on the area of the inhibiting field. Intercular brightness matches showed that, as the size of a surrounding annulus is increased from a thin ring, the degree of inhibition on the brightness of an inner disk increases rapidly at first and then more slowly as the effect approaches an asymptote. The increase of the inhibition with size of annulus can be expressed as an increase in the exponent of the power function that relates the apparent brightness of the disk to its physical luminance.
R 15

32,050
Ono, H. DIFFERENCE THRESHOLD FOR STIMULUS LENGTH UNDER SIMULTANEOUS AND NONSIMULTANEOUS VIEWING CONDITIONS. Perception & Psychophysics, May 1967, 2(5), 201-207. (Stanford University, Stanford, Calif.).

The present study was concerned with Weber's Law as it is related to the discriminability of the lengths of lines. Experiments were conducted to investigate three questions: a) Is Weber's Law equally applicable to simultaneous and nonsimultaneous viewing conditions? b) Is the relationship between the stimulus sizes and the values of DLs (difference limen) described more adequately by the function proposed by Weber or a generalized Weber's Law stated by Miller? and c) Is Weber's Law better approximated by proximal or distal size? It was demonstrated that the discriminability of the lengths of lines follows Weber's Law under the nonsimultaneous viewing condition, but not under the simultaneous viewing condition. Under the nonsimultaneous viewing condition, it was noted that the generalized Weber's Law as stated by Miller described the relationship between the DL and stimulus size significantly better than the function proposed by Weber. From the results pertaining to the third question, it was not possible to determine whether the proximal or the distal size follows Weber's Law more closely.
R 16

32,051
Ross, B.M. JUDGMENT STABILITY AND PSEUDORECOGNITION OF RANDOM AND PATTERNED CONFIGURATIONS. Perception & Psychophysics, May 1967, 2(5), 208-212. (Research in Thinking & Language Center, Catholic University of America, Washington, D.C.).

Thirty-six simple patterns were judged as "random" or "patterned" by adult subjects. Category judgments were consistent whether subjects were told that 1/4, 1/2, or 3/4 of the patterns were random or if no proportion was specified. In a second experiment, subjects viewed a series of slides previously judged patterned followed by a recognition series with two additional patterned slides inserted in a series of otherwise random slides. Although slides were never labeled random or patterned, subjects made the most false recognitions for the two patterned slides. In another condition where random and patterned slides were reversed, most false recognitions were made for the two random slides. Both Garner's notion of hypothetical set size and an analysis of balanced elements fit the results, but the adequacy of both hypotheses can be questioned when applied to previous results with more complex patterns.
R 4

32,052
Mehler, J., Bever, T.G. & Carey, P. WHAT WE LOOK AT WHEN WE READ. Perception & Psychophysics, May 1967, 2(5), 213-218. (Massachusetts Institute of Technology, Cambridge, Mass.).

The entire phrase structure hierarchy of sentences influences visual scanning patterns in reading familiar material. Eye-movements were recorded for forty adult subjects during the presentation of sentences which subjects were instructed to read. A general eye-fixation rule was found to predict the pattern of eye-fixations: fixate on the first half of phrase structure constituents. This rule applied cumulatively at all levels of the surface phrase structure.
R 8

32,053
Kinchla, R.A. & Sayzer, F. A DIFFUSION MODEL OF PERCEPTUAL MEMORY. Perception & Psychophysics, June 1967, 2(6), 219-229. (McMaster University, Hamilton, Ontario, Canada & University of California, Berkeley, Calif.).

A model is presented of the perceptual process through which an observer compares two consecutively observed stimuli. Emphasis is placed on the manner in which a memory of the first stimulus is maintained until the comparison stimulus is observed. It is argued that the role of this perceptual memory process provides the primary distinction between detection and recognition tasks. Two experiments are reported: an experiment in which the observer is asked to judge the similarity in position of two points of light presented serially in a dark room; and an experiment in which the observer judges the similarity in loudness of two serially presented tones. The visual experiment is discussed in relation to the analysis of autokinesis and involuntary eye movements, while the auditory experiment is shown to have special relevance to the issue of time-order errors.
R 9

32,054
Hyman, R. & Well, A. JUDGMENTS OF SIMILARITY AND SPATIAL MODELS. Perception & Psychophysics, June 1967, 2(6), 233-248. (University of Oregon, Eugene, Ore.).

Subjects judged the similarity between all pairs of stimulus objects under 3 conditions: when the objects were (a) Munsell 5R color patches varying in value and chroma; (b) parallelograms varying in size and tilt; and (c) circles-with-radius varying in diameter and angle of radius. For each set of judgments, the pattern of deviations from the Euclidean model was used to diagnose the most appropriate spatial model. The results confirm previous findings that the Euclidean space is appropriate for judgments of color patches, but that the city block space is appropriate for judgments of geometric forms which vary on perceptually distinct dimensions.
R 14

32,055
Chapanis, A. & Mankin, D.A. THE VERTICAL-HORIZONTAL ILLUSION IN A VISUALLY-RICH ENVIRONMENT. Perception & Psychophysics, June 1967, 2(6), 249-255. (Johns Hopkins University, Baltimore, Md.).

In the vertical-horizontal illusion the vertical dimension of a figure typically appears longer than the horizontal. Although there is a large body of research literature on this illusion, all of it refers to simple figures with well-drawn lines, exhibited against plain backgrounds. This experiment has investigated the illusion using real-world objects in a visually-rich environment. Ten male and ten female subjects were asked to judge the heights of ten objects of various sizes and shapes. They made their estimates by having the experimenter mark off a horizontal distance that corresponded to the judged height of the object. Each subject estimated the height of each object once a day for three consecutive days. The results show that, by and large, the illusion can be demonstrated for real objects in a visually-rich environment. There was, however, considerable variation among the objects. It appears that estimates of this kind may be influenced by size, size constancy, anchor effects, and angle of regard, along with other, as yet, unidentified factors.
R 7

32,056
Lamb, J.C. & Kaufman, H. THE EFFECTS OF CODING PROCEDURE ON HUMAN INFORMATION TRANSMISSION. Perception & Psychophysics, June 1967, 2(6), 256-262. (Electric Boat Div., General Dynamics Corporation, Groton, Conn. & University of Connecticut, Storrs, Conn.).

Three different coding schemes, i.e., transformations between stimuli and responses, were used in a continuous information transmission situation. The stimuli were groups of binary digits and a subject was required to transform these into verbal equivalents or combinations formed by taking various sets of the English letters. Three codes, one based on communication theory, one based on Miller's 1956 chunking hypothesis (HEIAS No. 6791), and a combination of the first two were used. In addition, two levels of stimulus redundancy, zero and 0.5 were used. Time to complete the task and errors were the dependent variables. The subjects were run for twelve days. The basic result was that subjects transmitted information at a constant rate regardless of the code or redundancy level used.
R 9

32,057
Fox, T.T. & Hunnally, J.C. THE EFFECTS ON EYE MOVEMENTS OF COMPLEXITY, NOVELTY, AND AFFECTIVE TONE. Perception & Psychophysics, July 1967, 2(7), 263-267. (Vanderbilt University, Nashville, Tenn.).

The major purpose of this study was to investigate the effects of stimulus complexity, novelty, and affective tone on the direction of eye movements of male college students. Motion pictures were taken of the subject's eye while he viewed pairs of stimuli. In no instance, in any part of the 10 sec. viewing interval, did subjects as a group fixate longer on unpleasant stimuli when they were paired with either pleasant or neutral stimuli; and pleasant stimuli consistently dominated neutral stimuli. Also, novel stimuli and complex stimuli tended to dominate their non-novel and less complex competitors. Differences in instructions were found to markedly affect the magnitude but not the direction of fixation-dominance.
R 13

32,058
Jacobs, G.H. SATURATION ESTIMATES AND CHROMATIC ADAPTATION. Perception & Psychophysics, July 1967, 2(7), 271-274. (Psychology Dept. & Defense Research Lab., University of Texas, Austin, Tex.).

Category estimates of spectral saturation were obtained from three observers under neutral adaptation and under three conditions of chromatic adaptation. The data so obtained show that chromatic adaptation causes a shift in the location of minimal spectral saturation toward the spectral locus of the adapting light. The existence of secondary minima and enhancement effects in spectral saturation are also noted.
R 11

32,059
Grosgole, L. & Whalen, Patricia M. THE EFFECT OF MEANING ON THE ALLOCATION OF VISUALLY INDUCED MOVEMENT. Perception & Psychophysics, July 1967, 2(7), 275-277. (USN Training Device Center, ONR, Port Washington, N.Y.).

The directional characteristics of a meaningful target were found to affect its apparent motion when it was displaced relative to a neutral object. The effect was destroyed, however, when the target was surrounded by a frame. This was because the frame imparted a meaning which tended to override that conveyed by the target.
R 2.

32,060
Lowe, G. INTERVAL OF TIME UNCERTAINTY IN VISUAL DETECTION. Perception & Psychophysics, July 1967, 2(7), 278-280. (Psychology Dept., University of Hull, Hull, England).

The effects of increasing the length of an interval of continuous temporal uncertainty (ITU) on the detectability of visual signals were investigated in a 'Yes/No' detection situation. Subjects were uncertain about when a signal might occur within a given observation interval the duration of which was varied. Longer intervals of uncertainty resulted in a decrement in detectability, which was shown to be directly attributable to increased false alarm rates. It was suggested that observers have more opportunities for confusing signals with noise. The time course of detectability within a given ITU was also investigated, but there were no significant variations.
R 12

32,061
Day, H. EVALUATIONS OF SUBJECTIVE COMPLEXITY, PLEASINGNESS AND INTERESTINGNESS FOR A SERIES OF RANDOM POLYGONS VARYING IN COMPLEXITY. Perception & Psychophysics, July 1967, 2(7), 281-286. (Ontario Studies in Education Institute, University of Toronto, Toronto, Ontario, Canada).

A series of random-shaped polygons varying in number of sides in approximately even logarithmic steps from four to 160 sides was generated. Subjects were required to compare all possible pairs of figures on one of three scales--subjective complexity, pleasingness and interestingness. Subjective evaluations of complexity continued to increase with informational content. Pleasingness evaluations described a bimodal function, peaking at the 6-sided and 28-sided levels then falling rapidly with increased complexity. Interestingness evaluations rose to a peak at the 28-sided figure and remained high throughout the rest of the series.
R 17

32,062
Stanley, G. MAGNITUDE ESTIMATES OF DISTANCE BASED ON OBJECT-SIZE. Perception & Psychophysics, July 1967, 2(7), 287-288. (Indiana University, Bloomington, Ind.).

At a fixed distance of 1.5 ft., varying sizes of vertical lines or circles were presented to S. Subjects estimated either apparent size or distance based on relative size. Estimates of line height and circle diameter yielded power functions with exponents of 0.97 and 0.98, respectively. Distance estimates were curvilinearly related to distance predicted from the size/distance ratio. This result is discussed in terms of non-Euclidean space and in relation to the nature of the judgmental task.
R 11

32,063
Fodor, J.A. & Garrett, M. SOME SYNTACTIC DETERMINANTS OF SENTENTIAL COMPLEXITY. Perception & Psychophysics, July 1967, 2(7), 289-296. (Massachusetts Institute of Technology, Cambridge, Mass.).

The perceptual complexity of three lists of self-embedded sentences was evaluated in terms of the accuracy and time required for their paraphrase. The lists differed by the presence of relative pronouns in one list, their absence in a second and by the addition of adjectives to the third. It was predicted that the presence of the relative pronouns would effect the only significant change in performance. In both auditory and visual presentations of the sentence lists, the presence of the relative pronouns proved to be facilitating, while the presence of the adjectives produced no significant changes.
R 6

32,064
Teller, Davida Y. & Galanter, E. BRIGHTNESSES, LUMINANCES, AND FECHNER'S PARADOX. Perception & Psychophysics, July 1967, 2(7), 297-300. (University of Washington, Seattle, Wash.).

Monocular brightnesses were varied, without varying monocular luminances, both by means of simultaneous contrast and by means of changes in the level of adaptation. Binocular brightness was shown to change in accord with monocular brightness, independent of monocular luminances.
R 14

32,066
Bakan, P. & Thompson, R.W. INDUCTION AND RETENTION OF KINESTHETIC AFTEREFFECTS AS A FUNCTION OF NUMBER AND DISTRIBUTION OF INSPECTION TRIALS. Perception & Psychophysics, July 1967, 2(7), 309-306. (Michigan State University, East Lansing, Mich. & Ohio University, Athens, Ohio).

Measures of kinesthetic aftereffects were made for 240 subjects in 15 groups. Each group was tested with a combination of number of 30-sec. inspection periods (5, 10, or 15) and time between inspection periods (0, 10, 30, 60, or 90 sec.). The number of inspection periods had a significant effect on size of aftereffect and on residual aftereffect 15 min. later. The maximum aftereffect followed the 10 period inspection (5 min inspection). Distribution of inspection periods in time had no significant effect on these measures of aftereffect. In a second experiment, distribution of inspection periods in time had no effect on induced aftereffect or on residual aftereffect 24 h later. There was significant residual aftereffect after 24 h which was significantly related to amount of aftereffect originally induced.
R 7

32,067
Yellott, J.I., Jr. & Curnow, P.F. SECOND CHOICES IN A VISUAL SPAN OF APPREHENSION TASK. Perception & Psychophysics, July 1967, 2(7), 307-311. (University of Minnesota, Minneapolis, Minn.).

Four subjects were run in a visual span of apprehension experiment to determine whether second choices made following incorrect first responses are at the chance level, as implied by various high threshold models proposed for this situation. The relationships between response biases on first and second choices, and between first choice biases on trials with two or three possible responses, were also examined in terms of Luce's choice theory. The results were: a) second choice performance in this task appears to be determined by response bias alone, i.e., second choices were at the chance level; b) first and second choice response biases were not related according to Luce's choice axiom; and c) the choice axiom predicted with reasonable accuracy the relationships between first choice response biases corresponding to trials with different numbers of possible response alternatives.
R 10

32,068
Poulton, E.C. POPULATION NORMS OF TOP SENSORY MAGNITUDES AND S. S. STEVENS' EXPONENTS. Perception & Psychophysics, July 1967, 2(7), 312-316. (Applied Psychology Research Unit, MRC, Cambridge, England).

If S.S. Stevens' exponents indicate the rates at which sensations grow with increases in sensory intensity, they ought to correlate with the population norms of top sensory magnitudes. Using a comprehensive sample of eight sensory dimensions, the tau coefficient of rank correlation between Stevens' exponents and the medians of the top sensory magnitudes reported by 305 observers was found to be only +.15 ($p>.05$). With the geometric means tau fell to -.04. A split-half consistency check on the medians of the population norms suggested that they were not to blame for the low correlation. Direct comparison of pairs of sensory dimensions on 146 additional observers produced results which confirmed the population norms. Since there is no way of comparing most of the top physical stimuli experienced in everyday life, it is not possible to make a joint prediction from exponents and top stimuli. S.S. Stevens' exponents thus appear to have little predictive value outside the experimental conditions under which they were measured.
R 21

32,069
Watkins, W.H. & Schjelderup, J.R. EFFECTS OF TEMPORAL VARIATION OF AUXILIARY LIGHT STIMULI UPON DETECTABILITY OF TONAL SIGNALS. Perception & Psychophysics, July 1967, 2(7), 317-322. (USAF Decision Sciences Lab., Hanscom AFB, Bedford, Mass.).

Literature is surveyed briefly which reported the effect upon hearing of varying the onset of a light relative to the onset of a tone. Four forced-choice experiments involving approximately 32,000 trials of the four-alternative type are reported whose results show both similarities and differences when compared with earlier experiments which did not use forced-choice. Tentative conclusions derived from all the experiments described also take into account the effect of cessation of the light relative to the tone.
R 5

32,070
Stewart, M.R., Fagot, R.F. & Eskildsen, P.R. INVARIANCE TESTS FOR BISECTION AND FRACTIONATION SCALING. Perception & Psychophysics, Aug. 1967, 2(8), 323-327. (University of Oregon, Eugene, Ore.).

If one is to accept the power function as the psychophysical law, then estimates of the exponent of a particular form of the power law should be independent of changes in basic independent variables. In the present study, various power law hypotheses were tested for the bisection and fractionation scaling of brightness. The results indicated that for bisection, estimates of exponents were dependent on the particular interval bisected, suggesting rejection of the simple power law for bisection. For fractionation, two additional forms of the power law were tested, each form involving a threshold parameter. One was the ϕ-law (involving a translation on the intensity axis), and the other was the ψ-law (involving a translation on the psychological axis). The ϕ-law provided a poor fit to the data, whereas the ψ-law appeared to fit well for at least one subject. Analysis for individuals showed that for all five subjects, the variance due to standards was appreciably larger for the ϕ-law.
R 25

32,071
Wickelgren, W.A. STRENGTH THEORIES OF DISJUNCTIVE VISUAL DETECTION. Perception & Psychophysics, Aug. 1967, 2(8), 331-337. (Massachusetts Institute of Technology, Cambridge, Mass.

Zero, 1, 2, or 3 black dots are tachistoscopically presented on a white field. There are two alternative tasks: a) to decide on the presence of each of the left, middle, and right dots (multiple detection) or b) to decide whether any of the dots was present (disjunctive detection). The results indicate that in disjunctive detection, Ss do not add together the strengths of the three dot positions and compare this sum to a criterion. Rather they combine their decisions about each dot, responding "yes" to the array, if and only if they decide "yes" to any one dot. Strength distributions appear to be invariant with respect to irrelevant stimuli. Invariance with respect to report order holds approximately. However, dots reported or first are slightly more detectable. This suggests a successive scanning process, whose rate is independent of whether a stimulus is present or absent at the position scanned.
R 12

32,072
Duke, J.A. NOISE METHODS IN PATTERN PERCEPTION. Perception & Psychophysics, Aug. 1967, 2(8), 338-340. (Ames Research Center, NASA, Moffett Field, Calif.).

This experiment investigated four methods of inducing visual noise at seven levels of noise. Forty-six subjects were presented 4800 sets of three patterns, with the task of judging which of two noisy patterns was more similar to the prototype pattern. The noisy patterns were generated by adding, moving, deleting or both adding and deleting elements of the prototype. All possible comparisons of each noise method were made at each noise level and the results plotted. The results show that the various methods of introducing noise do not produce identical results, and that the similarity assessment is dependent on noise level. Explanations are offered to account for the results.
R 4

32,073
Uttal, W.R. & Smith, Pamela. ON THE PSYCHOPHYSICAL DISCRIMINABILITY OF SOMATOSENSORY NERVE ACTION POTENTIAL PATTERNS WITH IRREGULAR INTERVALS. Perception & Psychophysics, Aug. 1967, 2(8), 341-348. (University of Michigan, Ann Arbor, Mich.).

In this paper the problem of whether or not a series of irregularities in the interpulse intervals in a train of nerve action potentials can be discriminated better than a single gap in a regular train is considered. The corollary problem is also considered--does an increase in the number of impulses in a burst with irregular intervals lead to a decrease in the threshold for irregularity, thus indicating some integrative capacity of the relevant neural decoding mechanisms? Answers to these questions are obtained by means of a psychophysical test and are affirmative in both cases. This suggests that the irregularities which have been observed in the intervals between nerve action potentials in animal preparations are true information-carrying codes within a restricted temporal region. Because of certain critical points in the functions relating this sensitivity to the basic frequency of the nerve impulses, a group of several temporal regions is postulated in which time is dealt with differently by the somatosensory system.
R 14

32,074
Tanner, T.A., Jr., Haller, R.W. & Atkinson, R.C. SIGNAL RECOGNITION AS INFLUENCED BY PRESENTATION SCHEDULES. Perception & Psychophysics, Aug. 1967, 2(8), 349-358. (Ames Research Center, NASA, Moffett Field, Calif.).

Performance in a recognition task involving two amplitudes of the same tone was investigated over a wide range of presentation schedules. The task was arranged so that there was no trial-to-trial feedback or other information regarding the relative frequencies of the two tones. The hit and false alarm rates (the proportion of "loud" responses to loud and soft stimuli, respectively) on any given trial were strongly influenced by the stimulus and response on the preceding trial. In general, subjects tended to repeat the last response and were more accurate after a stimulus alternation than after a stimulus repetition. In addition, hit and false alarm rates were inversely related to the presentation probability of the loud tone, in contrast to the direct relation typically found in signal detection experiments and in recognition experiments with trial-to-trial feedback. A mathematical model incorporating three processes (memory, comparison, and decision) was shown to give a good account of these data.
R 11

32,075
McLaughlin, S.C. PARAMETRIC ADJUSTMENT IN SACCADIC EYE MOVEMENTS. Perception & Psychophysics, Aug. 1967, 2(8), 359-362. (Tufts University, Medford, Mass.).

During a change-of-fixation eye movement, the target toward which subject was shifting his gaze was displaced 1° toward the original point of fixation so that the eye made an overshoot with respect to the new target position. When this was repeated several times in succession, the eye movement control system made an adjustment such that the overshoot gradually diminished. The end-result of this "parametric adjustment" was that a visual target 10° from the fovea elicited an eye movement of only 9.1°.
R 13

32,076
Uttal, W.R. & Smith, Pamela. CONTRALATERAL AND HETEROMODAL INTERACTION EFFECTS IN SOMATO-SENSATION: DO THEY EXIST? Perception & Psychophysics, Aug. 1967, 2(8), 363-368. (University of Michigan, Ann Arbor, Mich.).

This paper is concerned with the problem of whether or not conditioning stimuli of other modalities or stimuli applied to a distant locus of the body interact with a sensitive test of somesthetic temporal acuity called the gap test. The results of the experiment indicate that visual stimuli do not exert an observable influence on this temporal judgment, but that auditory stimuli and contralateral stimulation in the same modality do show a significant but relatively small effect. This is compared and contrasted with the very large and persistent effect reported when the conditioning stimulus is applied to the same electrodes as the gap test. By comparing these results with experiments of similar design carried out on lower animals by other investigators, some insights into the neural localization of the reported effects are obtained.
R 14

32,077
Collins, J.F. & Eriksen, C.W. THE PERCEPTION OF MULTIPLE SIMULTANEOUSLY PRESENTED FORMS AS A FUNCTION OF FOVEAL SPACING. Perception & Psychophysics, Aug. 1967, 2(8), 365-373. (University of Illinois, Urbana, Ill.).

Using five capital letters as the form stimuli and tachistoscopic presentation, an exposure duration was determined for each subject that yielded 80% identification accuracy when single letter displays were presented. Then the increment in exposure duration necessary for a correct identification of all letters on a display on 80% of the trials was determined for 2, 3, and 4 letter displays. In view of evidence that perceptual independence breaks down when stimuli are spaced much closer than 1° apart in the fovea, the effect of different foveal spacing of the form stimuli in the display was studied. Spacings of 1/2, 3/4, and 1° of angle were employed. Less than a 30% increment in exposure duration was necessary to recognize 2 form displays at the same accuracy level as single forms. But no further increase in exposure duration was necessary to recognize 3 and 4 form displays at the same accuracy criterion. Evidence for positive correlation of sensory perceptual error for forms spaced less than 1° apart in the fovea was found.
R 11

32,078
Kahan, J.P., Papoport, A. & Jones, L.V. DECISION MAKING IN A SEQUENTIAL SEARCH TASK. Perception & Psychophysics, Aug. 1967, 2(8), 374-376. (University of North Carolina, Chapel Hill, N.C.).

Subjects were instructed to find the largest of a set of 200 different numbers, observed one at a time (when only the number currently observed could be declared the largest). Numbers sampled from one of three distributions, one with positive skew, one with negative skew, and one rectangular, were presented to three samples of 22 subjects, tested in small groups. The rectangular-distribution condition also was administered individually to a fourth sample of 22 subjects. Results failed to show effects of the distribution of numbers upon subject's performance. However, as predicted, subjects tested in groups tended to observe more cards before stopping than those tested individually. Data are analyzed in an effort to evaluate the adequacy of alternative "stopping rules" as strategies descriptive of subject's performance.
R 4

32,079
Goldstein, A.G. GESTALT SIMILARITY PRINCIPLE, DIFFERENCE THRESHOLDS AND PATTERN DISCRIMINABILITY. Perception & Psychophysics, Aug. 1967, 2(8), 377-382. (University of Missouri, Columbia, Mo.).

Perceptual grouping within a visual array has been studied as a function of the difference limen between elements composing the array. Two experiments are reported in which the array elements differed in size or in shape. Although there is a relationship between perceptual emergence and amount of difference between elements of the display as expected, there was clear evidence that above threshold differences between elements could not be used to predict the emergence of a pattern hidden in the visual array.
R 21

32,080
Keele, S.W. & Chase, W.G. SHORT-TERM VISUAL STORAGE. Perception & Psychophysics, Aug. 1967, 2(8), 383-386. (University of Wisconsin, Madison, Wisc.)

The delay between the offset of a briefly exposed array of letters and digits and the onset of an arrow pointing at one of the array positions was varied from 0 to 5000 msec. In addition, the luminance of the stimulus array was varied over three levels. The Ss reported the item in the position indicated by the arrow. Luminance, delay, and the luminance by delay interaction were all significant. Performance monotonically decreased from a delay of 0 msec to a delay of 250 msec, but the percent correct remained fairly constant from 250 msec to 5000 msec. With delays shorter than 250 msec, high luminance arrays showed better performance.
R 10

32,081
Gettys, C.F. & Harker, G.S. SOME OBSERVATIONS AND MEASUREMENTS OF THE PANUM PHENOMENON. Perception & Psychophysics, Sept. 1967, 2(9), 387-395. (USA Medical Research Lab., Fort Knox, Ky.).

The angular separation between the "binocular" and the "monocular" line of Panum's limiting case was systematically varied under conditions in which the changes in seen relative depth could be quantified. Stereoscopic, equidistant, and anomalous depth localizations were seen. A criterion of variability of depth localization was utilized to differentiate the mechanism operative in determining the seen depth. When stereopsis is clearly present, depth in Panum's limiting case is predictable and reveals a one-to-one relationship with the angle of lateral separation of the stereoscopic stimuli, i.e., the odd line cooperates in free binocular vision with both of the paired lines to give "true" stereoscopic depth. The range of angular separation over which Panum's limiting case will give rise to stereoscopic depth is increased by free eye movements well beyond the usually reported limits of Panum's retinal areas.
R

32,082
Gould, J.D. PATTERN RECOGNITION AND EYE-MOVEMENT PARAMETERS. Perception & Psychophysics, Sept. 1967, 2(9), 399-407. (IBM Thomas J. Watson Research Center, Yorktown Heights, N.Y.).

Pattern perception was studied by recording eye movements while subjects visually scanned nine simultaneously presented patterns of asterisks for target patterns. Pattern parameters studied were: similarity of target patterns to non-target patterns (absolute difference in the number of elements), number of target elements, and frequency of targets. Systematic correlations between the first two pattern parameters and eye-movement parameters were found. Mean duration and mean number of fixations on targets and also on non-targets increased with increased similarity. Mean duration and mean number of fixations increased on targets with an increase in the number of target elements. Non-target patterns were perceived more quickly than targets. Fixations of longer duration were required to perceive the original target than to identify the other target patterns subsequently. The eye-movement results provide the basis for developing inferences about higher order processing of visual stimuli.
R 31

32,083
Dunn, S.E. & Parfitt, S. LOCALIZATION WITH COMPLETE MASKING IN ONE EAR. Perception & Psychophysics, Sept. 1967, 2(9), 408-410. (University of Calgary, Alberta, Canada).

There is some disagreement among the results of studies measuring lateralization and localization with an interference stimulus in one ear. At least one shows no fusion of a binaurally presented signal when the part of the signal in the ear receiving interference is completely masked. Two other studies obtain results which could not be predicted by the first result. The present study is a lateralization study presenting signals binaurally with complete masking in one ear. The stimuli are pure tones, and a subject manipulates the loudness of the signal in the unmasked ear. These are procedural differences from the first study. Results indicate that subjects can fuse signals when the part of the signal in one ear is completely masked by a narrow band of noise. It also indicates that the effect on lateralization is increased when the noise in the critical band is filtered out.
R 11

32,084
Bower, T.G.R. THE DEVELOPMENT OF OBJECT-PERMANENCE: SOME STUDIES OF EXISTENCE CONSTANCY. Perception & Psychophysics, Sept. 1967, 2(5), 411-418. (Harvard University, Cambridge, Mass.).

Object permanence or existence constancy was one of the phenomena which greatly exercised the philosophical fathers of experimental psychology. The topic has been little studied since. Michotte has described the psychophysics of existence constancy, while Piaget has studied its development. Michotte's work was restricted to adults while Piaget's notably lacked careful psychophysical control. The aim of the present study was to bridge the gap between the two, to study the psychophysics of existence constancy in infants. Results showed that there is remarkably little difference between infant and adult as far as psychophysical control is concerned. The major difference seems to be a rate of processing difference. However, changes in processing rate will not account for the development of the concept of object permanence. What seems to be learned is a rule which can override perceptual constancy and nonconstancy in some situations.
R 10

32,085
Fisher, G.H. PREPARATION OF AMBIGUOUS STIMULUS MATERIALS. Perception & Psychophysics, Sept. 1967, 2(9), 421-422. (University of Newcastle upon Tyne, Newcastle upon Tyne, England.

The problem of ensuring that ambiguous figures are equally probable in the appearance of each of their two alternative and mutually exclusive aspects is discussed. Failure to consider this problem raises difficulties for interpretation of the results of experiments in which such figures are used. A method of preparing and evaluating the extent to which ambiguous figures are equivocal according to acceptable criteria is described and illustrated. This yields a new ambiguous figure, each alternative aspect of which becomes apparent with approximately the same frequency.
R 3

32,086
Harker, G.S. A SACCADIC SUPPRESSION EXPLANATION OF THE PULFRICH PHENOMENON. Perception & Psychophysics, Sept. 1967, 2(9), 423-426. (USA Medical Research Lab., Fort Knox, Ky.).

A latency explanation of the Pulfrich phenomenon of binocular vision provides for the seen path with an oscillating pendulum to be symmetrical and at right angles to the line of sight. Since the experience of asymmetries in the seen path of a pendulum, when viewed with one eye filtered, is more than the exception, an explanation which has the potential to provide for both symmetry and asymmetry is to be preferred. A saccadic suppression explanation offers this possibility. A saccadic suppression explanation would provide that vision would be suppressed in the filtered eye first, followed by suppression in the unfiltered eye. Both eyes would recover vision simultaneously. The predicted resultant disparate stimulation is consistent in direction with that necessary to the Pulfrich phenomenon. The details of the required stimulation have been checked using simple and compound episcotisters. The results with the episcotisters are consistent with the Pulfrich phenomenon.
R 14

32,087
Clement, D.E. & Varradoo, K.V. PATTERN UNCERTAINTY AND THE DISCRIMINATION OF VISUAL PATTERNS. Perception & Psychophysics, Sept. 1967, 2(9), 427-431. (University of South Florida, Tampa, Fla.).

Sixty subjects individually sorted eight decks of 50 cards each. A deck contained 25 cards each of two stimulus patterns. The patterns were drawn from different sets of five-dot patterns judged to be equivalent. The eight decks represented pairs of patterns drawn from the same equivalence set, from different equivalence sets of the same size, and from different equivalence sets of different sizes. Sorting times were shown to increase with increasing size of equivalence set, and were shown to be greater for patterns drawn from within the same equivalence set than for patterns drawn from different equivalence sets. Ratings of pattern goodness were found to be useful predictors of sorting time only in their capacity to discriminate between equivalence sets of different sizes. The results were interpreted as supporting the importance of equivalence set membership in a discrimination task where the subject logically does not have to consider stimuli other than the given criterion stimuli.
R 8

32,088
Fox, R. & Herrmann, J. STOCHASTIC PROPERTIES OF BINOCULAR RIVALRY ALTERNATIONS. Perception & Psychophysics, Sept. 1967, 2(9), 432-436. (Vanderbilt University, Nashville, Tenn.).

The extent to which binocular rivalry phases are sequentially related was assessed by the λ statistic and by autocorrelation. Both measures indicate that the duration of successive phases are independent. The frequency distributions of suppression phases and of nonsuppression phases can be fitted by gamma distributions. These results are consistent with models of the rivalry process that incorporate independence assumptions.
R 6

32,089
Sachs, Jacqueline S. RECOGNITION MEMORY FOR SYNTACTIC AND SEMANTIC ASPECTS OF CONNECTED DISCOURSE. Perception & Psychophysics, Sept. 1967, 2(9), 437-442. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

This study investigates the pattern of retention of syntactic and semantic information shortly after comprehension of connected discourse. Ninety-six subjects listened to 24 taped passages and, after each passage, heard one recognition test sentence which was either identical to a sentence that had occurred in the passage, or was changed in some slight way. The subjects responded "identical" or "changed," rated their confidence, and classified changes as "meaning" or "form." Two independent variables were manipulated: a) The relationship between the original sentence in the passage and the test sentence. The test sentence was (1) semantically changed, (2) changed from active to passive voice or vice versa, (3) formally changed in other ways that did not affect the meaning, or (4) unchanged. Each sentence appeared in all change types. b) The amount of interpolated material between the original and test sentences was zero, 80, or 160 syllables of connected discourse which was a continuation of the passage. When the test sentence was heard immediately after the original, retention was high for all test types. But after 80-160 syllables, recognition for syntactic changes had dropped to near chance levels while remaining high for semantic changes. Even when the meaning of a sentence was remembered, formal properties that were not necessary for that meaning were forgotten very quickly. Thus the memory of the meaning is not dependent on memory of the original form of the sentence.
R 4

32,090
Warren, R.M. QUANTITATIVE JUDGMENTS OF COLOR: THE SQUARE ROOT RULE. Perception & Psychophysics, Sept. 1967, 2(9), 448-452. (University of Wisconsin, Milwaukee, Wisc.).

Judgments of the appearance of colored papers blended with different proportions of white were obtained using a rotating color mixer. Responses consisted of a mark on a line labeled with the appropriate color name at one end and "white" at the other. Prior context was avoided by obtaining only single judgments. It was found for all six color displays that distance from the colored end of the line was proportional to the square root of the proportion of white present in the mixture. This square root relation is in keeping with the physical correlate theory and with other experiments involving gray papers, point sources, and luminous fields.
R 24

32,091
Dewar, K.E. THE EFFECT OF ANGLE BETWEEN THE OBLIQUE LINES ON THE DECREMENT OF THE MÜLLER-LYER ILLUSION WITH EXTENDED PRACTICE. Perception & Psychophysics, Oct. 1967, 2(10), 426-428. (University of Calgary, Alberta, Canada).

Early work on the Müller-Lyer illusion had indicated that it disappears with extended practice. The present experiment failed to confirm this finding. The magnitude of the illusion increased for approximately 500 trials, but showed no further change over an additional 500 trials. The rate of the practice decrement was inversely related to the size of the angle formed by the oblique lines of the figure.
R 9

32,092
Hodge, M.H. SOME FURTHER TESTS OF THE CONSTANT-RATIO RULE. Perception & Psychophysics, Oct. 1967, 2(10), 429-437. (University of Georgia, Athens, Ga.).

Five experiments sought to test the constant-ratio rule (CRR) with single dimension ensembles composed of 2, 4, or 8 stimulus objects. Each subject attempted to identify stimuli which varied in weight or in visual size or brightness. The results demonstrated: a) The CRR predicts equally well the response proportions of single dimensional visual, kinesthetic, and auditory stimulus ensembles, but less well than those for multidimensional auditory stimuli. b) Better predictions are obtained with four than with two stimulus objects. c) The CRR is sensitive to variations in the spacing and range of the stimulus ensembles and to practice on the task. It is concluded that the rule tends to fail whenever stimulus conditions elicit differential amounts of stimulus and response confusion.
R 15

32,093
Harker, G.S. & O'Neal, O.L., Jr. SOME OBSERVATIONS AND MEASUREMENTS OF THE PULFRICH PHENOMENON. Perception & Psychophysics, Oct. 1967, 2(10), 438-440. (USA Medical Research Lab., Fort Knox, Ky.).

The Pulfrich pendulum was evaluated as a potential screening device for the detection of anomalies of binocular vision. For this purpose, a booth was set up at the Kentucky State Fair (1964) and the general public invited to observe the pendulum and record their responses with the equipment provided. The obtained results indicate that a dichotomy can be achieved between those who have binocular vision and those who do not. However, gradations of binocular vision from poor to good cannot be achieved with the pendulum as presently understood. Contrary to explanatory theory the characteristic shape of the seen pendulum path was asymmetrical following the rule that the path was displaced away from the observer on the side of the filtered eye.
R 6

32,094
Green, D.M. & Luce, R.D. DETECTION OF AUDITORY SIGNALS PRESENTED AT RANDOM TIMES. Perception & Psychophysics, Oct. 1967, 2(10), 441-450. (University of California, San Diego, Calif. & University of Pennsylvania, Philadelphia, Penn.).

One hundred msec tones of 1000 Hz at four intensities were presented according to two Poisson schedules in a background of wide band noise and as increments to a 1000 Hz tone. Each 15 minute test session was run under fixed conditions and one of three instructions to detect the signals; the two subjects were free to respond at any time. The data analyzed were several inter-response and signal-response distributions, and they were compared with a theory due to Luce. Discrepancies between the theory and data indicate needed modifications of both the theory and the procedure.
R 7

32,095
Stevens, J.C. BRIGHTNESS FUNCTION: BINOCULAR VERSUS MONOCULAR STIMULATION. Perception & Psychophysics, Oct. 1967, 2(10), 451-454. (John B. Pierce Foundation Laboratory, New Haven, Conn. & Yale University, New Haven, Conn.).

A dozen observers matched numbers to the apparent brightness of a target viewed by one eye or by both eyes. Brightness grew as a power function of luminance, and the functions were practically identical for the two modes of viewing. Throughout its course, the obtained binocular function tended to fall about a decibel above the monocular function. This small degree of binocular summation, of the order of a jnd, may or may not be significant.
R 10

32,096
Gogel, W.C. CUE ENHANCEMENT AS A FUNCTION OF TASK SET. Perception & Psychophysics, Oct. 1967, 2(10), 455-459. (University of California, Santa Barbara, Calif.).

The hypothesis was tested that the intention to use a particular cue relation would enhance the effectiveness of that particular cue in determining the resulting perception. For this purpose, a situation was presented in which the apparent depth position of an object in a configuration of objects would differ depending upon which of two possible cue relations (size cues) were used. The results support the conclusion that the perceived depth position of the object differed in the expected directions as a function of the task set. The data of the study are discussed with respect to the "adjacency principle" which states that cue efficiency is determined by the relative adjacency of objects between which the cues occur. Although the effect of cue set upon the perception seems to be small compared with that of adjacency, it cannot completely be ignored.
R 9

32,097
Stevens, S.S. & Guirao, Miguelina. LOUDNESS FUNCTIONS UNDER INHIBITION. Perception & Psychophysics, Oct. 1967, 2(10), 459-465. (Harvard University, Cambridge, Mass.).

In both vision and hearing, a masking or inhibiting stimulus increases the slope (exponent) of the power function that relates sensation to stimulus. The power transformation applies only to the inhibited part of the function where the signal is fainter than the masking noise. Where the signal equals the noise, the function shows a discontinuous knee. Experiments were undertaken to see whether the loudness of a tone of 1000 Hz in a white noise would follow a model based on a constant signal-to-noise ratio at two locations, at the effective threshold and at the knee where the inhibited function meets the uninhibited function. The data accord with the slopes (exponents) generated by the model. The same model gives a fairly good account of the recruitment functions for ears suffering from cochlear involvement (e.g., Ménière's disease). Regardless of degree of hearing loss, loudness recruitment reaches normal when the tone (1000 Hz) is about 30 dB above the effected threshold.
R 15

32,098
Rekosh, J.H. & Friedman, S.J. ERRORS IN AUDITORY DIRECTION-FINDING AFTER COMPENSATION FOR VISUAL RE-ARRANGEMENT. Perception & Psychophysics, Oct. 1967, 2(10), 466-468. (Tufts University, Medford, Mass.).

Subjects walked about out of doors wearing laterally displacing prisms, and sound-attenuating muffs. Errors occurred in an auditory localization task during exposure to visual displacement. With continued exposure these errors tended to disappear after about 180 min. The errors disappeared earlier when muffs were not worn.
R 7

32,099
Make, H.W., Faust, G.W., McIntyre, J.S. & Murray, N.G. RELATIONAL PERCEPTION AND MODES OF PERCEIVER OPERATION. Perception & Psychophysics, Oct. 1967, 2(10), 469-478. (University of Illinois, Urbana, Ill.).

Judgments were made of the size of a small, luminous (inner) square appearing in the center of a somewhat larger, variable (outer) square, the whole pattern appearing in the dark. Accuracy of judgment was greatest when the outer square was constant from trial to trial but deteriorated when the outer square also varied in size, reaching a lower limit less than the accuracy produced under the absolute judgment condition (no outer square presented). An application of multiple discriminant analysis and the use of a maximum likelihood observer model provided estimates of the extent to which observers responded to inner and outer size variation as separate aspects of stimulation. Although observers differed markedly in this respect, their ability to identify inner square size under various conditions did not reflect this difference.
R 7

32,100
Savin, H.B. ON THE SUCCESSIVE PERCEPTION OF SIMULTANEOUS STIMULI. Perception & Psychophysics, Oct. 1967, 2(10), 479-482. (University of Pennsylvania, Philadelphia, Penn.).

When subjects hear two messages concurrently over different "channels" (e.g., different ears, different voices, etc.), they tend to report first one message and then the other, rather than collating the two. This tendency has nothing to do with the nature of the differences between the two channels. It is a manifestation of the tendency for the auditory system to group successive, rather than simultaneous inputs. The same sequential grouping is found in the subjects' order of report when there is no stimulus property to differentiate between two channels.
R 4

32,101
Gregson, R.A.M. & Paris, C.L. INTENSITY-VOLUME INTERACTION EFFECTS IN GUSTATORY PERCEPTION. Perception & Psychophysics, Oct. 1967, 2(10), 483-487. (University of Canterbury, Christchurch, New Zealand).

Three paired comparison type experiments, with 20 different subjects in each, using citric acid at three concentration levels as taste stimulus, investigated some effects of differences in stimulus liquid bulk on perceived relative taste intensity, and effects of concentration differences on perceived relative volume. Perceived relative taste intensity increases slightly with increasing liquid bulk and relative perceived bulk increases slightly with concentration, both effects being significant: $p < .01$. An explanation in terms of a taste-quantity constancy mechanism is advanced.
R 10

32,102
Behar, I. & Wilms, J.S. EFFECTS OF ELECTROCUTANEOUS READY-SIGNAL VARIATION ON VISUAL REACTION TIME. Perception & Psychophysics, Nov. 1967, 2(11), 489-490. (USA Medical Research Lab., Fort Knox, Ky. & University of Louisville, Louisville, Ky.).

Two ready-signal variables (direction of change in electrocutaneous stimulation and method of presentation: "traced" or "delayed") were combined in a 2 by 2 by subject's design. Neither variable produced a significant main effect but yielded a highly significant interaction. Results were interpreted in terms of arousal, intersensory, and conditioning explanations of ready-signal effects.
R 7

32,103
Beck, J. PERCEPTUAL GROUPING PRODUCED BY LINE FIGURES. Perception & Psychophysics, Nov. 1967, 2(11), 491-495. (University of Oregon, Eugene, Ore.).

Two experiments, one with two and one with 3-line figures, studied the relative effectiveness of differences in orientation and shape in producing grouping by similarity. The results showed that changes in shape or orientation which leave the component lines of the figures vertical and horizontal do not facilitate grouping as readily as changes which alter the direction of the component lines to 45° and 135°. These results corroborate and extend the findings of Beck (HEIAS No. 32,103 & HEIAS No. 28,898) and are discussed in relation to the problem of specifying the properties of line figures that produce grouping by similarity.
R 6

32,104
Meiselman, H.L. & Dzendolet, E. VARIABILITY IN GUSTATORY QUALITY IDENTIFICATION. Perception & Psychophysics, Nov. 1967, 2(11), 496-498. (University of Massachusetts, Amherst, Mass.).

A total of 60 male and 60 female non-smoking undergraduates were tested on two guttatory screening tasks in which solutions representing the four basic taste qualities were used. The solution concentrations chosen were low, but supposedly distinct as to their qualities. Only 16% of the males were able to identify all solutions correctly, i.e., to a criterion of 4 correct out of 7 presentations, as compared to 34% of the females. A further 28% of the males consistently confused the sour and bitter qualities as did 10% of the females. A correction procedure used in one part of the experiment did not prevent this confusion. It is suggested that the sour-bitter confusion may be the gustatory analogue of abnormal color vision.
R 8

32,105
Rubinstein, L. & Rutschmann, J. REDUCTION OF THE "PSYCHOLOGICAL REFRACTORY PERIOD". Perception & Psychophysics, Nov. 1967, 2(11), 499-502. (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. & Columbia University, New York, N.Y.).

The usual increase in reaction time which occurs when a reaction stimulus is preceded by one irrelevant stimulus was reduced 30% by preceding the latter with a second irrelevant stimulus at certain critical intervals between stimuli. The interaction between the irrelevant stimuli, as measured by reaction time, has a different time course than the interaction implicit in the "psychological refractory period".
R 6

32,106
Pangborn, Rose Marie & Trabue, Ida M. DETECTION AND APPARENT TASTE INTENSITY OF SALT-ACID MIXTURES IN TWO MEDIA. Perception & Psychophysics, Nov. 1967, 2(11), 503-509. (University of California, Davis, Calif.).

Gustatory responses to mixtures of sodium chloride and citric acid were measured in two media of dispersion, distilled water and green bean puree, by fifteen experienced subjects. The two psychophysical methods employed, detection thresholds and apparent taste intensity, showed good agreement. Salt sharply depressed apparent sourness in both media, as well as interfering with detection of sourness. Citric acid influenced apparent saltiness in a complex manner, dependent upon concentration, media, method, and the individual subject. In water, lower concentrations of acid generally enhanced and higher concentrations depressed saltiness. Within both media, half the subjects indicated an enhancement of saltiness with increasing acidity and half indicated the reverse. Higher acid levels interfered with detection of saltiness. This biphasic response to binary taste stimuli is discussed and compared with pertinent findings from previous literature.
R 15

32,107
Kulp, R.A. & Alluisi, E.A. EFFECTS OF STIMULUS-RESPONSE UNCERTAINTY ON WATCHKEEPING PERFORMANCE AND CHOICE REACTIONS. Perception & Psychophysics, Nov. 1967, 2(11), 511-515. (HSA HumRRO Research Division No. 2 (Armor), Fort Knox, Ky. & University of Louisville, Louisville, Ky.).

The present study was conducted to assess the effects of stimulus-response (S-R) uncertainty on performance in watchkeeping and typical type-b choice-reaction situations. The assessment was based in part on measurements of S-R compatibility effects in the two performance conditions. Four levels of S-R uncertainty (1, 2, 3 and 4 bits/S-R event) were combined factorially with two levels of S-R compatibility (high and low) and the two kinds of tasks (watchkeeping and choice-reaction); 12 subjects were assigned at random to each of the 16 conditions. A matrix of lights was used as stimuli in the choice-reaction condition; subjects monitored the matrix for a 1-h duration in the watchkeeping condition. In both tasks, subjects responded by pressing a corresponding key after the presentation of a stimulus or "critical signal." Reaction time (RT) was found to be an increasing linear function of S-R uncertainty in both tasks, and the effects of S-R compatibility were essentially identical in the two. However, choice reactions were significantly faster than watchkeeping responses, and the rate of gain of information in watchkeeping was greater than in the comparable choice-reaction situations. The results are interpreted as supporting the hypothesis that watchkeeping differs from the simpler choice-reaction task principally in presenting an additional source of (temporal) uncertainty for information processing.
R 20

32,108
Stone, H. & Pryor, G. SOME PROPERTIES OF THE OLFACTORY SYSTEM OF MAN. Perception & Psychophysics, Nov. 1967, 2(11), 516-518. (Biobehavioral Sciences Dept., Stanford Research Institute, Menlo Park, Calif.).

Preliminary investigations into the effects of a 12-h diurnal variation suggested there was a 10-fold decrease in odor sensitivity from morning to evening. For a selected group of odorants (methyl, t-butyl, and phenyl isonitrile), the difference between detection and recognition thresholds in general was 5 and to be 10-fold; however, for some subjects the difference was less. When Ss were blindfolded, no changes in odor sensitivity were noted. Similarly, imposing an auditory stress on the test situation did not significantly alter odor sensitivity in either experienced or naive subjects.
R 6

32,109
Dzendolet, E. BEIDLER'S TASTE EQUATION: A CORRECTION. Perception & Psychophysics, Nov. 1967, 2(11), 519-520. (University of Massachusetts, Amherst, Mass.).

Beidler derived an equation relating the magnitude of neural response to a gustatory stimulus with the concentration of that stimulus. In the derivation, he assumed the amount of stimulating substance removed from the solution by the receptors was small enough not to change the stimulus concentration appreciably. An equation without this assumption is derived, and is evaluated in the light of existing data. The hypothesis for a dissociation reaction in taste inception under some circumstances is given support.
R 8

32,110
Beare, A.C. & Siegel, M.H. COLOR NAME AS A FUNCTION OF WAVELENGTH AND INSTRUCTION. Perception & Psychophysics, Nov. 1967, 2(11), 521-527. (Aerospace Div., Westinghouse Defense & Space Center, Baltimore, Md. & Ripon College, Ripon, Wisc.).

A series of experiments were performed to determine the effects of instructions upon color naming data. Although color name is basically a function of stimulus wavelength, even slight changes in the response categories available for the subject led to substantial changes in the pattern of subjects' response allocation.
R 6

32,111
Pangborn, Rose Marie, Trabue, Ida M. & Szrylko-Pikiella, Nina. TASTE, ODOR, AND TACTILE DISCRIMINATION BEFORE AND AFTER SMOKING. Perception & Psychophysics, Nov. 1967, 2(11), 529-532. (University of California, Davis, Calif.).

Differential sensitivity was measured before and after smoking a cigarette by seven smokers, using six non-smokers as controls. Stimuli consisted of the tastes of sucrose, sodium chloride, citric acid, caffeine, and quinine hydrochloride; the odors of vanillin and 2-butanone; and the viscosity produced by a carrageenan gum. No significant jnds were observed between smokers and non-smokers, nor before vs after smoking. Therefore, the data supported neither long-term nor short-term influences of cigarette smoking. Practice effects were noted among the control group, as more correct responses were obtained on the second than on the first set of solutions in most of the test stimuli.
R 8

32,112
Ylinen, H. PERCEPTUAL INVARIANCE AND THE PSYCHOPHYSICAL LAW. Perception & Psychophysics, Nov. 1967, 2(11), 533-538. (Arthur D. Little, Inc., Cambridge, Mass.).

The psychophysical power law, demonstrated empirically by Stevens, is derivable from two postulates concerning: a) the tendency of perceptual organizations to model the environment; and b) the tendency for perceptual relations to remain constant. The two postulates appear to rule out logarithmic laws of the Fechner type. The theory is extendable to multidimensional perceptions such as those encountered in speech and color vision. The power transformations produced by the sense organs may be of such form that they produce a perceptual space in which subsequent transformations need be only linear.
R 24

32,113
Segelman, O.A. & Steinfeld, G. AN INVESTIGATION OF SEVERAL PARAMETERS OF THE HORIZONTAL-VERTICAL ILLUSION. Perception & Psychophysics, Nov. 1967, 2(11), 539-543. (Fairfield Hills Hospital, Newtown, Conn.).

Length of standard line, degrees of lateral separation of H and V stimuli, and which line served as standard or comparison stimulus were systematically varied in a 4 by 3 by 2 factorial design on the horizontal-vertical illusion. When illusion effects were averaged under H- and V-standard conditions, a negative relationship obtained between magnitude of illusion and length of line. With vertical as standard, the illusion increased as a function of lateral separation of stimuli, but decreased with horizontal as standard. These differential trends for H- and V-standard conditions contributed to the unsystematic relationship between the size of the illusion and progressive displacement of H and V lines. The illusion curves for three lengths of standard line across degrees of lateral separation were similar. The findings are viewed as incompatible with explanations of the H-V illusion involving the so-called "error of the standard."
R 13

32,114
Huppert, Felicia & Singer, G. AN AFTEREFFECT IN JUDGMENT OF AUDITORY DURATION. Perception & Psychophysics, Nov. 1967, 2(11), 544-546. (University of California, San Diego, Calif. & University of Sydney, Sydney, Australia).

Two experiments were designed to investigate the occurrence of a temporal aftereffect following auditory spatial stimulation. The task required subjects to compare by means of a motor response the duration of a test tone presented at a variable interval after stimulation with a standard tone. In both experiments the posttest duration was underestimated relative to the pretest duration, i.e., there was a temporal aftereffect (TAE). A control experiment which involved subjects making estimates of the duration of the test tones, without the presentation of interpolated standard tones, did not show the effect. The temporal aftereffect followed a function analogous to the "distance paradox" for spatial aftereffects.
R 9

32,115
Mackworth, N.H. & Morandi, A.J. THE GAZE SELECTS INFORMATIVE DETAILS WITHIN PICTURES. Perception & Psychophysics, Nov. 1967, 2(11), 547-552. (Harvard University, Cambridge, Mass.).

The visual fixations of 20 subjects viewing each of two pictures were measured. Each picture was later divided into 64 squares, and 20 other subjects judged their recognizability on a 10-point scale. Both measures gave high readings for unusual details and for unpredictable contours. Although they were judged to be highly recognizable, all the redundant (or predictable) contours received few fixations. Areas of more texture scored low on both measures. The relations between fixation densities and estimated recognizability suggest that a scene may be divided into informative features and redundant regions. Not only do the eyes have to be aimed, they are usually aimed intelligently, even during the casual inspection of pictures.
R 26

32,116
Hayes, C.J.A. & King, W.L. TWO TYPES OF PHENOMENAL INSTRUCTIONS FOR SIZE AND DISTANCE JUDGMENTS OF OBJECTS PRESENTED ON A TWO-DIMENSIONAL PLANE. Perception & Psychophysics, Nov. 1967, 2(11), 556-558. (Dalhousie University, Halifax, Nova Scotia, Canada).

Demand characteristics were studied in a simple situation in which observers made size and distance estimates of stimuli presented on a two-dimensional linear perspective drawing. Half the subjects were asked questions stressing phenomenal report. The other half were asked the same questions preceded by instructions stressing the objective nature of the stimulus configuration but requesting, nonetheless, phenomenal report. Instructions resulted in a significantly greater perspective size illusion but did not affect the distance estimates. No meaningful correlations between size and distance estimates were found.
R 7

32,117
Glanzer, M. & Fleishman, J. THE EFFECT OF ENCODING TRAINING ON PERCEPTUAL RECALL. Perception & Psychophysics, Dec. 1967(Part A), 2(12), 561-564. (New York University, New York, N.Y. & Yeshiva University, New York, N.Y.).

The effect of encoding training on tachistoscopic performance was measured by training groups of subjects in either an octal or a standardized English encoding of nine place binary numbers. A control group of subjects was allowed to encode ad lib during an equivalent training period. Performance was measured before, during and after the encoding training. It was found that imposing a code on a subject impaired tachistoscopic performance both during and for some time after the encoding training. Possible reasons for this effect are discussed.
R 6

32,118
Dierspecker, D.D. & Davenport, W.G. THE INITIAL EFFECT OF NOISE ON A SIMPLE VIBROTACTILE LEARNING TASK. Perception & Psychophysics, Dec. 1967(Part A), 2(12), 569-571. (University of Newcastle, New South Wales, Australia).

In two experiments the effect of loud noise on a simple vibrotactile learning task was studied. After learning the task to criterion, 10 male and 10 female subjects received two pairs of test trials, one without noise, and one in continuous noise (a 1,000 cps pure tone at 90 dB sound pressure level). An additional 10 male and 10 female subjects learned the same task and also received the same two pairs of test trials, but instead of receiving continuous noise for the second condition, they received an intermittent noise (random numbers presented at 2 sec intervals at 95 dB sound pressure level). In the first experiment noise had a significant effect on the performance of the 20-subject group and also on the females in the group. Noise did not significantly affect the performance of males. In the second experiment noise had no significant effect on either males or females.
R 9

32,119
Dick, A.O. & Hochhorst, D.J.K. ORDER OF REPORT AND PROCESSING IN TACHISTOSCOPIC RECOGNITION. Perception & Psychophysics, Dec. 1967(Part A), 2(12), 573-576. (University of Waterloo, Waterloo, Ontario, Canada).

Two groups of twelve subjects were shown tachistoscopically 4 letters and 4 numbers. Within these alpha-numeric sequences, three variables were systematically manipulated; grouping of items, initial item, and familiarity of the letter sequences. One group of subjects reported first letters then numbers from each sequence; the other group reported numbers then letters. The results indicated that grouping, redundancy, and order of report had significant effects on letter accuracy but not on number accuracy. These effects were interpreted in terms of processing, particularly the use of spatial and identity information during recognition.
R 6

32,120
Kaufmann, R. THE OVERESTIMATION OF VERTICAL DISTANCE AND SLOPE AND ITS ROLE IN THE MOON ILLUSION. Perception & Psychophysics, Dec. 1967(Part A), 2(12), 585-589. (Oakland University).

Six experiments were conducted to test the hypothesis that overestimation of vertical distance is a pervasive phenomenon. The experiments involved judgments of: a) vertical distance looking forward; b) vertical distance looking downward; c) the slope of a real hill; d) the recalled slopes of streets; e) the magnitudes of angles drawn on paper; f) the distances to afterimages projected into the sky. The results showed that a very strong illusion of overestimation of both vertical distance and slope occurred in all situations except for the judgments of drawn angles by males. Furthermore, in five of the six experiments females showed a greater amount of the illusion than males. The discussion pointed out the difficulty of explaining the moon illusion by the assumptions of a flattened sky surface and Emmert's law in light of the data.
R 4

32,121
Pollack, I. & Rose, M. EFFECT OF HEAD MOVEMENT ON THE LOCALIZATION OF SOUNDS IN THE EQUATORIAL PLANE. Perception & Psychophysics, Dec. 1967(Part A), 2(12), 591-596. (Mental Health Research Institute, University of Michigan, Ann Arbor, Mich.).

Five experiments examined the effect of head movement on the localization of sound sources in the equatorial plane. Under most conditions, head movement produces poorer localization for sound sources in the equatorial plane. Only one condition demonstrated an improvement in localization with head movement. The sound source was located toward the side of the head and the source duration was long enough to permit reorientation of the position of the head with respect to the sound source.
R 5

32,122
Forsyth, G.A. & Brown, D.R. STIMULUS CORRELATES OF TACHISTOSCOPIC DISCRIMINATION-RECOGNITION PERFORMANCE: COMPACTNESS, JAGGEDNESS, AND AREAL ASYMMETRY. Perception & Psychophysics, Dec. 1967(Part A), 2(12), 597-600. (University of New Hampshire, Durham, N.H. & Purdue University, Lafayette, Ind.).

The utility of three physical dimensions (compactness, jaggedness, and areal asymmetry) of four-sided random forms on discrimination-recognition performance was examined. Six experimental conditions were defined by constructing discrimination-recognition problems wherein forms were paired on the basis of a high or low value on each of the three physical dimensions. Twenty-six subjects were randomly assigned to each experimental condition and were tested on five problems, four times at each of five single form duration times. Each problem presentation consisted of selecting which of two forms had been previously exposed at the selected duration. Analysis of the number of correct responses indicated support for the existence of a selective attention process and the utility of the compactness physical dimension.
R 14

32,123
Doetsch, E. & Matselaan, H.L. CATION AND ANION CONTRIBUTIONS TO GUSTATORY QUALITY OF SIMPLE SALTS. Perception & Psychophysics, Dec. 1967(Part B), 2(12), 601-604. (University of Massachusetts, Amherst, Mass.).

Curves of mean percentages of the four gustatory quality responses as a function of concentration of solutions of LiCl, KCl, lithium sulfate, and potassium sulfate were evaluated as to the relative contributions of the cation and anion to the quality. It was concluded that chloride ion, and sulfate ion to a lesser degree, were responsible for the salty quality. In the mid-range concentrations, potassium ion was responsible for the bitter quality, and lithium ion, by means of an ion-solvent interaction, was responsible for the sour quality reported. At the very low concentrations, at which all salts tested evoked sweet responses, a structure produced by a solvent-cation interaction was assumed to be responsible. The details of the presumed structure are still to be clarified. Although one ion in each salt is primarily responsible for a particular quality over a given concentration, the other ion usually modifies the effect.
R 5

32,124
Foley, J.M. DISPARITY INCREASE WITH CONVERGENCE FOR CONSTANT PERCEPTUAL CRITERIA. Perception & Psychophysics, Dec. 1967(Part B), 2(12), 605-608. (University of California, Santa Barbara, Calif.).

If a depth interval is matched to an egocentric distance, the disparity required increases with convergence by 50 to 130% (depth micropsia). If a depth interval is matched to a frontal extent of constant visual angle, disparity again increases with convergence, but the proportion increase is slightly smaller. This difference is attributed to the previously established effect of convergence on perceived size (size micropsia).
R 9

32,125
Clark, B. & Graybiel, A. EGOCENTRIC LOCALIZATION OF THE VISUAL HORIZONTAL IN NORMAL AND LABYRINTHINE-DEFECTIVE OBSERVERS AS A FUNCTION OF HEAD AND BODY TILT. Perception & Psychophysics, Dec. 1967(Part B), 2(12), 609-611. (San Jose State College, San Jose, Calif. & USN Aerospace Medical Institute, NAMC, Pensacola, Fla.).

Perception of the visual horizontal by observers in five different combinations of head and body position was studied to determine the effect of 20-degree body tilts. Both normal and labyrinthine-defective observers made five settings to the visual horizontal for each condition using a goggle device which presented a collimated line of light to the right eye while the other eye was covered. The results showed no significant constant errors in the settings by either group, and it is suggested that the absence of the E-phenomenon was due primarily to adequate contact cues and kinesthetic cues. The data also make it clear that vestibular information is not required for veridical perception of the visual horizontal under these experimental conditions.
R 9

32,126
Stevens, J.C. & Marks, L.E. APPARENT WARMTH AS A FUNCTION OF THERMAL IRRADIATION. Perception & Psychophysics, Dec. 1967(Part B), 2(12), 613-619. (John B. Pierce Foundation Laboratory, New Haven, Conn. & Yale University, New Haven, Conn.).

The skin of the back was periodically exposed to a source of radiant heat. In Experiment 1, twenty subjects matched numbers to the apparent warmth aroused by various levels of irradiant flux (method of magnitude estimation). In Experiment 2, fifteen subjects matched the loudness of a white noise to the apparent warmth aroused by the same levels used in Experiment 1 (method of cross-modality matching). Both experiments showed that apparent warmth is related to absorbed irradiance by a power function whose exponent is approximately 0.7.
R 14

32,127
Tees, R.C. & Hore, Linda K. VISUAL DISAPPEARANCES UNDER SIMPLIFIED STIMULUS CONDITIONS CAUSED BY AUDITORY PERCEPTUAL LEARNING. Perception & Psychophysics, Dec. 1967(Part B), 2(12), 627-629. (University of British Columbia, Vancouver, British Columbia, Canada).

The purpose of this investigation was to determine whether auditory experience with stimuli would produce predictable changes in disappearances of these same stimuli when later presented visually under simplified stimulation conditions. Modifications in disappearance phenomena were observed which supported the inter-modal perceptual learning hypothesis.
R 8

32,128
Saul, E.V. ON THE BUILDING OF BRIDGES. Hum. Factors J., Feb. 1967, 9(1), 1-4. (Psychology Dept., Tufts University, Medford, Mass.).

This paper presents in the first person singular a description of some needs of human factors scientists and practitioners which have programmatic implications for individual and collective action by the membership of the Human Factors Society.
R 7

32,129
Bennett, C.A., Winterstein, S.H. & Kent, A.E. IMAGE QUALITY AND TARGET RECOGNITION. Hum. Factors J., Feb. 1967, 9(1), 5-32. (IBM Electronics Systems Center, Owego, N.Y.).

The terminology and literature in the area of image quality and target recognition are reviewed. An experiment in which subjects recognized strategic and tactical targets in aerial photographs with controlled image degradations is described. Some findings are: Recognition performance is only moderate for representative conditions. There are wide differences among target types in the recognizability. Knowledge of a target's presence (briefing) greatly aids recognition. Better resolution means better performance. Enlarging the image such that a line of resolution subtends more than three minutes of arc hinders recognition. Grain size should be kept below 20 seconds of arc. It is suggested that the eventual application of the modulation transfer function approach to measurement of image quality and target characteristics will enable a quantitative subsuming of various quality-size relationships. More attention needs to be paid in recognition research to suitable task definition, target description, and subject selection.
R 61

32,130
Hornseth, J.P. & Davis, J.H. INDIVIDUAL AND TWO-MAN TEAM TARGET FINDING PERFORMANCE. Hum. Factors J., Feb. 1967, 9(1), 39-43. (USAF Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio & Miami University, Oxford, Ohio).

Individuals and two-man teams were tested on three target finding tasks. Effective performance of a target-finding task requires the establishment of an efficient search strategy which minimizes the time taken to find the target. On two of the tasks team performance was no better than would be expected, from normal order statistics, of its more capable member. Team performance on the third task presented evidence of a shift in team search strategy away from independent (or redundant) searching toward a more effective division of labor.
R 4

32,131
Smith, W.E. A MODEL FOR A SERIES PROCESSING SYSTEM. Hum. Factors J., Feb. 1967, 9(1), 53-59. (IBM Systems Development Div., San Jose, Calif.).

Many processing systems, such as manufacturing assembly lines, can be described as a series of discrete operations performed on discrete units being processed. To evaluate the effectiveness of operators in such systems or to determine the best way to improve their performance, it is necessary to have a performance measure that relates to total system effectiveness. Current techniques measure operator performance in terms of time and errors, but they provide little predictive ability as to the effects of these parameters. To relate time and yield measures to a single criterion of system performance, a method has been developed for evaluating operator effectiveness in a series processing system that processes discrete items in large quantities. By recognizing and dealing with the fact that rejects at the end of series process are more expensive than at the beginning of the process, statements are developed for measuring performance in terms of its actual effect on the system. Concepts and methods are presented for measuring total system performance, performance of any segment of the system, total performance of any operator, and the effects of time and accuracy on operator performance.

32,132
Braunstein, M.L. & Coleman, O.F. AN INFORMATION-PROCESSING MODEL OF THE AIRCRAFT ACCIDENT INVESTIGATOR. Hum. Factors J., Feb. 1967, 9(1), 6.-70. (Psychology Dept., University of California, Irvine, Calif.).

Verbal reports elicited from accident investigators and motion pictures of the investigators' activities during 16 investigations of light aircraft accidents were used as the empirical basis for a computer model of the aircraft accident investigator. The model simulates the major processes apparent in the investigators' reports, including the selection of aircraft and terrain features to be observed and the generating and testing of kinematics hypotheses. The computer program accepts a description of aircraft damage and gouge marks and generates a series of kinematics hypotheses. The effects of variations in investigator parameters on the outputs of the model were studied in a series of 40 simulation runs. A preliminary comparison was made between the output of the model and the conclusions of a human investigator working with the same data.
R 3

32,133
Meister, D. & Farr, D.E. THE UTILIZATION OF HUMAN FACTORS INFORMATION BY DESIGNERS. Hum. Factors J., Feb. 1967, 9(1), 71-87. (Bunker-Ramo Corporation, Canoga Park, Calif.).

Ten packaging designers were tested on three specially developed tests which required them to analyze various design situations and to construct a conceptual drawing of the equipment configuration according to design specifications. Five human factors specialists were also tested on several sub-test items. Designers appear to have little or no interest in human factors criteria or information and usually fail to consider human factors in their designs. Their analysis of design requirements is minimal and shallow. Human factors personnel reacted in a manner similar to designers in terms of overall design criteria.
R 6

32,134
Holland, C.L., Jr. PERFORMANCE EFFECTS OF LONG TERM RANDOM VERTICAL VIBRATION. Hum. Factors J., April 1967, 9(2), 93-104. (Lockheed-Georgia Company, Lockheed Aircraft Corp., Marietta, Ga.).

Compensatory tracking performance was assessed during six hours of continuous exposure to random vertical vibration conditions. The results indicate that performance is significantly affected by the location of peak vibration acceleration power. Longitudinal assessment of tracking performance revealed that subjects can track and perform other tasks without serious decrement for as long as six hours while experiencing vibration acceleration intensities of 0.16g root-mean-square (RMS).
R 10

32,135
Hershberger, M.L. AN EXPERIMENTAL STUDY OF IMAGE MOTION COMPENSATION TRACKING FOR EARTH RECONNAISSANCE FROM SPACE. Hum. Factors J., April 1967, 9(2), 105-118. (Aerospace Group, Hughes Aircraft Company, Culver City, Calif.).

An experiment was conducted to investigate man's ability to perform image motion compensation tracking for earth reconnaissance from space. The study investigated: a) two control system tracking modes--computer-aided tracking and manual tracking; b) control dynamics--rate and acceleration; c) controller gain--low, medium, and high; and d) magnification--1 to 200 power. The two control modes were treated in separate studies based on large performance differences observed during pilot studies. A major objective of the study was to determine the type of control system and the amount of magnification necessary to meet a 0.05 mr/sec image motion compensation tracking performance criterion. The results of the investigation revealed that the manual tracking mode was unacceptable in terms of the system performance criterion; whereas, the computer aided tracking mode yielded performance which met the criterion at several combinations of experimental conditions. Magnification and controller gain levels were found to have highly significant effects on tracking performance. The results are discussed in terms of reconnaissance system design applications.
R 3

32,136
Chapanis, A. & Mankin, D.A. TESTS OF TEN CONTROL-DISPLAY LINKAGES. Hum. Factors J., April 1967, 9(2), 119-126. (Psychology Dept., Johns Hopkins University, Baltimore, Md.).

This experiment tested ten different linkages between four displays and four control buttons on a vertically-mounted surface. The displays were arranged in a square and the controls were in a vertical colum to the right of the displays. A single panel was used for all tests; different linkages were made by changing electrical connections. Eighty male subjects (eight for each linkage) were tested. The subject's task was to push the appropriate control button as soon as a light appeared in one of the displays. Each subject was given 96 consecutive trials on the linkage to which he was assigned. Dependent measures were: times to first response, times to correct response, and errors. The results show that one of the ten linkages is best in terms of both time and errors. There are also some significant differences between certain other linkages. These findings hold only for those situations in which, for some reason, it is necessary to have the displays arranged in the form of a square and the controls in a vertical colum to the right of the displays.
R 7

32,137
Gifford, R.N. & Lyman, J. TRACKING PERFORMANCE WITH ADVANCED AND DELAYED VISUAL DISPLAYS. Hum. Factors J., April 1967, 9(2), 127-132. (Biotechnology Lab., University of California, Los Angeles, Calif.).

Human operator performance in continuous pursuit tracking when the stimulus either disappeared prior to the appropriate response time or appeared subsequently to that time was investigated. Tracking was one-dimensional, the stimulus appeared to vary randomly, and feedback of results wasn't provided. The stimulus, consisting of the sum of three low-frequency sine waves, appeared on recording paper tape, moving at 1.0 cm/sec. Masks hid the display in steps up to 1.0 secs before or 0.5 secs. after the position of a manually-controlled pointer. Timing performance was measured by the peaks of cross-correlations of stimulus/response data pairs which had been successively shifted in time. Tracking performance was measured by root-mean-square (RMS) error. Timing was increasingly too early for advanced displays but followed closely the actual appearance time of delayed displays. RMS tracking error increased with increasingly advanced and delayed displays. Practice effects were negligible.
R 9

32,138
Weiman, G., Nachson, A. & Groth, Hilde. SKILL ACQUISITION IN MULTI-DIMENSIONAL MANIPULATOR CONTROL. Hum. Factors J., April 1967, 9(2), 132-139. (University of California, Los Angeles, Calif.).

Movements of a three-jointed electrically-powered manipulator were controlled by vertical movements of the second, third and fourth fingers of the subject's hand. Both two-dimensional and three-dimensional movement problems were examined. In the two-dimensional case, subjects were shown a silhouette of the manipulator with a lit endpoint or the manipulator endpoint alone. The manipulator was always fully visible in the three-dimensional case. Recordings were made of time-to-target, maximum deviation from a straight line path, and the percent of time that various numbers of controls were activated simultaneously. The results indicated that with practice the subjects tended to approach targets on a straight line course in both situations. They also increased the percentage of time that several controls were activated together. Being able to see the manipulator improved control coordination and decreased movement time in the two-dimensional case, but did not affect movement accuracy.
R 7

32,139
Knowles, W.B. AEROSPACE SIMULATION AND HUMAN PERFORMANCE RESEARCH. Hum. Factors J., April 1967, 9(2), 149-159. (Hughes Aircraft Company, Culver City, Calif.).

The many large-scale aerospace simulation facilities now available offer considerable potential for the generation of data on human performance that can be used in systems engineering design efforts. To realize this potential requires an understanding of the methodological limitations imposed by the basic characteristics of human performance, the application of efficient organizational techniques, and the development of more efficient techniques of experiment planning, design, and execution.
R 31

32,140
Carr, R.M. THE EFFECTS OF COLOR CODING INDICATOR DISPLAYS ON DARK ADAPTATION. Hum. Factors J., April 1967, 9(2), 175-179. (Raytheon Company, Portsmouth, R.I.).

Utilization of complex sonar systems is handicapped by lighting requirements for dark adaptation of personnel. An experiment was conducted to compare reaction times to color-coded indicators under red, normal white and normal white ambient lighting. Subsequent analysis shows that poorest performance was obtained under red ambient illumination. Visual acuity tests indicate that dark adaptation is primarily dependent upon the overall illumination level rather than upon red lighting. Results tend to prove that an illuminated indicator display color has little effect on dark adaptation, and that certain indicator colors are more quickly detected than others. Recommendations are made for optimal and alternate lighting and indicator color combinations.
R 3

32,141
Reed, L.E. & Wise, F.H. REPORT ON AUTOMATED HUMAN FACTORS TASK DATA HANDLING RESEARCH. Hum. Factors J., April 1967, 9(2), 181-186. (USAF Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio & System Development Corporation, Dayton, Ohio).

The relative simplicity of early systems was such that hardware components and the accompanying human requirements (skills) were easily interchanged within and between systems. Current complex systems are accompanied by an increased need for closer consideration of the human component. The volumes of information generated and the compressed developmental schedules have led to: a) decreased effectiveness of data on system design and development; b) increased reliance on expertise when existing data are not known to exist or are inaccessible; c) generation of inadvertant duplication of research effort; and d) scattering of costly information. In 1963, the Aerospace Medical Research Laboratories and the National Aeronautics and Space Administration, initiated a joint research effort to explore and, where possible, develop techniques for efficient handling and processing human factors task data generated in support of the Personnel Subsystem program. These techniques are being developed within the context of an overall data handling system concept which would operate in an Air Force/NASA/contractor environment.
R 4

32,142
Gould, J.D. & Schaffer, Amy. THE EFFECTS OF DIVIDED ATTENTION ON VISUAL MONITORING OF MULTI-CHANNEL DISPLAYS. Hum. Factors J., June 1967, 9(3), 191-201. (IBM Research Center, Yorktown Heights, N.Y.).

This study investigated the effects of divided attention on monitoring multi-channel alphameric displays for signals defined on the basis of the simultaneous values of all channels, i.e., multi-channel signals as opposed to single-channel signals. Variables investigated included: a) three methods of dividing attention (a short writing task, a long writing task, and blanking out the display), b) number of channels monitored (4, 8, 12, and 16), c) rate of display change (6 or 12 times per minute); d) number of different signals simultaneously watched for (8 or 24), and e) number of levels within channels (2 or 8). The main results were: a) divided attention did not lead to a decrease in monitoring, compared to a control study without divided attention; b) the rate of display change had the greatest effect upon performance, followed by the number of channels monitored; c) even at the faster rate of display change, untrained subjects detected 80% or more of the signals when they monitored up to 12 channels; and d) different methods used to divide attention affect performance differentially.
R 22

32,143
Fox, W.F. HUMAN PERFORMANCE IN THE COLD. Hum. Factors J., June 1967, 9(3), 203-220. (Human Resources Research Office, George Washington University, Alexandria, Va.).

The literature dealing with human performance in the cold is reviewed. Seven major areas are discussed: a) tactile sensitivity, b) manual performance, c) tracking, d) reaction time, e) complex behaviors, f) maintaining hand skin temperature (HST) as a means of maintaining operator effectiveness, and g) adaptation and acclimatization to low ambient temperatures. Performance decrements at low ambient temperatures appear to result principally from lowered HST and competing stimuli provided by the cold environment.
R 48

32,144
Wargo, M.J. HUMAN OPERATOR RESPONSE SPEED, FREQUENCY, AND FLEXIBILITY: A REVIEW AND ANALYSIS. Hum. Factors J., June 1967, 9(3), 221-238. (Western Div., Dunlap & Associates, Inc., Santa Monica, Calif.).

The innate and state-of-the-art limitations on human operator manual control speed, frequency, and flexibility are reviewed and analyzed. Advanced manual control techniques for overcoming these limitations are suggested and research relating to these suggestions is reviewed. It is concluded that a considerable increase in human operator response speed, frequency, and flexibility could accrue from use of the suggested manual control techniques.
R 107

32,145
Cahill, H.E. & Luce, R.S. EFFECTIVENESS OF SIDE-LOOKING RADAR IN SIMULATED ORBIT AS A FUNCTION OF REFERENCE DATA SUPPORT. Hum. Factors J., June 1967, 9(3), 239-250. (Missiles & Space Company, Lockheed Aircraft Corp., Sunnyvale, Calif.).

Subjects' ability to identify ground targets through side-looking radar imagery from a simulated space orbit was evaluated. Two levels of target localization data (Precise versus General) were provided on a reference display either simultaneously with or immediately in advance of the presentation of targets on an adjacent TV monitor. Precise Target Localization Groups performed better both with respect to speed and accuracy of identification. Simultaneous and advanced-presentation of reference data produced essentially equivalent accuracy results but subjects in the latter condition responded significantly faster. It was concluded that precise target localization, as may be provided by preflight intelligence or inflight information from forward looking sensors, is particularly important in supporting target identification by side-looking radar at near real time rates. Possible advantages of advanced presentation of localization cues were less clearly established.
R 7

32,146
Morrill, C.S. COMPUTER-AIDED INSTRUCTION AS PART OF A MANAGEMENT INFORMATION SYSTEM. Hum. Factors J., June 1967, 9(3), 251-256. (Mitre Corporation, Bedford, Mass.).

This paper discusses the application of computer-aided instruction as part of a management information system. The computer presents displays which instruct the student on-line to exercise control of the computer system using a typewriter or a lightpen located at the console work station.
R 5

32,147
Kinkade, R.G. & Ranc, M.P. THE EFFECT OF CONFLICTING INSTRUCTIONS AND FEEDBACK SPECIFICITY ON TACTICAL DECISION PERFORMANCE. Hum. Factors J., June 1967, 9(3), 257-262. (A.A.I. Corporation, Cockeysville, Md.).

A relatively simple tactical decision task was employed to study the effects of conflicting instructions and feedback specificity on tactical decision performance. The results of this experiment indicate that instructions which are diametrically opposed to the actual situation will decidedly degrade the quality of decision making performance regardless of the specificity of feedback. The decision maker apparently will continue to perform in accordance with the relationships outlined in his instructions, even when numerical information about the Ps (probability succe of the selected alternative is provided as feedback.

32,148
Hillix, W.A., Kapfer, E.L., Jr. & Hershman, R.L. HUMAN ESTIMATES OF RANDOMLY PERTURBED FUNCTIONAL VALUES. Hum. Factors J., June 1967, 9(3), 263-272. (USN Electronics Lab., Bureau of Ships, San Diego, Calif.).

The ability to estimate values of a function of two independent variables was studied. Numbers in a matrix were first estimated on the basis of past observations; then different subjects estimated the heights of rods which were to occupy positions in the same matrix. In each condition subjects were given feedback information which deviated from the true functional values because of "noise" or random error in the observations. The visual effect of the rods presentation enhanced estimation performance only at the highest noise levels and then only to a small degree. Subjects showed a decreasing but persistent ability to estimate, and this was linearly related to the standard deviation of the perturbing noise. The variance of subjects' guesses generally increased with the variance of the perturbed inputs. Subjects' behaviors were compared with that of a simple scanning and average-taking estimator.
R 19

32,149
Christ, R.E. & Teichner, W.E. THE EFFECTS OF DIFFERENTIAL VALUE ON THE RECALL OF REALISTIC TARGETS. Hum. Factors J., June 1967, 9(3), 273-276. (Psychology Dept., Kansas State University, Manhattan, Kan. & Psychology Dept., Northeastern University, Boston, Mass.).

The effects of differential value upon detection and recall were investigated using a multisymbol visual display. Three groups of 14 subjects each viewed slides containing experimentally varied numbers of different realistic targets drawn from a population of nine possible targets. All subjects were instructed to maximize the value of their reports. One group was told that all targets were of equal value; for another group a different value was assigned to each of the nine targets; and for a third group, three different values were assigned to three sets of three targets each. The results suggested that performance may depend less on the differences in values assigned to targets than on the number and range of different values.
R 3

32,150
Mirabella, A. & Goldstein, C.A. THE EFFECTS OF AMBIENT NOISE UPON SIGNAL DETECTION. Hum. Factors J., June 1967, 9(3), 277-284. (Electric Boat Div., General Dynamics Corporation, Groton, Conn.).

One aspect of the sensory interaction phenomenon was reviewed, the effect of ambient noise upon signal detection performance. An objective of this review was to arrive at possible generalizations about the effects of noise through an examination of variables affecting both similarities and divergencies of results. A second objective was to discuss some of the limitations of noise research for theory and practice, using sonar surveillance in undersea warfare as a reference operation. The conclusions from the review were organized under two major headings: a) effects of noise for the alerted operator case involving threshold sensitivity, and b) effects of noise for the unalerted operator case involving vigilance behavior. The limitations of the literature for theory and practice were also discussed under these major headings.
R 31

32,151
Jerison, H.J. SIGNAL DETECTION THEORY IN THE ANALYSIS OF HUMAN VIGILANCE. Hum. Factors J., June 1967, 9(3), 285-288. (Behavior Research Lab., Antioch College, Yellow Springs, Ohio).

This note analyzes several recent experimental and theoretical reports on vigilance that use the theory of signal detectability (TSD). The psychological interpretation of the TSD measure of criterion, β, as an index of conservativeness during a vigil does not appear to be valid. As computed, β is probably an artifact due to pooling observations made under different conditions of attentiveness during a long vigil. The basic problems of vigilance research remain: to determine the conditions that affect attentiveness in signal detection tasks.
R 11

32,152
Freund, L.E. & Sadosky, T.L. LINEAR PROGRAMMING APPLIED TO OPTIMIZATION OF INSTRUMENT PANEL AND WORKPLACE LAYOUT. Hum. Factors J., Aug. 1967, 9(4), 295-300. (University of Michigan, Ann Arbor, Mich.).

This paper investigates the application of several linear programming algorithms to the problems of work-place and instrument panel design. The various approaches described depend primarily upon the type of problem constructed; that is, upon the structure of constraints and available information. Two types of optimization functions are described, one based upon the distance between available positions and the second based on minimum eye travel. One formulation incorporates the probability of transition between any pair of available positions as a design parameter. The results indicate that solution of these problems is possible by several algorithms, primarily the transportation algorithm and the assignment algorithm. A solution using Simplex was attempted for one type of design and the constraint structure proved to be complex.
R 4

32,153
Johnston, Dorothy M. THE RELATIONSHIP OF NEAR-VISION PERIPHERAL ACUITY AND FAR-VISION SEARCH PERFORMANCE. Hum. Factors J., Aug. 1967, 9(4), 301-303. (North American Aviation, Inc., Columbus, Ohio).

Thirty-five Ss who did not wear glasses or contact lenses and with foveal acuity of 20/30 or better monocular and binocular far and near vision were given a near-vision peripheral acuity test and a far-vision search task. The results, which showed a low correlation between near-vision peripheral acuity and far-vision search performance, are consistent with Giese's findings of low correlations between near and far foveal acuity.
R 5

32,154
Knowles, W.B. FLIGHT CONTROLLERS FOR JET TRANSPORTS. Hum. Factors J., Aug. 1967 9(4), 305-320. (Hughes Aircraft Company, Culver City, Calif.).

Several designs for flight controllers for jet transports were developed to improve panel visibility and pilot comfort. The designs were rated by a panel of 12 pilot-evaluators. Three of the designs--Dual Side-Arm, Yoke with a Vernier Handle, and Circumferential Drive with a Vernier Handle--met with sufficiently high acceptance that their further development and evaluation appears warranted. The issues of gaining acceptance, of obtaining judgments from appropriate evaluators, and of the need for further testing in dynamic flight simulators are discussed.
R 4

32,155
Ellis, N.C. USING THE NULL HYPOTHESIS IN HUMAN ENGINEERING EVALUATIONS. Hum. Factors J., Aug. 1967, 9(4), 321-324. (Life Sciences, Inc., Fort Worth, Tex.).

The purpose of this paper is to make practical suggestions regarding the appropriate use and interpretation of the null hypothesis (H_0) in human engineering research. The coverage of this topic, as presented herein, is neither meant to be restrictive nor exhaustive, but it does represent a simple and concise treatment of a very real methodological problem. The paper itself is offered as a single collective source of several research arguments underlying using and interpreting H_0 in experimental investigations.

32,156
Chiles, W.D. METHODOLOGY IN THE ASSESSMENT OF COMPLEX PERFORMANCE: INTRODUCTION. Hum. Factors J., Aug. 1967, 9(4), 325-327. (USAF Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio).

This paper provides the background for the following papers with respect to the general purposes and objectives of the conference of which those papers were a part. The basic point of departure of the conference was the measurement of performance that could be considered to be relevant to the requirements placed on the human operator by operational systems. The primary points for consideration related to practical research design requirements such as validity and reliability.

32,157
Christensen, J.M. & Mills, R.G. WHAT DOES THE OPERATOR DO IN COMPLEX SYSTEMS? Hum. Factors J., Aug. 1967, 9(4), 329-340. (USAF Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio).

An effort was made to locate representative data on human activities in complex operational systems. Very little operational data were found which were suitable for our purposes. Therefore, this requirement was compromised and activity data from tests and paper and pencil analyses were used. These data were then classified by two raters according to an adopted taxonomy. It was generally concluded that where activity data have been gathered under operational conditions, they have been useful to design engineers, human factors specialists and systems analysts. It is further noted, however, that additional effort must be devoted to the development of better methods for obtaining data and corresponding criteria of human performance under operational conditions. A discussion of the taxonomy and other techniques indicated that collection of activity data should be feasible under operational conditions. In addition it is suggested that increased standardization and use of operational definition in the development of these techniques might result in improvement of their general applicability.
R 21

32,158
Grodsky, M.A. THE USE OF FULL SCALE MISSION SIMULATION FOR THE ASSESSMENT OF COMPLEX OPERATOR PERFORMANCE. Hum. Factors J., Aug 1967, 9(4), 341-348. (Martin Company, Martin Marietta Corporation, Baltimore, Md.).

This report describes the use of full-scale high fidelity simulation as a technique for the evaluation of the performance of the human operator in an aerospace vehicle context. The specific implementation of this approach used an Apollo simulation with highly trained aerospace research pilots as subjects. The major advantages of the approach are considered to derive from the relative ease with which generalizations can be made from the research vehicle to the vehicle being simulated. The ultimate criterion, in-flight validation, is not as yet attainable, but the prediction is made that this approach would be fully supported by the outcome of such an evaluation. A requirement exists for the examination of this approach in relation to more commonly employed laboratory situations and tasks so that a tie in with such research can be established.
R 5

32,159
Fleishman, E.A. PERFORMANCE ASSESSMENT BASED ON AN EMPIRICALLY DERIVED TASK TAXONOMY. Hum. Factors J., Aug. 1967 9(4), 349-366. (American Institutes for Research, Washington, D.C.).

This report reviews and discusses a number of the methodological questions relating to the application of an experimental-correlational approach to the problem of assessing complex performance. The basic point of departure is the specification of the requirements for a task taxonomy and an analysis of the value of factor analytic investigations in combination with experimental methods in providing the framework for such a taxonomy. The way in which this approach has been applied in the past and the expected benefits of its successful implementation are discussed. It is concluded that experimental-correlational studies offer considerable promise in attacking complex performance but that a more extensive research program is needed. The general outline of such a program is described.
R Many

32,160
Parker, J.F., Jr. THE IDENTIFICATION OF PERFORMANCE DIMENSIONS THROUGH FACTOR ANALYSIS. Hum. Factors J., Aug. 1967, 9(4), 367-373. (BioTechnology, Inc., Arlington, Va.).

The problems encountered in trying to relate factor-analytically derived performance measures to real world, complex work situations are described. A particular implementation of this approach to the problem of assessing the performance capabilities of the on-orbit astronaut is described in relation to the task demands of the predicted space vehicle performance requirements. The general approach as outlined here is restricted to the measurement of perceptual motor functions of the sort traditionally looked at by factor analysts in relation to the ability requirements of aircraft operators. Relatively mild stressors--sleep loss and heat--have not resulted in significant alterations of performance on these tasks.
R 16

32,161
Alluisi, E.A. METHODOLOGY IN THE USE OF SYNTHETIC TASKS TO ASSESS COMPLEX PERFORMANCE. Hum. Factors J., Aug. 1967, 9(4), 375-384. (University of Louisville, Louisville, Ky.).

The application of synthetic tasks to the assessment of complex performance is discussed in relation to the trade-offs involved in achieving adequate levels of face validity and in specifying the exact changes in psychological functions that may result from particular environmental manipulations. It is argued that the multiple-task performance battery approach can provide levels of face validity adequate to maintain the motivation of subjects while at the same time permitting the identification of changes in specific performance functions. The characteristics of this approach are discussed in relation to a program of research on the effects of confinement and demanding work-rest schedules on crew performance.
R 13

32,162
Chiles, W.D. METHODOLOGY IN THE ASSESSMENT OF COMPLEX PERFORMANCE: DISCUSSION AND CONCLUSIONS. Hum. Factors J., Aug. 1967, 9(4), 385-392. (USAF Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio).

This paper summarizes the discussion elicited by the preceding papers. Subsequent to the conference, the tape recordings of the discussion were perused and a series of statements were identified as representing possible points of agreement on the issues considered. These statements were evaluated by 15 people who participated in the conference on a semantic differential scale (agree vs. disagree). The most important conclusions relate to the criterion problem, task taxonomies, the reliability of measures, and the role of face validity in the design of research apparatus.
R 7

32,163
Kelley, C.R. & Wargo, M.J. CROSS-ADAPTIVE OPERATOR LOADING TASKS. Hum. Factors J., Oct. 1967, 9(5), 395-404. (Dunlap & Associates, Santa Monica, Calif.).

Performance measures often fail to indicate the amount of effort expended by an operator in reaching various levels of task performance. Secondary or loading task techniques have been developed to overcome this problem. However, with the loading task technique a problem of interpretation arises when both primary and secondary task measures vary with operator performance. The cross-adaptive operator loading technique, which automatically adjusts the difficulty level of the loading task on the basis of primary task performance, is suggested as a solution to this problem. Data are presented which demonstrate that the cross-adaptive technique effectively standardizes scores on the primary task while casting all the variance in performance to the loading task scores. The cross-adaptive secondary scores thereby become a single unambiguous and sensitive index of effort expended to reach a pre-established level of task performance. Procedures for the implementation of the cross-adaptive techniques are discussed and guidelines for its use are suggested.
R 15

32,164
Goldstein, D.A. & Lees, J.C. VISUAL CODING USING FLASHING LIGHTS. Hum. Factors J., Oct. 1967, 9(5), 405-408. (Electric Boat Div., General Dynamics Corporation, Groton, Conn.).

An investigation of the feasibility of an alarm system employing visual signals was made. Using flash rate, values for four easily discriminable signals were established. In addition, minimum effective intensities for the four signals were obtained for the entire range of ambient illuminations associated with the operational situation. In a separate study, it was shown that little training was required to learn the signal code and once learned the code was maintained with little or no retention loss over the length of the experiment. The alarm system in its final form was used under both simulated work and actual shipboard conditions and was found to be effective as an attention-getting device and as a message source.
R 5

32,165
Sampaga, J.L., Shavelson, R.J. & Parsons, S.O. EFFECT OF REDUCED PRESSURE ON HUMAN PERFORMANCE. Hum. Factors J., Oct. 1967, 9(5) 409-418. (Missiles & Space Company, Lockheed Aircraft Corporation, Sunnyvale, Calif.).

The purpose of this study was to determine whether reduced pressure (1.5 psi) versus ambient pressure (14.7 psi) had a differential effect on man's performance in a pressurized (3.7 psi) Apollo suit. Two subjects were tested on three different types of tasks: psychomotor, a lunar mission-specific task, and walking. The results of this study are supportive to the hypothesis that it would require greater effort to complete the same tasks in the reduced pressure condition than in the ambient pressure condition. During the reduced pressure condition, an increase in total time, total errors, heart rate, and carbon dioxide production was consistently observed over the ambient condition. These findings are considered preliminary, and future research is required to substantiate the conclusion that reduced pressure associated with the space environment negatively affects human performance.

32,166
Chapanis, A. & Scarpa, Lorraine C. READABILITY OF DIALS AT DIFFERENT DISTANCES WITH CONSTANT VISUAL ANGLE. Hum. Factors J., Oct. 1967, 9(5), 419-425. (Psychology Dept., Johns Hopkins University, Baltimore, Md.).

The purpose of this experiment was to study the readability of dials at different distances when the visual angle subtended by the dials is held constant. Five dials, the sizes and markings of which were proportional to viewing distance, were tested at distances ranging from 14 to 22½ in. Each of 20 subjects made 70 readings on each dial. Care was taken to select subjects with excellent uncorrected near and far visual acuity. A focus sign above each dial was used to hold accommodation time constant. Directions to the subject stressed accuracy. Response times, errors of estimation, and questionnaire data were recorded. The results show a significant effect of distance on readability: Dials located at distances greater than .8 inches were read faster than two smaller, closer dials. Although there are no significant differences among the errors made on the five dials, the error data are consistent with the time data.
R 15

32,167
Mackenzie, F., Jr. & Rockwell, T.H. DRIVING PERFORMANCE UNDER NIGHTTIME CONDITIONS OF VISUAL DEGRADATION. Hum. Factors J., Oct. 1967, 9(5), 427-432. (Ohio State University, Columbus, Ohio).

Nighttime driving performance was studied in relation to four different driving tasks and four levels of visual degradation. Four matched but task-differentiated groups of four subjects each drove an instrumented vehicle at night on a superhighway. The four levels of visual degradation presented the roadway to the driver at overall luminance levels of 5.228 mL, 2.688 mL, 0.755 mL, and 0.168 mL. The two dependent variables were vehicle speed and vehicle distance from the white shoulder line. The visual degradation caused the subjects to slow down and position the vehicle slightly farther away from the shoulder. It was found that a driver also is capable of driving at a constant speed and of maintaining a constant lane position at very high degrees of visual degradation. These results were explained by the different instructions given to each task group.
R 10

32,168
Suggs, C.W. APPLICATION OF SERVO THEORY TO A MANUAL REPETITIVE OPERATION. Hum. Factors J., Oct. 1967, 9(5), 433-438. (North Carolina State University, Raleigh, N.C.).

The purpose of this study was to develop a model to describe the response of a subject feeding items into a machine. Analysis of a set of data produced a first order servo system with a corner frequency of about 110 cycles per minute. At low frequencies the gain of the system approached one and at high frequencies it decreased at a rate which approached -6 db per octave. An additional analysis based on the distribution of the time periods required to handle the items gave a response curve very closely fitting the first order servo system and the experimental data.
R 7

32,169
Engstrand, R.O. & Moeller, G. CONFUSION MATRIX ANALYSIS FOR FORM PERCEPTION. Hum. Factors J., Oct. 1967, 9(5), 439-446. (USN Submarine Medical Research Lab., New London Submarine Base, Groton, Conn.).

The Constant-Ratio Rule (CRR) an empirical technique for analysis of confusion matrices, was developed for use in predicting intelligibility of speech syllables. This study investigated the validity of the rule when applied to the data from experiments on visual form perception. English letters and simple geometric figures were tachistoscopically presented in the center of a viewing field. Response proportions for subsets of this master set of stimuli were predicted by CRR. Results indicated that the rule: a) accurately predicted numeric response proportions for subsets of stimuli when experimental conditions were similar and b) predicted ordinally accurate data when experimental conditions varied within the limit which might be encountered in "operational situations." These results, as well as arithmetic factors which can result in errors in prediction, are discussed.
R 11

32,170
Crawford, B.H. & Kama, W.N. JUDGMENTS OF RELATIVE DISTANCE BASED ON SEPARATE 2-D TV VIEWS. Hum. Factors J., Oct. 1967, 9(5), 447-453. (USAF Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio).

An experiment was conducted to determine human capabilities for making judgments of relative distance based on cues obtained from two ordinary, two-dimensional, closed-circuit television systems. The two cameras were placed so that their lines-of-sight converged symmetrically upon the mid-point between the two rods of a modified Howard-Dolman depth perception apparatus. Four camera lines-of-sight convergence angles were investigated: 15°, 30°, 60°, and 90°. Difference thresholds for relative depth perception were determined for 24 subjects by the psychophysical Method of Limits. Thresholds were on the order of 12-13 minutes of arc in terms of the parallactic difference angle for the camera lines-of-sight. The results are related to the design of viewing systems for remote operations.
A 11

32,171
Williams, C.H. LEGIBILITY OF NUMERALS AS A FUNCTION OF CONTRAST AND ILLUMINATION. Hum. Factors J., Oct. 1967, 9(5), 455-460. (Bell Telephone Laboratories, Inc., Holmdel, N.J.).

While contrast is recognized as an important variable affecting legibility, scant information of what happens in the mid-ranges is available. Thus nine contrast conditions consisting of black or white lettering on white, black, or grey backgrounds were compared under three levels of illumination--0.06, 0.60, and 6.0 footcandles. Fifteen subjects were asked to search a stimulus array for a particular stimulus and then indicate its relative position among the other stimuli. Reaction time and errors were recorded. Illumination proved to be the single most important factor. Significant differences in performance were observed between the contrast conditions under poor illumination. It was concluded that for recognition tasks of short duration, varying contrast within wide limits has little effect on speed and accuracy of performance as long as illumination remains above 0.60 footcandles. Black lettering on a white background and white lettering on a black background did not differ significantly and were associated with the shortest reaction times and the least number of errors at all light levels.
R 3

32,172
Perriment, A.D. & Webster, W.R. DISPLAY-CONTROL RELATIONSHIPS WITH BISENSORY SIGNALS. Hum. Factors J., Oct. 1967, 9(5), 461-469. (Monash University, Clayton, Victoria, Australia).

Using a bi-sensory signal, simultaneously presented in the visual and auditory modes, an experiment was carried out to examine the effects of varied display-control relationships upon information transfer rate. Of the three response variables examined, i.e., limb relationship, control position, and digit correspondence, that of control position was found to have the most significant effect upon performance. Controls which were centrally-placed, gave higher information transfer rates than those placed laterally to the line of the incoming signal. The complex interactions, which were observed between all three response variables suggest the need for system specific examination of S-R (stimulus response) ensembles where complex bi-sensory signals are used.
R 22

32,173
Bell, G.L. THE EFFECTS OF SYMBOL FREQUENCY IN LEGIBILITY TESTING. Hum. Factors J., Oct. 1967, 9(5), 471-477. (Mitre Corporation, Bedford, Mass.).

The legibilities of two fonts used for teletyped weather reports are being studied. The first tests were controlled-exposure-time tests, made with a tachistoscope, in which single symbols were shown to subjects randomly with respect to alphabetical and numerical order. The two fonts were tested at symbol brightnesses of 8, 6 and 5 ft-L against a constant background brightness of 1 ft-L. For each font at each symbol brightness, two conditions were compared. The first condition was that all the symbols occurred with the same frequency and the second condition was that the symbols occurred with relative frequencies similar to their frequencies in actual use in the weather reports. The results showed that the subjects' performances were better when the symbols occurred with the unequal frequencies than they were for the equal frequency condition. Implications which reflect on the validity of legibility testing are discussed.
R 8

32,174
Nath, D.W. & Kolasnik, P.F. THE THUMBWHEEL SWITCH AS A DATA ENTRY DEVICE. Hum. Factors J., Oct. 1967, 9(5), 479-482. (Autonetics, North American Aviation, Inc., Anaheim, Calif.).

This study evaluated the speed and accuracy with which latitude and longitude coordinates can be entered into a computer by use of a thumbwheel switch unit. In addition, it determined the effect of flight gloves on thumbwheel operation, and compared two methods of using thumbwheels for entering coordinates. In the first method, one thumbwheel unit was used to enter both latitude and longitude of a given checkpoint before proceeding to the coordinates of the next checkpoint. In the second method, all latitude coordinates were entered sequentially, after which all longitude coordinates were entered in a similar manner. It was found that there were no significant differences in errors between gloved and ungloved operation, or between the two methods of entering coordinates. However, the two-unit method of entry was significantly faster than the one-unit method. It was concluded that the thumbwheel switch is suitable for use in entering navigational coordinates into an airborne computer.
R 6

32,175
Teichner, W.H. THE SUBJECTIVE RESPONSE TO THE THERMAL ENVIRONMENT. Hum. Factors J., Oct. 1967, 9(5), 497-510. (Northeastern University, Boston, Mass.).

Techniques used to assess subjective reactions to the thermal environment are evaluated and found to have been developed without any conceptual basis. In addition, the scales used lack sensitivity and inter-experimenter consistency. A novel approach to the problem has been developed which assumes that such measurements must account explicitly for the subject's motivation and which depends upon the correlation between physiological and behavioral measurements on the one hand, and voluntary exposure time on the other. Exploratory data are presented as a first step in the direction of developing methods for introducing the concepts into the laboratory.
R 21

32,176
Noble, M. & Trumbo, D. THE ORGANIZATION OF SKILLED RESPONSE. J. Org. Behav. Hum. Perf., Feb. 1967, 2(1), 1-25. (Kansas State University, Manhattan, Kan.).

A series of experiments concerned with the ways in which responses become organized is discussed. The principle parameter in most studies was stimulus coherence, and tracking tasks were used as a vehicle because gradad responses permit detailed and fine-grained analyses. Both spatial and temporal coherence are used in response organization, and type of response strategy varies with degree of stimulus coherence. The effects of secondary tasks, sequence length and task coding were also examined.
R 56

32,177
MacKinney, A.C. THE ASSESSMENT OF PERFORMANCE CHANGE: AN INDUCTIVE EXAMPLE. J. Org. Behav. Hum. Perf., Feb. 1967, 2(1), 56-72. (Iowa State University, Ames, Iowa).

Extensive empirical research has been concerned with job performance and performance change, but virtually nothing has been done to develop a broader conceptual framework which might be useful in giving direction to further research. Toward this end, a number of diverse and previously unrelated empirical findings relevant to job performance are shown to converge on one generalization which accounts for all. The central theme of this generalization pertains to the changing nature of performance across time. The applicability of this generalization beyond the job performance setting is shown by various findings from psychological testing and animal learning research. The increased use of this inductive approach is suggested as one possible way to alleviate the widely recognized shortage of theory in industrial-differential psychology.
R 46

32,178
Schum, D.A., Goldstein, I.L., Howell, W.C. & Southard, J.F. SUBJECTIVE PROBABILITY REVISIONS UNDER SEVERAL COST-PAYOFF ARRANGEMENTS. J. Org. Behav. Hum. Perf., Feb. 1967, 2(1), 84-104. (Human Performance Center, Ohio State University, Columbus, Ohio).

Human performance at a complex probabilistic inference task was evaluated in a simulated military threat-diagnosis context. Subjects' estimates of posterior probabilities were compared with theoretically optimal revisions calculated from a modification of Bayes' theorem. Cost-payoff arrangement was one variable. Subjects performing under a logarithmic cost-payoff arrangement came closest to being optimal in their estimates of posterior probabilities and were generally the least variable in their performance. Subjects who received a fixed amount for choosing correct hypotheses and nothing for choosing incorrect hypotheses (an all-or-nothing payoff) were the most cautious in their estimates of posterior probabilities. Subjects performing under a linear cost-payoff arrangement were the least optimal in their estimates of posterior probability and were extremely variable in their performance. In all three groups, costs and payoffs affected the size of confidence judgments (posterior probabilities) but not the ability to place highest posterior probabilities under true hypotheses. By this criterion, performance was identical in all groups. Amount of evidence to be evaluated was another variable. The experiment provided further evidence that subjects extract a smaller proportion of total diagnosticity from evidence as the amount of evidence increases. There was no evidence of interaction between payoff arrangement and amount of evidence being evaluated. Degree of prior uncertainty, a third variable, had little effect upon the degree of optimality of subjects' posterior probability estimates.
R 15

32,179
Dunnette, M.D., Campbell, J.P. & Hakel, M.D. FACTORS CONTRIBUTING TO JOB SATISFACTION AND JOB DISSATISFACTION IN SIX OCCUPATIONAL GROUPS. J. Org. Behav. Hum. Perf., May 1967, 2(2), 143-174. (Psychology Dept. & Industrial Relations Dept., University of Minnesota, Minneapolis, Minn.).

The taxonomy of job situations suggested by Herzberg et al. (Personnel Psychology, 1959, 12, 303-402) was used to develop two Q-sort decks of 36 statements each, one describing satisfying job situations, the other describing dissatisfying job situations. Subjects in six occupational groups used these Q-sort decks in counterbalanced order to describe previously satisfying and dissatisfying job situations. Mean job-dimension scores for each type of situation for each occupational group were computed. Also, two (one for satisfying situations, one for dissatisfying situations) person-person correlation matrices were developed for each of the six occupational groups, and Q-type factor analyses carried out on them. Results show that the Herzberg two-factor theory is a grossly oversimplified portrayal of the mechanism by which job satisfaction or dissatisfaction comes about. Satisfaction or dissatisfaction can reside in the job content, the job context, or both jointly. Moreover, certain job dimensions--notably Achievement, Responsibility, and Recognition--are more important for both satisfaction and dissatisfaction than certain other job dimensions--notably Working Conditions, Company Policies and Practices, and Security. Results of other recent studies are reviewed which, along with results of this one, lead us to conclude that the two factor theory should be laid to rest so as to reduce the danger of further research or administrative decisions being dictated by its seductive simplicity.
R 23

32,181
Galbraith, J. & Cummings, L.L. AN EMPIRICAL INVESTIGATION OF THE MOTIVATIONAL DETERMINANTS OF TASK PERFORMANCE: INTERACTIVE EFFECTS BETWEEN INSTRUMENTALITY--VALENCE AND MOTIVATION--ABILITY. J. Org. Behav. Hum. Perf., Aug. 1967, 2(3), 237-257. (Alfred P. Sloan Management School, Massachusetts Institute of Technology, Cambridge, Mass. & Graduate Business School, Indiana University, Bloomington, Ind.).

The present study was designed to operationalize and test two components of a motivational model thought to be useful in the explanation of productivity variations among operative workers. Vroom (Work and motivation. New York: Wiley, 1964) has suggested that performance can be thought of as a multiplicative function of motivation and ability ($p = f(M \cdot A)$). Motivation to perform a task can be postulated to vary with the valences (V) of outcomes associated with the performance of that task and the instrumentality (I) of performance for attainment of these desirable outcomes or for avoidance of undesirable outcomes. Thirty-two operative workers completed questionnaires designed to operationalize the concepts of valence and instrumentality and to test the interactive effects of V and I as well as M and A. A modified analysis of variance procedure, utilizing a "dummy variable" technique and stepwise multiple regression procedure, yielded support for the hypothesized interactive effects. Results are interpreted in terms of the Vroom model as well as other recent research yielding M · A effects.
R 18

32,182
Beach, L.R. MULTIPLE REGRESSION AS A MODEL FOR HUMAN INFORMATION UTILIZATION. J. Org. Behav. Hum. Perf., Aug. 1967, 2(3), 276-289. (University of Washington, Seattle, Wash.).

A large experimental literature shows that statistical theory and procedure provide fruitful models for certain aspects of human behavior. However, it is sometimes difficult to see how one might use these models in applied psychological research. In this article the use of one model, multiple regression, is discussed in some detail in order to demonstrate the reasoning behind the proposed research approach.
R 16

32,183
Johnston, W.A. INDIVIDUAL PERFORMANCE AND SELF-EVALUATION IN A SIMULATED TEAM. J. Org. Behav. Hum. Perf., Aug. 1967, 2(3), 309-328. (Human Performance Center, Ohio State University, Columbus, Ohio).

Team feedback was simulated by telling each subject that he had a partner and that post-trial feedback indicated their team score relative to average tracking performance. Feedback actually indicated the subject's own tracking score relative to a criterion, the stringency of which was systematically manipulated to generate varying levels of simulated team feedback. Teammate replacement was simulated by instructions and, in some conditions, by an actual change in criterion stringency. The subjects accepted the credit for the good scores incurred by a lenient criterion but attributed the blame for the poor scores wrought by a stringent criterion to their contrived partners. Individual performance was retarded by poor scores, but only after teammate replacement had been simulated. This inhibitory effect was most pronounced when poor scores were given both before and after replacement instructions. The performance data were interpreted in terms of the motivating effect of self-evaluations and of the discouragement rendered by unfulfilled hopes of improved team output. The self-evaluation data were interpreted in terms of social comparison theory.
R 20

32,184
Miller, L.W., Kaplan, R.J. & Edwards, W. JUDGE: A VALUE-JUDGMENT-BASED TACTICAL COMMAND SYSTEM. J. Org. Behav. Hum. Perf., Nov. 1967, 2(4), 329-374. (Rand Corporation, Santa Monica, Calif.).

This paper reviews work completed on a value-judgment-based tactical air command system intended to dispatch missions from a limited supply in response to requests for immediate close air support. A Judged Utility Decision Generator (JUDGE) assumes that value judgments can be made explicitly and in real time by appropriately trained personnel, and that decision systems should maximize expected utility. Its inputs include demand forecasts, numbers of aircraft available, and turnaround time distributions. As each request is received, JUDGE makes a dispatching decision based on the judged utility of destroying the target named in the request, kill probability data, number of sorties remaining before resupply of aircraft, and the time. In a war-game situation using experienced military subjects, JUDGE was considerably superior to a simulated current system in amount of expected utility gained. Concluding sections of the paper identify characteristics of judgment-based command systems, and discuss logical implications of such characteristics for system evaluation.
R 18

32,185
Holt-Hansen, K. KINDS OF EXPERIENCES IN THE PERCEPTION OF A CIRCLE. Percept. mot. Skills, Feb. 1967, 24(1), 3-12. (Psychological Lab., Copenhagen University, Copenhagen, Denmark).

When the stimulus object is a circle subjects report many different kinds of experience apart from the perception of the circle. These include (amongst many others) radii, polygons, concentric circles, and small straight lines. Most of these experiences are characterized by rhythmic oscillations for which frequency measurements are given in c/s.
R 5

32,186
Baumeister, H., Wapner, S. & Werner, H. METHOD OF STIMULUS PRESENTATION AND APPARENT BODY POSITION UNDER LATERAL BODY TILT. Percept. mot. Skills, Feb. 1967, 24(1), 43-50. (Clark University, Worcester, Mass.).

Eighty subjects, 40 male and 40 female, indicated by means of a luminescent rod the location of their longitudinal body axis (apparent body position) under body tilt ranging from 90° left (counterclockwise), through upright, to 90° right (clockwise). The luminescent rod was presented by two psychophysical methods: a) the method of limits and b) the method of constant stimuli. Deviations of apparent from objective body position showed significant differences between the two methods. The results were interpreted in terms of an organismic theory of perception, utilizing the notion of a dynamic body schema as spatial reference system which was subject to modifications due to the method of stimulus presentation.
R 8

32,187
Wargo, M.J. DELAYED SENSORY FEEDBACK IN VISUAL AND AUDITORY TRACKING. Percept. mot. Skills, Feb. 1967, 24(1), 55-62. (Tufts University, Medford, Mass.).

Visual compensatory, visual pursuit, auditory compensatory, and auditory pursuit tracking of 20 male college students was observed under the conditions of .000-, .210-, .420-, and .840-sec. transmission type control delay. Tracking efficiency decreased as transmission delays increased; visual tracking was consistently superior to auditory tracking, although the relative degradation across delays was greater for visual than for auditory tracking; and little if any adaptation to the delays was apparent. These results point out the essentially similar effects of delayed sensory feedback on equivalent motion patterns when guided by different feedback modalities.
R 7

32,188
Ammons, Carol H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: LVII. BALDWIN'S DICTIONARY THROUGH 1893. Percept. mot. Skills, Feb. 1967, 24(1), 63-65. (University of Montana, Missoula, Mont.).

Eighty-nine items concerning some aspect of motor skills are listed alphabetically.
R 89

32,189
Wist, E.R., Hughes, F.W. & Forney, R.B. EFFECT OF LOW BLOOD ALCOHOL LEVEL ON STEREOSCOPIC ACUITY AND FIXATION DISPARITY. Percept. mot. Skills, Feb. 1967, 24(1), 83-87. (Franklin & Marshall College, Lancaster, Penn.).

The stereoscopic acuity and fixation disparity of 9 subjects was measured before and after the consumption of 1 oz. of Scotch or bourbon whiskey per 150 lb. of body weight. It was found that, while stereoscopic acuity measures were unaffected by alcohol, fixation disparity increased significantly.
R 7

32,190
Ammons, Carol H. & Ammons, R.B. PERCEPTION BIBLIOGRAPHY: XXXIX. PSYCHOLOGICAL ABSTRACTS, 1928, VOLUME 2. Percept. mot. Skills, Feb. 1967, 24(1), 95-98. (University of Montana, Missoula, Mont.).

One hundred seven items dealing with perception and closely related topics are listed alphabetically.
R 107

32,191
Tanaka, Y. & Nakatani, K. ON CATEGORICAL SCALES OF WEIGHT. Percept. mot. Skills, Feb. 1967, 24(1), 143-150. (University of Tokyo, Tokyo, Japan).

The law of categorical judgment was applied to data on subjective weight in order to eliminate the possible biases. Conditions D, C, and a new approximation method were used. Stimuli were two series of plastic cylinders weighing 40 to 200 gm. The results indicate that linearity in the relationship between scale values R and stimulus values S increases as the number of assumptions decreases. When Scheffé's method is used, the relationship can be given by $R = 2.5\,S - 3.1$, which is similar to that obtained by the new method of the law of categorical judgment.
R 5

32,192
Barlow, D.H. & Maer, D.J. EFFECT OF CIGARETTE SMOKING ON THE CRITICAL FLICKER FREQUENCY OF HEAVY AND LIGHT SMOKERS. Percept. mot. Skills, Feb. 1967, 24(1), 151-155. (Boston College, Boston, Mass.).

In order to evaluate the effects of smoking on critical flicker frequency (CFF), heavy and light smoker thresholds were determined five minutes and one minute before, and then 1, 5, 10, and 15 min. after 10 inhalations of a cigarette. Although both groups of smokers showed a significant elevation in CFF immediately after smoking, the light smokers' CFF gradually returned to pre-smoking levels, while the heavy smokers' CFF fell below and then rose above the pre-smoking level.
R 9

32,193
Smith, A.H. PERCEIVED SLANT AS A FUNCTION OF STIMULUS CONTOUR AND VERTICAL DIMENSION. Percept. mot. Skills, Feb. 1967, 24(1), 167-173. (Defence Research Medical Labs., Toronto, Ontario, Canada).

Twenty-four observers judged the slants represented by nine trapezoids presented monocularly and binocularly, with fixed head under reduced viewing conditions. The trapezoids were the frontal-parallel plane projections of rectangles with the dimensions, 12 in. by 6 in., 10 in. by 5 in., and 8 in. by 4 in., each slanted 30°, 45° and 60°, but with their heights increased to 12 in., 10 in. and 8 in., respectively, and the other contour dimensions increased in proportion. All forms were displayed in the frontal-parallel plane only. The greatest variance in the slant judgments was associated with variation in contour. Decrease in stimulus height tended to be associated with increase in judged slant. Monocular and binocular judgments did not differ significantly. There were no significant interactions. The results were interpreted as supporting the contour perspective theory of monocular slant.
R 13.

32,194
Hartz, R.L. AUDITORY VIGILANCE AS AFFECTED BY SIGNAL RATE AND INTERSIGNAL INTERVAL VARIABILITY. Percept. mot. Skills, Feb. 1967, 24(1), 195-203. (USN Submarine Medical Center, New London Submarine Base, Groton, Conn.).

Vigilance performances consisting of auditory threshold, latency of response, and false-positive response measures were obtained from 24 Navy and civilian observers during the course of six daily 48-min. monitoring sessions in which observer pressed a microswitch to report single tones in signal trains of increasing intensity. Six signal rates from 2.5 to 120 signals per hour and six inter-signal intervals ranging up to 108 sec. around a signal rate of 1 per minute were found to have some differential effect on auditory threshold. An improvement of 3.25 db in signal/noise detection occurred when signal rate was increased from 2.5 to 15 per hour. Higher rates were not additionally effective. Below the rate of 15/hr., response latency increased regularly with the slower rates, although there was no further improvement with higher signal rates. Thus a rate of about 1 signal every 4 min. was the most efficient. Time-on-watch analysis revealed large individual differences. An analysis of false-positive responding indicated that false alarms were unrelated to signal rate, intersignal variability, or listening session.
R 16

32,195
Horowitz, M.W. & Berkowitz, A. LISTENING AND READING, SPEAKING AND WRITING: AN EXPERIMENTAL INVESTIGATION OF DIFFERENTIAL ACQUISITION AND REPRODUCTION OF MEMORY. Percept. mot. Skills, Feb. 1967, 24(1), 207-215. (Queens Coll., University of New York, Flushing, N.Y.).

Under controlled conditions, subjects differed significantly in their reproductions of The War of the Ghosts, depending upon their mode of acquisition (listening and reading) and their mode of reproduction (speaking or writing). Listeners produced a larger corpus, more ideas, fewer omissions of important units, more distortions, and a stylistically superior reproduction than readers. Reproduction by speaking produced a larger corpus, less diversity of expression, more additions, more subordinate ideas, and more signals than did reproduction by writing. Listening seems (logically and empirically) more closely allied to speaking and reading seems more closely allied to writing.
R 13

32,196
Ammons, R.B. & Ammons, Carol H. PERCEPTION BIBLIOGRAPHY: XL. PSYCHOLOGICAL ABSTRACTS, 1929, VOLUME 3, FIRST HALF. Percept. mot. Skills, Feb. 1967, 24(1), 235-238. (University of Montana, Missoula, Mont.).

An alphabetical listing of 90 items dealing with perception and closely related topics.
R 90

32,198
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: LVIII. PSYCHOLOGICAL INDEX NO. 1, 1895. Percept. mot. Skills, Feb. 1967, 24(1), 277-278. (University of Montana, Missoula, Mont.).

Forty-six items on motor skills are listed alphabetically.
R 46

32,199
Landauer, A.A. & Feakes, R. A SIMPLE ELECTRONIC APPARATUS TO RECORD CONTINUOUSLY CHANGES IN PUPILLARY SIZE. Percept. mot. Skills, Feb. 1967, 24(1), 283-286. (University of Western Australia, Perth, Australia).

Chopped infra-red light is beamed at the iris and pupil and the infra-red light reflected gathered by a photo-transistor. A continuous pen recording of changes in reflectance is obtained which can be related to changes in pupil size.
R 5

32,200
Brown, R.L., Spern, R.A. & Solomon, A. ELECTROPULSE RESPONSIVITY TO CHANGES IN SKIN MOISTURE. Percept. mot. Skills, Feb. 1967, 24(1), 303-308. (Human Resources Research Office, George Washington University, Alexandria, Va.).

Twelve subjects were exposed to electropulse stimulation under three moisture treatments: dry, water immersion, and a fluid approximation of sweat. Touch threshold data were obtained under these conditions during the first half of the experiment and electropulse recognition responses during the second half. A significant threshold rise occurred with increased amounts of moisture on the skin. Similarly, recognition accuracy decreased but remained within a 90 to 100% range. Human engineering implications pertinent to a tactual communication system were discussed.
R 10

32,201
Olson, Janice K. & Waterland, Joan C. BEHAVIOR OF INDEPENDENT JOINTS SERVED IN PART BY MUSCLES COMMON TO BOTH: ELBOW AND RADIOULNAR JOINTS. Percept. mot. Skills, April 1967, 24 (2), 339-349. (University of Wisconsin, Madison, Wisc.).

The purpose of this study was to answer the basic biological question: does cortical control of movement allow for the activation of a single joint when the muscles implicated are placed anatomically to affect more than one articulation and, if so, what muscles are activated? Four normal, adult women performed four trials of volitional elbow and radioulnar movements against gravity and against two weight increments during two experimental settings. Simultaneous electrogoniometric and electromyographic data were collected from the two joints and eight muscles sampled. Biplane photographs provided reference points for the analysis of the electromyograms. The results indicated that volitional action at the elbow or radioulnar joint produced involuntary movement at the neighboring articulation with predictable patternings. Muscle participation and range of movement recorded for the involuntary joint actions were augmented by stress.
R 17

32,202
Ammons, Carol H. & Ammons, R.B. PERCEPTION BIBLIOGRAPHY: XLI. PSYCHOLOGICAL ABSTRACTS, 1929, VOLUME 3, SECOND HALF. Percept. mot. Skills, April 1967, 24(2), 359-362. (University of Montana, Missoula, Mont.).

Ninety-one items concerning perception are listed alphabetically.
R 91

32,203
Ammons, Carol H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: LIX. PSYCHOLOGICAL INDEX NO. 2, 1895. Percept. mot. Skills, April 1967, 24(2), 421-422. (University of Montana, Missoula, Mont.).

This bibliography consists of an alphabetical listing of thirty-eight items dealing with motor skills.
R 38

32,204
Ross, B.M. & Chambers, R.M. EFFECTS OF TRANSVERSE G-STRESS ON RUNNING MEMORY. Percept. mot. Skills, April 1967, 24(2), 423-435. (Research in Thinking & Language Center, Catholic University of America, Washington, D.C. & USN Air Development Center, Psychology Div., Johnsville, Penn.).

A two-channel running memory task with two random binary series as stimuli was used to test subjects under four levels of transverse G (gravity)-stress. No memory deficit was found at 3G. Significant memory deficit was found at 5G and 7G with still greater deficit at 9G. Most of the deficit occurred during the latter half of each two-minute and eighteen-second stress-period. Serial-order error ranking for retained symbols was similar for both stress and non-stress performance, but stress increased error for all serial orders. However, stress vs non-stress differences were found in serial orders that included a previously correct symbol that the subject had to disregard. This irrelevant symbol was an important error factor in non-stress performance but not in stress performance where the subject curtailed the number of symbols he processed each trial.
R 6

32,205
Furedy, J.J. INTERACTIVE CLASSIFICATION: A METHOD FOR ASSESSING THE ADEQUACY OF COUNTERBALANCING AS A MEANS OF CONTROL. Percept. mot. Skills, April 1967, 24(2), 443-450. (Indiana University, Bloomington, Ind.).

In situations where a treatment is varied over the same subjects in order that each subject may serve as his own control and where an associated source of variation is controlled for by counterbalancing between subjects, the success of this method of control depends on the absence of interaction between the treatments and the counterbalanced factor. When the data are classified into a factorial system involving the treatments and the counterbalanced factor as the two classifications, it is difficult to find a statistical model to test such an interaction. A strategy, by means of which established statistical models can be used to evaluate this interaction, is presented here, and its range of application is discussed.
R 7

32,206
Choban, G.M. EFFECTS OF VISUAL DISTORTIONS ON MOTOR EXECUTION AS MEASURED IN A DRAWING TEST. Percept. mot. Skills, April 1967, 24(2), 455-464. (Upstate Medical Center, State University of New York Syracuse, N.Y.).

The influence of visual distortions introduced by cylindrical lenses upon copying a geometric pattern of varying distortion was studied in fifteen subjects. The experimental conditions specifically influenced shape but not size and regularity of drawings; the latter rather depend upon repetition of the task. The results are discussed as indicating some properties of a central selective mechanism for a visual sensorimotor model.
R 17

32,207
Kalil, R. & Freedman, S.J. COMPENSATION FOR AUDITORY RE-ARRANGEMENT IN THE ABSENCE OF OBSERVER MOVEMENT. Percept. mot. Skills, April 1967, 24(2), 475-478. (Tufts University, Medford, Mass.).

Subjects wearing a pseudophone which produced functional rotation of the interaural axis sat motionless watching a sound-source move in an arc in front of their bodies. After short exposures, significant adaptive compensation for this auditory re-arrangement was measured. An interpretation is suggested in terms of the resolution of intersensory discordance.
R 9

32,208
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: LX. PSYCHOLOGICAL INDEX NO 3, 1896. Percept. mot. Skills, April 1967, 24(2), 493-494. (University of Montana, Missoula, Mont.).

Forty-five references to publications dealing with various aspects of skilled behavior are listed.
R 45

32,209
Ammons, Carol H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: LXI. PSYCHOLOGICAL INDEX NO. 4, 1897. Percept. mot. Skills, April 1967, 24(2), 505-506. (University of Montana, Missoula, Mont.).

This is an alphabetical listing of forty-six items about motor skills.
R 46

32,210
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY. LXII. PSYCHOLOGICAL INDEX NO. 5, 1898. Percept. mot. Skills, April 1967, 24(2), 541-542. (University of Montana, Missoula, Mont.).

This is an alphabetical listing of fifty-six items pertaining to motor skills research.
R 56

32,211
Nickerson, R.S. "SAME"-"DIFFERENT" RESPONSE TIMES WITH MULTI-ATTRIBUTE STIMULUS DIFFERENCES. Percept. mot. Skills, April 1967, 24(2), 543-554. (USAF Decision Sciences Lab., L.G. Hanscom Field, Bedford, Mass.).

The subject's task was to decide as quickly as possible whether two simple visual stimuli were the same or different. Stimuli varied with respect to three attributes: size, color, and shape. Pairs of stimuli were presented either simultaneously or in sequence. "Different" reaction times (RT) varied inversely with the number of attributes with respect to which the two stimuli of a pair differed, d. "Same" RTs were shorter than would be expected from an extrapolation of the results with $d \geq 1$ (different stimuli) to include the case of $d = 0$ (same stimuli). Error rates were related to d in much the same way as was RT.
R 7

32,212
Ammons, R.B. & Ammons, Carol H. PERCEPTION BIBLIOGRAPHY: XLII. PSYCHOLOGICAL ABSTRACTS, 1930. VOLUME 4. Percept. mot. Skills, April 1967, 24(2), 563-566. (University of Montana, Missoula, Mont.).

One hundred ten items relevant to perception are listed alphabetically for this year.
R 110

32,213
Wyman, A.B. & Moos, R.H. TIME PERCEPTION AND ANXIETY. Percept. mot. Skills, April 1967, 24(2), 567-570. (Stanford University School of Medicine, Stanford, Calif.).

This paper aimed to a) study the relationship between time perception and two levels of anxiety, b) raise a methodological question about the measurement of time perception, and c) measure the stability of production interval estimates. a) Eight patients with high anxiety demonstrated greater distortions of time perception than nine with low anxiety, b) the choice of interval between 15 and 90 sec. was not important, and c) the time production method is fairly stable but was effected by changes in anxiety for five subjects.
R 9

32,214
Singer, E. & Roby, T.B. DIMENSIONS OF DECISION-MAKING BEHAVIOR. Percept. mot. Skills, April 1967, 24(2), 571-595. (Tufts University, Medford, Mass.).

Most laboratory research on decision making has been derived from normative theories, whose purpose is to advise the decision maker on what he should do. The present study, however, approached the problem of pinpointing the variables which are most relevant to unguided decision making behavior. A factor analysis was done of a battery of 76 scores which included a wide sample of decision-making behavior and certain cognitive and personality measures. The decision behavior was obtained in a variety of laboratory tasks designed to measure different traits. The cognitive and personality measures were included to help clarify the behavior represented by each factor. Eight oblique, but nearly orthogonal, factors were obtained: a) readiness to make distinctive or informationally more certain responses, b) intellectual passivity, c) rational, active approach to new problems, d) formation of stored concepts, combined in decision making, with mimicry of the outcomes of prior events, e) pessimism, with unstructured or global responses, f) constrictive rigidity when required to make too many decisions in a short time, g) consideration of each decision element independently, with active search for information and h) contemplative appreciation of the structure of events.
R 28

32,216
Gardner, R.W. & Coyne, Lolafaye. CONTROL OF DRAWING STYLE IN THE MEASUREMENT OF AUTOKINESIS. Percept. mot. Skills, April 1967, 24(2), 617-618. (Menninger Foundation, Topeka, Kan.).

The need for control of drawing size in autokinetic procedures in which the subject draws the apparent movement and a method of control appropriate to the problem are exemplified with data from a study of twins and their parents. It is noted that the control judgments employed are in themselves of potential interest to students of cognitive style.
R 5

32,217
Glucksberg, S., Karsh, R. & Monty, R.A. SEQUENTIAL MEMORY: KEEPING TRACK PERFORMANCE AS A FUNCTION OF INFORMATION EXPOSURE TIME AND INTERSTIMULUS NOISE. Percept. mot. Skills, April 1967, 24(2), 651-656. (Princeton University, Princeton, N.J.).

Subjects were required to keep track of the number of occurrences of each of three pure tones presented at a constant rate in sequences (trials) of various lengths. With trial lengths of 8 and 12 tones, as practice progressed the shorter the stimulus exposure duration, the better the performance. This effect was not obtained with trial lengths of 16 and 20 tones. White noise presented during interstimulus intervals did not affect performance. Implications for a model of keeping-track behavior are examined.
R 6

32,218
Hefferd, R.B., Jr., Redding, G.M. & Wieland, Betty A. DEPTH PERCEPTION AND ITS SPECIAL CASE, SLANT IN DEPTH, AS INDEPENDENT OF APPARENT ORIENTATION (PERSPECTIVE) IN DEPTH. Percept. mot. Skills, June 1967, 24(3)Part 1, 679-690. (US Veterans Administration Hospital, Psychiatric & Psychosomatic Research Lab., Houston, Tex.).

The relationships of the perception of depth, slant in depth, and of apparent orientation in depth were examined. Trained observers judged the presence or absence of slant (45° in the sagittal plane) and of its direction concomitantly with judgments of relative depth between luminous standard and comparison rods. It was shown that perception of slant in depth is a special case of depth perception. Failure to perceive slant or the attribution of slant to vertical rods was accompanied by inaccurate judgments of depth, suggesting that the determinants in such non-veridical judgments were non-attendance to cues, guessing, fatigue, etc. The concomitance of veridical judgments of slant and accurate judgments of depth suggested that observers were attending depth cues assiduously. However, accurate judgments of depth were also made when observers detected slant but reported its inclination in the non-veridical direction, i.e., where apparent reversals of orientation in depth (perspective reversals of three-dimensional objects) were possible. This suggests that vis-a-vis depth perception the percept was veridical, but that in interpreting their two-dimensional retinal image, observers reversed the spatial ordering along the depth dimension of the near and far parts of an object. Apparent reversal of orientation in depth seems to be a process distinct from that involved in depth perception.
R 6

32,219
Cook, T.H., Mefferd, R.B., Jr. & Wieland, Betty A. APPARENT REVERSALS OF ORIENTATION (PERSPECTIVE REVERSALS) IN DEPTH AS DETERMINANTS OF APPARENT REVERSALS OF ROTARY MOTION. Percept. mot. Skills, June 1967, 24(3)Part 1, 691-702. (US Veterans Administration Hospital, Psychiatric & Psychosomatic Research Lab., Houston, Tex.).

Previous theorists have conceptualized apparent reversals of direction of rotation either as misperceptions based on misleading perspective cues or as chance events occurring in the absence of valid depth cues. On the basis of three experiments with six stimulus figures observed by five practiced observers, it was concluded that apparent motion reversals are a consequence of an automatic, abrupt apparent reversal of orientation in depth, analogous to a perspective reversal. It was found that these apparent reversals: a) are systematic, nonrandom events and b) occur quite readily in the absence of misleading perspective cues or in the presence of valid depth cues.
R 22

32,220
Smith, L.E. PROGRESSIVE FACILITATION OF BODY REACTION TIME RESULTING FROM INCREASING SUPPORT OF BODY WEIGHT. Percept. mot. Skills, June 1967, 24(3)Part 1, 703-707. (University of Iowa, Iowa City, Iowa).

As counterbalancing the effect of gravity should increase the speed of reaction time (RT), fifty college men completed three discrete RT tests while standing, sitting, and sitting with the weight of the legs supported. Progressive decreases in body weight were accompanied by parallel increases in speed of RT. The RTs of the upper 14% of the group, classified by body weight, did not differ from the lowest 14%. Correlations between body weight and RT within the three RT conditions were not significant.
R 2

32,221
Redding, G.M., Mefferd, R.B., Jr. & Wieland, Betty A. EFFECT OF OBSERVER MOVEMENT ON MONOCULAR DEPTH PERCEPTION. Percept. mot. Skills, June 1967, 24(3)Part 1, 725-726. (US Veterans Administration Hospital, Psychiatric & Psychosomatic Research Lab., Houston, Tex.).

In three experiments in which observers' degree of movement during monocular regard was varied, exaggerated body sway produced expected improvement in accuracy of depth judgments. However, small head sways failed to produce improvement in performance. The relatively small influence of minor head movements of unrestrained observers suggests that uncomfortable head restraints impose unnecessary and possibly distracting restriction on cooperative observers.
R 1

32,222
Steedman, W.C. ABSOLUTE JUDGMENTS OF SIZE IN A RESTRICTED VISUAL ENVIRONMENT. Percept. mot. Skills, June 1967, 24(3)Part 1, 731-736. (USAF Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio).

The number of categories of stimulation requisite to maximal information transmission in a size-judgment task was investigated. Absolute judgments were made of the size of visual stimuli in an otherwise stimulus-free visual field. The stimuli ranged from approximately 1 to 160' of visual angle. Three experimental phases of presentation were used: a) pretest familiarization, no knowledge of results; b) pretest familiarization, knowledge of results after each presentation; and c) no pretest familiarization, no knowlege of results. Performance level increased throughout Phases 1 and 2. Knowlege of results in Phase 2 gave noticeable increase in performance. Performance level dropped during the third or retention phase, although not below the highest level achieved in the first phase. The data suggest that nine categories should be employed for maximal information transmission with no feedback, about eleven with feedback.
R 4

32,223
Minard, J.G. & Belcher, J. DISAPPEARANCE OF NATURALLY FIXATED LUMINOUS STIMULI AND STABILITY OF PHASE SEQUENCES: A SELECTIVE REVIEW AND RELATED EXPERIMENT. Percept. mot. Skills, June 1967, 24(3)Part 1, 747-752. (University of Pittsburgh School of Medicine, Pittsburgh, Penn. & University of Pittsburgh, Pittsburgh, Penn.).

A luminous stimulus in the dark may abruptly vanish or fragment, as if it were a fixed image. Current methodology is reviewed with consideration of effects of procedures on eye movements, attention, and point of fixation disappearances caused by insensitivity of the dark adapted fovea. A study is desirable which shows procedural differences like those in current research which significantly modify results. Perceptual phenomena other than disappearance are present and may compete during stimulus inspection. A procedure is suggested for regularly obtaining disappearances and reducing artifacts. This interpretation emphasizes the interaction of central and peripheral variables and the concept of the phase sequence.
R 12

32,224
Abmons, Carol H. & Abmons, R.B. MOTOR SKILLS BIBLIOGRAPHY: LXIII. PSYCHOLOGICAL INDEX NO. 6, 1899. Percept. mot. Skills, June 1967, 24(3)Part 1, 793-794. (University of Montana, Missoula, Mont.).

An alphabetical listing of fifty-five references on motor skills is given.
R 55

32,225
Winnick, Wilma A., Kurla, J. & Zuker, W.J. TWO SIGNAL DETECTION APPROACHES TO TACHISTOSCOPIC RECOGNITION. Percept. mot. Skills, June 1967, 24(3)Part 1, 795-803. (Queens College, City University of New York, Flushing, N.Y.).

In experiment I, subjects made and rated decisions about two possible outcomes involving tachistoscopically presented materials. The noise (N) condition consisted of a display of random letters; in the signal (S) condition an English word was centered within the random letters. Receiver-operating characteristic curves based upon the data from two durations (.02 and .03 sec.) were close to those predicted by the theory of signal detection (TSD). Experiment II presented a horizontal line of six letters at .01-sec. duration. Subject was to decide whether a particular letter had (S) or had not (N) been part of the display. Again, subject rated his confidence in each decision. Although this proved a more difficult task (as indicated by the value of d'), the receiver-operating characteristic (ROC) curves were again as predicted by TSD.
R 26

32,226
Hunsdahl, J.B. A NEW SIMPLE METHOD OF RECORDING EYE MOVEMENTS. PRELIMINARY REPORT. Percept. mot. Skills, June 1967, 24(3)Part 1, p. 804. (General Psychology Institute, Royal Danish School of Educational Studies, Copenhagen, Denmark).

This method utilizes the following setup: A text line is presented to a subject. Below the line are colored, rectangular strings on a contrasting background. When reading the line subject experiences certain movements among the strings which are peripherally perceived. By describing these movements phenomenologically a relatively exact indication is obtained concerning eye movements during visual, central perception.
R 3

32,227
Snelbecker, G.E. & Downes, R. EFFECTS OF KNOWLEDGE OF RESULTS AND FRAME DIFFICULTY ON INDUCTIVE REASONING PROGRAM TASKS. Percept. mot. Skills, June 1967, 24(3)Part 1, 823-828. (US Veterans Administration Hospital, Brockton, Mass.).

Eight female high school students solved inductive reasoning problems under two different types of experimental conditions with or without knowledge of results and with positive or negative reinforcement. The data lend support to the hypothesis that incidence of errors is greater under no knowledge of results conditions and that the effect is more noticeable with difficult items than with easy ones. Response time was not affected by the knowledge of results conditions. Difficulties encountered in manipulating negative reinforcement (because subjects made few errors than had been anticipated) prohibited testing of the positive/negative reinforcement hypothesis as originally planned.
R 12

32,228
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: LXIV. PSYCHOLOGICAL INDEX NO. 7, 1900. Percept. mot. Skills, June 1967, 24(3)Part 1, 829-830. (University of Montana, Missoula, Mont.).

This listing contains fifty-two references to research on motor skills.
R 52

32,230
Ammons, Carol H. & Ammons R.B. MOTOR SKILLS BIBLIOGRAPHY: LXV. PSYCHOLOGICAL INDEX NO. 8, 1901. Percept. mot. Skills, June 1967, 24(3)Part 1, 869-870. (University of Montana, Missoula, Mont.).

This alphabetical listing of references to work on motor skills contains fifty-six items.
R 56

32,231
Ammons, Carol H. & Ammons, R.B. PERCEPTION BIBLIOGRAPHY: XLIII. PSYCHOLOGICAL ABSTRACTS, 1931, VOLUME 5. Percept. mot. Skills, June 1967, 24(3)Part 1, 911-914. (University of Montana, Missoula, Mont.).

One hundred fifteen items relevant to perception are listed alphabetically for this year.
R 115

32,232
Merrick, R.M. PSYCHOPHYSICAL METHODOLOGY: COMPARISON OF THRESHOLDS OF THE METHOD OF LIMITS AND OF THE METHOD OF CONSTANT STIMULI. Percept. mot. Skills, June 1967, 24(3)Part 1, 915-922. (USN Aerospace Medical Research Dept., NADC, Johnsville, Penn.).

"Yes"-"No" psychophysical experiments assume that the greater the intensity of the stimulus, the greater the probability of a "Yes" response. On the basis of this assumption: a) the relationships between the method of limits and the method of constant stimuli are derived, b) a procedure for comparing data obtained by the two methods is recommended, and c) a procedure for comparing ascending and descending series within the method of limits is given.
R 5

32,233
Ellingstad, V.S. VELOCITY ESTIMATION FOR BRIEFLY DISPLAYED TARGETS. Percept. mot. Skills, June 1967, 24(3)Part 1, 945-947. (University of South Dakota, Vermillion, S.D.).

The present investigation examined the effects of display extent and object velocity on the accuracy of target arrival estimation after target disappearance. After viewing a target which moved across a variable length display aperture at one of three target velocities and then disappeared, subjects estimated the time at which the target would reach a fixed destination. Elapsed time between time of target disappearance and subject's response was recorded. Each of fifteen subjects made ninety such judgments. It was found that target velocity was a significant source of variation but that display extent did not reach statistical significance. The interaction between target velocity and display extent was also statistically significant. When time estimates were converted to velocity estimates and the standard deviation of estimate was plotted against mean velocity estimate, a linear function similar to those reported by Brown (HEIAS No. 15,407) was obtained.
R 4

32,234
Kaufman, H. & Lamb, J.C. AN EMPIRICAL TEST OF GAME THEORY AS A DESCRIPTIVE MODEL. Percept. mot. Skills, June 1967, 24(3)Part 1, 951-960. (University of Connecticut, Storrs, Conn. & Electric Boat Div., General Dynamics Corporation, Groton, Conn.).

In a test of game theory as a descriptive model for behavior, a group of naive subjects played 2 x 2 zero-sum competitive games having small amounts of money as payoffs. The optimal strategies for each game were mixed. Subjects were provided with a device which allowed them to choose a probability and play a given alternative with that probability, i.e. the device provided a ready means of choosing and playing a mixed strategy. The data indicate that subjects do not play, or learn to play, the optimal strategy. Furthermore, subjects' use of the strategy-choosing device indicates that they have little tendency to choose a given alternative with a fixed probability.
R 10

32,235
Karrer, Elizabeth T. & Davidon, R.S. AUDITORY DIRECTION AND HEAD ROTATION. Percept. mot. Skills, June 1967, 24(3)Part 1, 961-962. (Bryn Mawr College, Bryn Mawr, Penn.).

When the head is turned to the right or left there is a constant error in judgments of the direction of a sound, an effect similar to the visual A-effect with head tilt.
R 6

32,236
Ammons, R.B. & Ammons, Carol H. PERCEPTION BIBLIOGRAPHY: XLIV. PSYCHOLOGICAL ABSTRACTS, 1932, VOLUME 6. Percept. mot. Skills, June 1967, 24(3)Part 1, 963-966. (University of Montana, Missoula, Mont.).

One hundred eleven items relevant to perception are listed alphabetically for this year.
R 111

32,237
Smith, S., Myers, T.I. & Murphy, D.B. VIGILANCE DURING SENSORY DEPRIVATION. Percept. mot. Skills, June 1967, 24(3)Part 1, 971-976. (USN Medical Research Institute, National Naval Medical Center, Bethesda, Md.).

In two studies, isolated subjects (N = 59), while undergoing four days of dark, quiet sensory deprivation (SD), exhibited superior auditory vigilance compared with that shown by non-deprived controls (N = 76). This finding contrasts with the usual reports of performance decrements attributed to SD. There are indications that performance on such tests may be quite different when measured post-isolation rather than during isolation. Reasons for the apparent differences are discussed, as are the concepts of arousal, stimulus hunger, and distractibility, which appear to be useful in understanding these vigilance results.
R 8

32,238
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: LXVI. PSYCHOLOGICAL INDEX NO. 9, 1902. Percept. mot. Skills, June 1967, 24(3)Part 1, 977-978. (University of Montana, Missoula, Mont.).

Forty-one items concerned with some aspect of motor skills learning or performance are listed alphabetically.
R 41

32,239
Lurie, S.N., Kinney Jo Ann S. & Weitzman, S. DISTANCE ESTIMATES WITH "FILLED" AND "UNFILLED" SPACE. Percept. mot. Skills, June 1967, 24(3)Part 1, 1007-1010. (USN Submarine Medical Center, Naval Submarine Base, Groton, Conn.).

To investigate the effect of the "filled-unfilled space" illusion on perception of depth, forty observers estimated the relative distances of comparison and standard targets when there was a rod from observer's chin rest to the standard and when the rod was absent. The apparent distance of the standard was greater when the rod was present.
R 11

32,240
Davidson, R.S., Jr. A SAFE AND SIMPLE SHOCK SOURCE FOR HUMAN SS. Percept. mot. Skills, June 1967, 24(3)Part 2, 1045-1046. (US Veterans Administration Hospital, Coral Gables, Fla.).

A simple shock circuit for use with humans in research on punishment is described.
R 1

32,241
Stratcher, Helen W. & Brantley, J.C. A REPEATED ESTIMATE EFFECT IN LINE DRAWING. Percept. mot. Skills, June 1967, 24(3)Part 2, p.1054. (Institute for Juvenile Research, Chicago, Ill. & Irving Schwartz Institute, Philadelphia, Penn.).

Data are reported from four male and four female undergraduates on repeated drawings of lines without knowledge of results. An analysis of variance yielded a significant sex X trials interaction, the females showing progressive lengthening of judgments with repetition. The findings are considered relative to Von Sturmer's work on repeated time estimates. (HEIAS)
R 3

32,242
Wolf, G. CONSTRUCT VALIDATION OF MEASURE OF THREE KINDS OF EXPERIENTIAL FATIGUE. Percept. mot. Skills, June 1967, 24(3)Part 2, 1067-1076 (Cornell University, Ithaca, N.Y.).

Three subjective fatigues, nervous, drowsy, exhaustion, from a factor analysis of adjectives in a pre-study, were used as dependent variables in an experimental design in which three tasks were used to elicit the fatigues (N = 184 undergraduates). Measures of motivation were also taken to show the fatigues as a product of type of task and level of motivation. Results indicated that the fatigue is a product of motivation, not task. A modification of Campbell and Fiske (HEIAS 13,344) multitrait, multimethod analysis and a varimax factor analysis indicated that the scales possess some discriminant validity but little convergent validity which was interpreted as possibly due to low reliability of the behavioral measures.
R 14

32,243
Ammons, Carol H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: LXVII. PSYCHOLOGICAL INDEX NO. 10, 1903. Percept. mot. Skills, June 1967, 24(3)Part 2, 1077-1078. (University of Montana, Missoula, Mont.).

Forty-seven items concerning motor skills are listed alphabetically.
R 47

32,244
Creelman, C.D. EMPIRICAL DETECTABILITY SCALES WITHOUT THE JND. Percept. mot. Skills, June 1967, 24(3)Part 2, 1079-1084. (University of Toronto, Toronto, Ontario, Canada).

Psychometric functions for discrimination yield direct estimates of the slope of the psychophysical scale. These estimates of slope may be used to deduce an equation for the general scale. This procedure avoids recourse to differential thresholds or to unacceptable mathematical assumptions.
R 18

32,245
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: LXVIII. PSYCHOLOGICAL INDEX NO. 11, 1904. Percept. mot. Skills, June 1967, 24(3)Part 2, 1117-1118. (University of Montana, Missoula, Mont.).

Forty-six skills items comprise this alphabetical listing.
R 46

32,246
Day, M. & Thomas, E.L. EFFECTS OF AMPHETAMINE ON SELECTIVE ATTENTION. Percept. mot. Skills, June 1967, 24(3)Part 2, 1119-1125. (Lakeshore Psychiatric Hospital, New Toronto, Ontario, Canada & University of Toronto, Toronto, Ontario, Canada).

By means of an eye-marker camera, films were taken of the proportion of time subjects spent fixating the more complex (MC) alternative of visual patterns exposed in pairs for 25-sec. intervals. It was expected that under the effects of 10 mg. d-amphetamine, an arousing agent, subjects would reduce the proportion of time spent attending to the MC alternatives; instead, the shift was in the opposite direction. The results were discussed in terms of "free" and "forced" exploration.
R 29

32,247
Gregory, R.L. & Rose, Helen E. ARM WEIGHT, ADAPTATION, AND WEIGHT DISCRIMINATION. Percept. mot. Skills, June 1967, 24(3)Part 2, 1127-1130. (Psychological Lab., University of Cambridge, Cambridge, England).

The addition of a large weight to the forearm impairs weight discrimination by an amount which is small by Weber's Law but which could affect skilled tasks. When time is allowed for adaptation to the forearm weight, discrimination with the weight is improved and discrimination without the weight is impaired. Implications for pilots and astronauts under varying g are discussed.
R 15

32,248
Shontz, F.C. ESTIMATION OF DISTANCES ON THE BODY. Percept. mot. Skills, June 1967, 24(3) Part 2, 1131-1148. (University of Kansas, Lawrence, Kan.).

Twenty-four men and twenty-four women college students estimated the sizes of thirteen body stimuli and thirteen nonbody objects by adjusting markers on a horizontal rod and by drawing 1:4 scale pictures of their own bodies. Data were scores expressing response size as a percentage of stimulus size. In both response modes, percentage scores for body stimuli assumed a pattern that was not evident in estimates of nonbody-object sizes. Combinations of body parts, judged as a unit, were underestimated relative to estimates of component body parts judged separately. Subjects' free drawings of the body in figure, rated for disturbance in body image, were not significantly related to size-estimations of body or nonbody stimuli.
R 13

32,249
Zimmerman, J., Plass, R.C., Brown, W. & Hilleson, E.A. PANEL FOR STIMULUS CONTROL OVER TOGGLE-SWITCH BEHAVIOR IN TECHNICIANS. Percept. mot. Skills, June 1967, 24(3)Part 2, 1201-1206. (Indiana University School of Medicine, Indianapolis, Ind.).

This note describes a device which controls toggle-positioning behavior in technicians. Its application has eliminated toggle-positioning errors and superseded the daily verbal instructions previously [illegible]. It can be applied to the reduction of technician errors in any situation in which a given set of equipment is used repeatedly in different ways over short periods of time.

32,250
Freedman, S.J., Wilson, Lynn & Rekosh, J.H. COMPENSATION FOR AUDITORY RE-ARRANGEMENT IN HAND-EAR COORDINATION. Percept. mot. Skills, June 1967, 24(3)Part 2, 1207-1210. (Tufts University, Medford, Mass.).

Ten subjects pointed at concealed auditory targets while listening through a pseudophone which produced 20° functional rotation of the interaural axis. After short exposures listening to a sound source held in one hand while moving that hand about, large and significant corrective shifts in pointing were measured.
R 7

32,251
McGrath, J.J. & O'Hanlon, J.F., Jr. METHOD FOR MEASURING THE RATE OF SUBJECTIVE TIME. Percept. mot. Skills, June 1967, 24(3)Part 2, 1235-1240. (Human Factors Research Incorporated, Goleta, Calif.).

A method was developed for measuring rate of subjective time (RST). Subjective time (T) was recorded in subjects making a series of contiguous estimations of a standard interval of time. The results showed that T generally increased as a linear function of real time (t). RST was measured by describing T as a linear function of t and by differentiating that function in respect to t. Individual differences in RST were large and stable within a test session. The differences were reliable from one session to the next. Within the range studied (1 to 10 min.) the duration of the standard interval had no systematic effect upon RSTs. And, RSTs were related in the appropriate direction to traditional measures of time perception. It was concluded that the RST is a useful measure for research on time perception.
R 8

32,252
Ammons, Carol H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY. LXIX. PSYCHOLOGICAL INDEX NO. 12, 1905. Percept. mot. Skills, June 1967, 24(3)Part 2, 1241-1242. (University of Montana, Missoula, Mont.).

This list of references to work on motor skills contains forty-nine items.
R 49

32,253
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: LXX. PSYCHOLOGICAL INDEX NO. 13, 1906. Percept. mot. Skills, June 1967, 24(3)Part 2, 1249-1250. (University of Montana, Missoula, Mont.).

Forty-four references to material on motor skills are listed alphabetically.
R 44

32,254
Ammons, Carol H. & Ammons, R.B. PERCEPTION BIBLIOGRAPHY: XLV. PSYCHOLOGICAL ABSTRACTS, 1933, VOLUME 7. Percept. mot. Skills, June 1967, 24(3)Part 2, 1259-1262. (University of Montana, Missoula, Mont.).

One hundred references to research on perception are listed alphabetically.
R 100

32,255
Scott, T.R., Bragg, R.A. & Jordan, A.E. LACK OF EFFECT OF STIMULANT AND DEPRESSANT DRUGS ON SPIRAL AFTEREFFECT. Percept. mot. Skills, June 1967, 24(3)Part 2, 1263-1270. (US Veterans Administration Hospital, Columbia, S.C.).

Eysenck's claim that sodium amytal shortens and dexedrine lengthens the duration of spiral aftereffect was not borne out in any of four experiments designed to demonstrate it, including a replication of his study. A further replication, different only in the stimulus used, yielded no effect of amytal or dexedrine. Actual measurement of aftereffect rate immediately following the eliciting stimulus and after selected delays showed an exponential decay function for aftereffect rate but did not demonstrate any effect of the two drugs. This repeated failure to demonstrate a change in aftereffect as a result of the administration of drugs known to affect neuron firing thresholds has implications for the understanding of neurophysiology of visual motion perception. It was proposed that motion aftereffect is based on a comparison of the states of two neural systems both of which are equally affected by the drugs.
R 12

32,256
Burg, A. LIGHT SENSITIVITY AS RELATED TO AGE AND SEX. Percept. mot. Skills, June 1967, 24(3)Part 2, 1279-1288. (Institute of Transportation & Traffic Engineering, University of California, Los Angeles, Calif.).

In order to provide normative data on light sensitivity as a function of age and sex, some 17,500 subjects, ages 16 to 92, were tested for both form recognition ability and glare recovery time under scotopic levels of illumination. The results show: a) a progressive deterioration of performance on both tests with increasing age, b) a very low correlation between form recognition ability and glare recovery time, and c) no consistent difference in performance between males and females. Possible explanations for these findings are presented.
R .0

32,257
Hall, A.C. FACTOR ANALYSIS AS AN EXPERIMENTAL TECHNIQUE. Percept. mot. Skills, June 1967, 24(3)Part 2, 1289-1290. (University of Newcastle, Newcastle, Australia).

Factor analysis is not restricted to explanatory and classificatory studies but has its place as a hypothesis-testing experimental tool. A study in the field of experimental aesthetics is briefly described. In this study, a set of orthogonal reference factors summarized the essential characteristics of a set of random "paintings." The vectors of 200 Ss, who had ranked the paintings, were inserted into this factor space to test a prediction regarding differences in vector positions related to different experimental treatments. Two advantages of this type of experimental design over more usual classical procedures are suggested.
R 6

32,258
Cohen, M.M. CONTINUOUS VERSUS TERMINAL VISUAL FEEDBACK IN PRISM AFTEREFFECTS. Percept. mot. Skills, June 1967, 24(3)Part 2, 1295-1302. (USN Air Engineering Center, Philadelphia, Penn.).

Subjects wore prisms as they reached for a visible target with one hand. When the reaching hand was viewed continuously, aftereffects were restricted to that hand. When the reaching hand was viewed only after each reaching movement had already been completed, aftereffects were obtained with both hands. These findings dispute the generality of assertions that the aftereffects of wearing prisms are exclusively a result of either changes in the sensed position of the prismatically viewed arm or changes in the judgment of the direction of the gaze. Rather, both appear to be possible mechanisms underlying the aftereffects, and their relative prominence depends strongly upon visual feedback conditions.
R 11

32,259
Herron, R.E. & Rasmussen, R.W. CONTINUOUS MONITORING OF SWEAT HUMAN BODY MOVEMENT BY RADIO TELEMETRY: A BRIEF REVIEW. Percept. mot. Skills, June 1967, 24(3)Part 2, 1303-1308. (University of Illinois, Urbana, Ill.).

Although radio transmission of analog signals has been known for over 100 years, very few investigators have exploited this approach to the systematic study of overt human movement. The small number of known previous applications are critically reviewed and suggestions made regarding future possibilities. Now that micro-electronic transmitters are commonplace, the only major obstacle to future use of this technique seems to rest with the design of unobtrusive motion transducers which are parsimonious in the acquisition of relevant data.
R 9

32,260
Yanaka, Y., Uemura, Y. & Torii, S. DECREASE AND INCREASE IN TEST-THRESHOLD LUMINANCE INDUCED BY A CONTIGUOUS ANNULAR FIELD. Percept. mot. Skills, June 1967, 24(3)Part 2, 1319-1326. (University of Tokyo, Tokyo, Japan).

The threshold luminance of the test field (0.6') presented to the retinal region about 1°09' below a fixation point was measured under various combinations of luminance and area of contiguous annular field, according to the method of limits. The following results for two subjects were obtained. a) As the luminance of inducing field increased from -2.5 to 0.5 log mL, the test threshold, after once it became lower than the ones measured without inducing field, increased gradually. b) It seemed to be dependent on the inducing-area where minimum value of threshold appears on the inducing luminance axis.
R 11

32,261
Ammons, Carol H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: LXXI. PSYCHOLOGICAL INDEX NO. 14, 1907. Percept. mot. Skills, Aug. 1967, 25(1), 23-24. (University of Montana, Missoula, Mont.).

Forty-seven references to research on motor skills are listed alphabetically.
R 47

32,263
Dixon, N.F. EFFECT OF INFORMATION CONTENT AND SIZE UPON THE ABSOLUTE THRESHOLD FOR MOVEMENT. Percept. mot. Skills, Aug. 1967, 25(1), 37-40. (University College, London, England).

From the finding that the absolute threshold for rotational movement was significantly lower for a field of randomly, as opposed to regularly, distributed black and white squares it was hypothesized that only in the case of high selective information-content fields would there be an inverse relationship between size of elements and the movement threshold. Movement thresholds, obtained for random and regular displays containing different sizes of internal element, confirmed the crucial role of selective information in determining the movement threshold but did not support the predicted size effect. This apparent paradox may be explained by the reduced confidence which subjects experience when judging the movement of random displays.
R 5

32,264
Evans, W.O. & Consolazio, C.F. EFFECTS OF HIGH ALTITUDE ON PERFORMANCE OF THREE DIFFERENT TYPES OF WORK. Percept. mot. Skills, Aug. 1967, 25(1), 41-50. (USA Medical Research & Nutrition Lab., Fitzsimons General Hospital, Denver, Colo.).

To determine the effects of transition from a low altitude to a high altitude on three types of work performance, the rate at which the subject proceeded from low to high altitude, and the effects of a physical conditioning program. Twenty-four young soldiers were studied at sea level. Their maximum performance on medicine ball putting (an explosive strength task), the bicycle ergometer (a stamina task), and chin-ups (a dynamic strength task) were measured. Half of the subjects participated in a physical conditioning program; subjects' daily exercise was based upon exercise at 90% of his own maximum capacity. Eight subjects remained at sea level, eight subjects ascended to an altitude of 14,110 ft. gradually (one week each at an altitude of 5,200 ft. and 11,400 ft.), eight subjects went directly to 14,110 ft. within one day. It was not possible to predict the amount of depression of performance capacity found at high altitude. Dynamic strength was not affected by high altitude, but explosive strength and stamina were. Explosive strength readapted within two weeks; stamina had not readapted after one month. Gradual transition to high altitude was beneficial for the explosive strength but did not effect stamina. Physical conditioning proved efficacious in reducing performance decrement in explosive strength and stamina.
R 10

32,265
Cook, M.L. THE POWER LAW AS A SPECIAL CASE OF FECHNER'S LAW. Percept. mot. Skills, Aug. 1967, 25(1), 51-52. (Australian National University, Canberra, Australia).

Ekman has suggested that, if Fechner's law held for both the stimulus dimension being investigated and number, power functions would result from magnitude estimation procedures. It is shown that his argument implies that the exponents in these functions would depend on both the choice of the modular stimulus and the number to be assigned to it. Existing data are inconsistent with the predicted form of this dependance.
R 2

32,266
Burkhard, D.G., Patterson, J. & Pupo, R. EFFECT OF FILM FEEDBACK ON LEARNING THE MOTOR SKILLS OF KARATE. Percept. mot. Skills, Aug. 1967, 25(1), 65-69. (University of Georgia, Athens, Ga.).

An experiment was conducted to evaluate the usefulness of individual execution films in teaching elementary karate movements. Results indicated that the subject's learning rate improved when he was able to view his own performance.
R 8

32,268
Mefferd, R.B., Jr. & Wieland, Betty A. PERCEPTION OF DEPTH IN ROTATING OBJECTS: I. STEREOKINESIS AND THE VERTICAL-HORIZONTAL ILLUSION. Percept. mot. Skills, Aug. 1967, 25(1), 93-100. (US Veterans Administration Hospital, Psychiatric & Psychosomatic Research Lab., Houston, Tex.).

Observers viewed under extreme reduction conditions either a rod or an ellipse as it rotated slowly (5 rpm) in the frontoparallel plane. They reported seeing a sequence of percepts of the luminous stimulus starting with veridical rotation, then expansion-contraction, and/or advance-retreat and finally ending with apparent rotation in a plane oblique to the observer. The percepts were the same with either monocular or binocular regard and with the head tilted 90° to the side. In the latter case, the apparent plane of rotation shifted with the head position showing that the visual field determined the effect. This stereokinetic effect was related to the vertical-horizontal illusion and was explained in terms of the asymmetry of the visual field.
R 19

32,269
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: LXXII. PSYCHOLOGICAL INDEX NO. 15, 1908. Percept. mot. Skills, Aug. 1967, 25(1), 111-112. (University of Montana, Missoula, Mont.).

This listing contains thirty-four references to research on motor skills.
R 34

32,270
Smith, A.H. PHENOMENAL SHAPE AS A FUNCTION OF AMBIGUITY OF OCULAR PERSPECTIVE. Percept. mot. Skills, Aug. 1967, 25(1), 121-127. (Defence Research Medical Labs., Toronto, Ontario, Canada).

Observers made outline drawings of the apparent shapes of a rectangle and three trapezoids, exposed under reduced viewing conditions at slant of 10°, 25°, and 40°. The four forms were of equal height and area. The smallest projective angular convergence of the sides of the frontoparallel trapezoids was larger than that of the rectangle at its maximum slant. Observers distinguished significantly between forms and angles of slant. The shape indices for the monocular and binocular groups did not differ significantly, and the interaction between eye(s) and form was not significant. The data were interpreted, with those of a similar experiment on slant (Smith, HEIAS No. 28,775) as supporting a formulation of the shape-slant relation in which phenomenal shape is primary, phenomenal slant subsidiary.
R 8

32,271
Antonelli, D.C. & Karas, G.G. PERFORMANCE ON A VIGILANCE TASK UNDER CONDITIONS OF TRUE AND FALSE KNOWLEDGE OF RESULTS. Percept. mot. Skills, Aug. 1967, 25(1), 129-138. (IBM Systems Development Div., Rochester, Minn. & Iowa State University, Ames, Iowa).

A vigilance study comparing the effects of true and false knowledge of results is presented. The study determines at what point, if any, the effects of false knowledge of results (FKR) reflect the results of earlier vigilance studies involving true knowledge of results (KR). The task used required a response to a signal on a display panel. The KR was either an [illegible] or randomly generated FKR. Latency of response was the dependent variable. The results demonstrated that groups receiving KR do not differ significantly in performance from groups receiving FKR. The best results were obtained at the 100% feedback level, a drop occurred at the 50% level, and the hypothesized drop in performance occurred between 30% and 20%.
R 14

32,272
Ammons, Carol H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: LXXIII PSYCHOLOGICAL INDEX NO. 16, 1909. Percept. mot. Skills, Aug. 1967, 25(1), 139-140. (University of Montana, Missoula, Mont.).

This is an alphabetical listing of fifty-six references to research on motor skills.
R 56

32,273
Warm, J.S., Smith, R.F. & Caldwell, L.S. EFFECTS OF INDUCED MUSCLE TENSION ON JUDGMENT OF TIME. Percept. mot. Skills, Aug. 1967, 25(1), 153-160. (University of Louisville, Louisville, Ky.).

The functional relation between induced muscle tension and temporal perception was explored. Judgments of the duration of four intervals (6, 12, 24, and 48 sec.) were made under five levels of muscle tension (0, 10, 20, 30 and 40% of maximum grip strength) by the methods of reproduction and verbal estimation. The effects of degree of muscle tension were negligible at the two shortest stimulus durations. At the two longer intervals, perceived duration decreased as a non-monotonic function of muscle load. Findings were independent of the psychophysical methods employed. Disparities in the magnitude of duration judgments secured by the two psychophysical methods were also dependent upon stimulus duration. At 24 and 48 sec., verbal estimates of the standard interval were significantly longer than reproductions. Differences in response magnitude between methods were not observed at the two shortest stimulus intervals. Results are discussed in terms of the general relation between activity level and temporal perception and in terms of the problem of methodological equivalence in judgments of time.
R 22

32,274
Feeney, W.R. & Braunstein, M.L. APPARENT VIBRATION OF VERTICAL LINES. Percept. mot. Skills, Aug. 1967, 25(1), 173-176. (University of California, Irvine, Calif.).

Displays of motionless vertical lines sometimes produce an impression of vibration. The relative strength of this impression was explored for 40 subjects, using a paired-comparison procedure, for displays of black lines subtending visual angles from 2 to 20' of arc and having black to white area ratios of 1:1.5 and 1:3. The maximum impression of vibration was found for lines between 3' and 10' with 1:1.5 spacing.
R 11

32,276
Brooks, L.O. RESPONSE TIME DURING INSTRUCTION. Percept. mot. Skills, Aug. 1967, 25(1), 203-204. (American Institutes for Research, Palo Alto, Calif.).

It may be useful to replace concern for years of instruction with greater interest in moments richest in educational progress. This note complements another in which a type of response-time analysis was suggested as a means of identifying less desirable items in an instructional program. It concerns response time considerations in forced pacing and suggests an alternative way of modifying student response times. It seems possible to increase the speed of an instructional process without impairing performance by differentially reinforcing especially quick, correct answers to questions designed to teach.
R 3

32,277
Ammons, R.B. & Ammons, Carol H. PERCEPTION BIBLIOGRAPHY: XLV. PSYCHOLOGICAL ABSTRACTS, 1934, VOLUME 8, PART 1. Percept. mot. Skills, Aug. 1967, 25(1), 205-208. (University of Montana, Missoula, Mont.).

One hundred twelve references to research on perception are listed alphabetically.
R 112

32,278
James, W.E., Hefferd, R.B., Jr. & Wieland, Betty A. REPETITIVE PSYCHOMETRIC MEASURES: HANDEDNESS AND PERFORMANCE. Percept. mot. Skills, Aug. 1967, 25(1), 209-212. (US Veterans Administration Hospital, Psychiatric & Psychosomatic Research Lab., Houston, Tex.).

Many investigators have reported that right-handed people perform most motor tasks better, faster, and with relatively fewer errors than do the left-handed. Slight differences were found in performance on only three of the tests of the Repetitive Psychometric Measures battery--Spatial Orientation (SO), Speed of Closure (SC), and Flexibility of Closure (FC). Some of the difference in performance may be alleviated by minor changes in instruction for left-handed subjects.
R 15

32,279
Gogel, W.C. & Mertens, H.W. PERCEIVED SIZE AND DISTANCE OF FAMILIAR OBJECTS. Percept. mot. Skills, Aug. 1967, 25(1). 213-225. (University of California, Santa Barbara, Calif. & US Civil Aeromedical Institute, FAA, Oklahoma City, Okla.).

The relationship between the perceived size and distance of a playing card and its retinal size was studied using both stationary and moving stimuli. A distinction between absolute and relative familiar size cues was supported by the experimental results in that successive judgments of the distance of different retinal sizes of the cards were not predictable solely from cues of absolute retinal size. The data from both the stationary and moving stimuli suggest, however, that the perceived distance of the initial presentations resulting from the absolute size cue provides a metric for the distance perceptions resulting from cues of relative size. As indicated by the results from the initial presentations, the absolute size cue to distance from familiar objects in this study was a highly variable determiner of perceived distance.
R 8

32,280
Silverman, F.H. & Sherman, Dorothy. EQUAL-APPEARING INTERVAL SCALE VALUES AND SUCCESSIVE INTERVAL SCALE VALUES DERIVED FROM THE SAME SET OF RATINGS. Percept. mot. Skills, Aug. 1967, 25(1), 226-228. (University of Iowa, Iowa City, Iowa).

Both equal-appearing interval scale values and successive interval scale values were computed for each of five sets of ratings on five different kinds of stimuli. The scale values obtained by these two methods rank ordered almost identically the stimuli which were scaled. For all five sets of ratings, the Pearson r for estimating the relationship between the two sets of scale values was equal to or greater than .99. In view of the close relationship between the scale values derived by the two methods, practical considerations would make the method of equal-appearing intervals the preferable one for many purposes.
R 7

32,281
Smith, S., Myers, T.I. & Johnson, E., III. STIMULATION SEEKING THROUGHOUT SEVEN DAYS OF SENSORY DEPRIVATION. Percept. mot. Skills, Aug. 1967, 25(1), 261-271. (USN Medical Research Institute, National Naval Medical Center, Bethesda, Md.).

Sixty volunteer Naval enlisted men participated in a study of seven-day, individual isolation. Forty subjects lived in small, dark, quiet rooms with little to do (SD). The other twenty served in a live-in-the-lab control group (C) with ad lib. access to lights, recreational materials, and intercom conversation with another C subject if mutually desired. Nineteen SD subjects, but only one C subject, requested early release. Pre-, during-, and post-isolation tests were given. In a test of stimulation seeking, boring stock reports could be heard during a one-hour period on each of Days 1, 5, and 7 of isolation. SD subjects selected to listen significantly more than Cs on Days 4 and 7, with the differences increasing over time. Day 1 listening (about six hours after isolation began) predicted who would later request release. In the discussion, currently available stimulation-seeking data are summarized and integrated.
R 15

32,282
Mori, F. EEG ANALYSIS OF VISUAL PERCEPTION OF REGULAR AND IRREGULAR FIGURES. Percept. mot. Skills, Aug. 1967, 25(1), p.272. (Hokkaido University, Sapporo, Japan).

This is a brief summary of findings on the relationship between alpha percentage during observation of regular and irregular visual patterns. For the more complex patterns, there were longer periods of desynchronization. (HEIAS)
R 1

32,283
Pearce, D.G. & Abel, Sharon, M. AUTOKINESIS OF AN INTERMITTENT LUMINANCE. Percept. mot. Skills, Aug. 1967, 25(1), 278-280. (Defence Research Medical Labs., Toronto, Ontario, Canada).

Twenty subjects were used in an experiment to determine whether autokinetic latency and displacement of an intermittent luminance reach minimum and maximum, respectively, at the same rate of intermittence. It was found that autokinetic latency and displacement of a small, low-luminance stimulus reach minimum and maximum, respectively, in the region of 2 to 16 cps (cycles per sec.). Measures repeated over five days disclosed no systematic effects of repeated exposures to the illusion.
R 5

32,284
Ammons, Carol H. & Ammons, R.B. PERCEPTION BIBLIOGRAPHY: XLVII. PSYCHOLOGICAL ABSTRACTS, 1934, VOLUME 8, PART 2. Percept. mot. Skills, Aug. 1967, 25(1), 281-284. (University of Montana, Missoula, Mont.).

One hundred fifteen references to work on perception are listed alphabetically.
R 115

32,285
Harcum, E.R. TWO POSSIBLE MECHANISMS OF DIFFERENTIAL SET IN TACHISTOSCOPIC PERCEPTION OF MULTIPLE TARGETS. Percept. mot. Skills, Aug. 1967, 25(1), 289-304. (College of William & Mary, Williamsburg, Va.).

Two conceptions of set are discussed as possible explanations for hemifield differences in perceptual accuracy for tachistoscopic patterns. One conception implies a general facilitation for all stimuli in one hemifield, usually the right. The other implies a selector of certain stimuli, usually on the left, to be scanned first, favored by a primacy effect. Both notions of set are necessary to account for existing data.
R 45

32,286
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: LXXIV PSYCHOLOGICAL INDEX NO. 17, 1910. Percept. mot. Skills, Aug. 1967, 25(1), 323-324. (University of Montana, Missoula, Mont.).

Fifty-six items pertaining to research on motor skills are listed alphabetically.
R 56

32,287
Weber, R., Love, W. & Goldstein, M. NUMERICALLY VARIED S-R MAPPING DISORDER. Percept. mot. Skills, Oct. 1967, 25(2), 361-373. (Oklahoma State University, Stillwater, Okla.).

Qualitative support for the effects on learning of various degrees of S-R (stimulus-response) mapping disorder was cited to show that the way stimulus and response classes are connected or mapped together may have a strong effect on learning rate. Then to study quantitatively the S-R mapping problem a paradigm based on discrimination learning procedures was constructed. It made possible the numerical variation of S-R mapping on an order-disorder basis. The order-disorder dimension was related a priori to a linear variable for number of different correct choices and to a quadratic variable for conditional mapping uncertainty, Us(R). Mean errors were significantly related to only the quadratic component. Other results include: a closer relation between Us(R) and SDs (standard deviations) than between Us(R) and means, unique patterns of errors within groups related to mapping structure; and a correspondence between post-experimental subjective measures and both task structure and difficulty. Finally, among post hoc explanations of mapping effects one phrased in terms of mapping uncertainty and hypothesis storage, sampling, and generation gave the best account of obtained results.
R 26

32,288
Ammons, Carol H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: LXXV. PSYCHOLOGICAL INDEX NO. 18, 1911. Percept. mot. Skills, Oct. 1967, 25(2), 390-392. (University of Montana, Missoula, Mont.).

Skills references (n=56) are listed alphabetically.

32,289
Geddes, W.H. A NEW TEST OF DYNAMIC VISUAL RETENTION. Percept. mot. Skills, Oct. 1967, 25 (2), 393-396. (University of Victoria, Victoria, British Columbia, Canada).

A new test is described which is designed to measure visual serial-order perception. A total of 331 normal subjects, including children aged 8 through 12 and groups of both adolescents and adults, were tested. Results indicate that performances of subjects free of obvious cerebral dysfunctions show a linear improvement from age 8 to about 13. After that age, gains are at a slower rate until adulthood. No sex differences were noted. The test appears to have value for providing information about the normal development of serial-order visual perception, serial-order visual memory and spatial imagery. As a neuropsychological test it is sensitive in discriminating brain-damage and cerebral dysfunction.
R 5

32,290
Bortner, R.W. MEASUREMENT OF INFORMAL SELECTION PROCESSES. Percept. mot. Skills, Oct. 1967, 25(2), 421-436. (US Veterans Administration Center, Research Unit on Aging, Hampton, Va.).

When statements of formal eligibility requirements fail to account for the characteristics of institutional populations, there is a tendency to resort to speculative explanations. This study examined some methods for empirical evaluations of these speculative notions. Univariate and step-down analyses did not aid in conceptualizing informal selection processes in this study; a discriminant function analysis seemed to provide an adequate approach to a synthesis. The method was illustrated by examining definable subsamples in a Veterans Administration domiciliary which were compared with a non-institutional, community sample; means of the standardization samples for the tests used provided additional reference points for comparison. For these particular subsamples from this institution, alterations in self concept appeared to provide the single unifying theme which best integrated the diverse differences among the groups.
R 12

32,291
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: LXXVI. PSYCHOLOGICAL INDEX NO. 19, 1912. Percept. mot. Skills, Oct. 1967, 25(2), 454-456. (University of Montana, Missoula, Mont.).

Fifty-four references to items dealing with perceptual-motor skills are presented.

32,292
Surwillo, W.W. RELATIONSHIP BETWEEN ELECTRICAL POTENTIAL OF THE SKIN AND SKIN TEMPERATURE. Percept. mot. Skills, Oct. 1967, 25(2), 465-470. (University of Louisville School of Medicine, Louisville, Ky.).

The relationship between electrical potential of skin (SP) and temperature of the skin (ST) in the region of the recording electrode was investigated in 12 healthy subjects. SP between palm and ventral surface of forearm was recorded during a 1-hr. test session in which the subject was asked to watch for a rarely-occurring stimulus. Forearm ST and SP proved to be unrelated. The regression of SP on palm ST was statistically significant, but the low correlation suggested that, under the conditions investigated, SP and ST were largely independent.
R 13

32,293
Ammons, R.B. & Ammons, Carol H. PERCEPTION BIBLIOGRAPHY: XLVIII. PSYCHOLOGICAL ABSTRACTS, 1935, VOLUME 9, FIRST HALF. Percept. mot. Skills, Oct. 1967, 25(2), 493-496. (University of Montana, Missoula, Mont.).

One hundred references to work on perception are listed alphabetically.

32,294
Hofmann, M. RESPONSE TIMES TO ELECTROCUTANEOUS STIMULATION. Percept. mot. Skills, Oct. 1967, 25(2), 509-513. (University of South Dakota, Vermillion, S.D.).

Response times were obtained from nine subjects responding to DC electrocutaneous signals. Each subject received a series of 160 signals varying randomly in inter-signal interval (response to onset of next signal) and location. The results indicated that of the 5 inter-signal intervals employed, those being 7, 10, and 12 sec. in duration produced faster mean response times than those of 2 and 4 sec. Response times to the locations, the left hand, left foot, right hand, and right foot, did not differ significantly from one another but significantly interacted with subjects.
R 17

32,295
Ammons, Carol H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: LXXVII. PSYCHOLOGICAL INDEX NO. 20, 1913. Percept. mot. Skills, Oct. 1967, 25(2), 522-524. (University of Montana, Missoula, Mont.).

An alphabetical listing of 59 references to work on motor skills is given.

32,296
Kavale, A., Von Cott, H.P., Orr, D.B. & Small, V.H. HUMAN DERMO-OPTICAL PERCEPTION: COLORS OF OBJECTS AND OF PROJECTED LIGHT DIFFERENTIATED WITH FINGERS. Percept. mot. Skills, Oct. 1967, 25(2), 525-542. (American Institutes for Research, Washington, D.C.).

It has been popularly reported that some persons can discriminate nonvisually among stimulus objects usually requiring visual cues. A female subject (A) was reported to possess the ability of so-called "finger-sight" or "dermo-optical perception." To determine whether there was anything unusual about her sensory behavior, the subject and three controls were tested using plastic discs, projected light and playing cards as stimuli. The stimuli were presented so as to prevent use of visual cues for identification. Results indicated that the subject performed reliably above chance and above the level of the controls as a group in discriminating colored plastic discs, colored projected lights, and in discriminating the suit and number of playing cards. Some controls also performed reliably above chance but below A.
R 15

32,297
Ammons, Carol H. & Ammons, R.B. PERCEPTION BIBLIOGRAPHY: XLIX. PSYCHOLOGICAL ABSTRACTS, 1935, VOLUME 9, SECOND HALF. Percept. mot. Skills, Oct. 1967, 25(2), 543-543 (University of Montana, Missoula, Mont.).

Ninety-nine references to work on perception are listed alphabetically.

32,298
Berglund, Birgitta, Berglund, U. & Ekman, G. TEMPORAL INTEGRATION OF VIBROTACTILE STIMULATION. Percept. mot. Skills, Oct. 1967, 25(2), 549-560. (Psychological Labs., University of Stockholm, Stockholm, Sweden).

The perceived intensity of vibrotactile stimulation at 250 c/s was measured by a psychophysical scaling method under different conditions of intensity (32-54 db) and duration (30-1200 msec.) of stimulation. It was found that perceived intensity grows as a logarithmic function of stimulus duration up to about 1 sec., thereafter it remains constant, and that the exponent of the psychophysical power function decreases from 0.7 at the shortest duration and approaches a constant value of 0.4 for the longest durations.
R 27

32,299
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: LXXVIII. PSYCHOLOGICAL INDEX NO. 21, 1914. Percept. mot. Skills, Oct. 1967, 25(2), 567-568. (University of Montana, Missoula, Mont.).

Fifty-eight references to research on skills are given alphabetically.

32,300
Levy, C.M. & Nagle, Karen. THE PSYCHOLOGY OF MEMORY--1965: A BIBLIOGRAPHY. Percept. mot. Skills, Oct. 1967, 25(2), 573-582. (University of Florida, Gainesville, Fla.).

Two hundred and fifty-four contributions to the psychology of memory and forgetting published in 1965 are listed.

32,301
Dietze, Doris [illegible] FOR MORE THAN TWO. Percept. mot. Skills, Oct. 1967, 25(2), 589-602. (US Veterans Administration Hospital, Seattle, Wash.).

A simple method for performing t tests of the differences between means of independent groups, matched groups, and paired observations is presented and illustrated. The method is especially appropriate where data are collected simultaneously on a large number of dependent variables. Statistical tables are provided which markedly reduce the number of calculations to be performed. The method provides a clearcut way of graphically representing t test data relative to chosen significance levels.
R 1

32,303
Hayashi, T. & Bryden, M.P. OCULAR DOMINANCE AND PERCEPTUAL ASYMMETRY. Percept. mot. Skills, Oct. 1967, 25(2), 605-612. (University of Waterloo, Waterloo, Ontario, Canada).

Two experiments were performed to determine the relation of sighting and acuity dominance to tachistoscopic recognition. In both, single-letter material was exposed binocularly to either the left or right of fixation at brief durations. In Exp. I (N=32) visual field differences in recognition were unrelated to sighting dominance. The results of Exp. II (N=24) suggested that both acuity dominance and cerebral dominance affect visual field differences. While all were strongly right-handed (and presumably left cerebral-dominant), right acuity-dominant subjects displayed a large right-field superiority, whereas left acuity-dominant subjects exhibited no visual field difference. The results suggest an interaction between acuity dominance and cerebral dominance which may be mediated by the relative superiority of the crossed optic pathways.
R 21

32,304
Hafford, R.B., Jr. & Wieland, Betty A. PERCEPTION OF DEPTH IN ROTATING OBJECTS: 2. PERSPECTIVE AS A DETERMINANT OF STEREOKINESIS. Percept. mot. Skills, Oct. 1967, 25(2), 621-628. (US Veterans Administration Hospital, Psychiatric & Psychosomatic Research Lab., Houston, Tex.).

Ten observers viewed under extreme reduction conditions 5 simple, plane, featureless figures and an Ames trapezoidal window as they rotated slowly (5 rpm) in the frontoparallel plane. Judgments of shape, slant, and type of movement were obtained for 4-min. periods first with binocular regard and later with monocular. As more perspective cues were introduced and as viewing time increased, there were progressive increases in depth indicants with all three types of judgments.
R 9

32,305
Oltman, P.K. & Capobianco, Frances. FIELD DEPENDENCE AND EYE DOMINANCE. Percept. mot. Skills, Oct. 1967, 25(2), 645-646. (New York State University Downstate Medical Center, Brooklyn, N.Y. & University of Connecticut, Storrs, Conn.).

Twenty-one subjects with incompletely established eye dominance were found to be significantly more field dependent (Hidden-figures Test) than 58 with established eye dominance.
R 6

32,307
Daniel, R.S. ALPHA AND THETA EEG IN VIGILANCE. Percept. mot. Skills, Dec. 1967, 25(3), 697-703. (University of Missouri, Columbia, Mo.).

During a one hour vigilance session subjects were required to detect specified digit triads in an uninterrupted random digit series. Electroencephalogram (EEG) was recorded continuously with sampled epochs analyzed by computer for autocorrelation and period analysis. Correlogram ratios indicated progressively decreasing arousal through the session but did not distinguish responses from detection failures. Incidence of alpha waves by period analysis also did not identify errors, but incidence of theta waves dropped significantly just prior to failures and did not do so around responses.
R 16

32,308
Silverman, F.H. CORRESPONDENCE BETWEEN MEAN AND MEDIAN SCALE VALUES FOR SETS OF STIMULI SCALED BY THE METHOD OF EQUAL-APPEARING INTERVALS. Percept. mot. Skills, Dec. 1967, 25(3), 727-728. (University of Iowa, Iowa City, Iowa).

Mean scale values were computed for each of five sets of stimuli for which median scale values and the distributions of judges' ratings had been reported. The correlations (Pearson rs) between the mean and the median scale values for each of the five sets of stimuli range from .995 to .999. These high correlations indicate that mean and median scale values rank order sets of stimuli in approximately the same manner. Several implications of this finding are discussed.
R 8

32,309
Ammons, Carol H. & Ammons, R.B. PERCEPTION BIBLIOGRAPHY: L. PSYCHOLOGICAL ABSTRACTS, 1936, VOLUME 10, FIRST HALF. Percept. mot. Skills, Dec. 1967, 25(3), 769-772. (University of Montana, Missoula, Mont.).

One hundred and eight items, listed in alphabetical order, concern some aspect of perception.
R 108

32,310
Ammons, Carol H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: LXXIX. PSYCHOLOGICAL INDEX NO. 22, 1915. Percept. mot. Skills, Dec. 1967, 25(3), 787-788. (University of Montana, Missoula, Mont.).

Fifty-five citations of work on motor skills are listed alphabetically.
R 55

32,311
Evans, F.J. & McGlashan, T.H. WORK AND EFFORT DURING PAIN. Percept. mot. Skills, Dec. 1967, 25(3), p. 794. (University of Pennsylvania, Philadelphia, Penn.).

A cuff of a mercury portable sphygmomanometer was placed around subject's upheld forearm, and inflated to 180 mm Hg (above systolic pressure). As S pumped a rubber bulb, water was displaced. After S reported when the sensation turned to pain (threshold), he continued pumping as long as he could (tolerance). Rate of work was calculated (ccs/sec.) to the point of threshold, and between threshold and tolerance. The mean work rate before threshold was 16.3 ± 1.6 ccs/sec. The mean rate after threshold, while enduring pain, was 16.67 ± 1.7 ccs/sec. (N = 24 volunteer students; $t = 2.19$, $p < .05$). More effort was exerted while the subject experienced pain than before pain was first experienced. Postexperimental interviews indicated subjects predicted the opposite to be true, that they pumped less while suffering pain. The present procedure provides a paradigm for recording continuous measures of work and pain intensity, which would facilitate further investigation of the relationship between use of work and effort as a mechanism useful to control physical discomfort.

32,312
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: LXXX. PSYCHOLOGICAL INDEX NO. 23, 1916. Percept. mot. Skills, Dec. 1967, 25(3), 803-804. (University of Montana, Missoula, Mont.).

Fifty-six references to research on motor skills are listed alphabetically.
R 56

32,313
Levy, C.M. & Hartnagle, Karen. PSYCHOLOGY OF MEMORY--1966: A BIBLIOGRAPHY. Percept. mot. Skills, Dec. 1967, 25(3), 825-839. (University of Florida, Gainesville, Fla.).

Three hundred eighty-nine contributions to the psychology of memory and forgetting published in 1966 are listed.
R 389

32,314
Ammons, Carol H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: LXXXI. PSYCHOLOGICAL INDEX NO. 24, 1917. Percept. mot. Skills, Dec. 1967, 25(3), 855-856. (University of Montana, Missoula, Mont.).

This is an alphabetical listing of fifty-six references to research on motor skills.
R 56

32,315
Freedman, S.J. & Wilson, L. COMPENSATION FOR AUDITORY RE-ARRANGEMENT FOLLOWING EXPOSURE TO AUDITORY-TACTILE DISCORDANCE. Percept. mot. Skills, Dec. 1967, 25(3), 861-866. (Tufts University, Medford, Mass.).

Fifteen observers presented with discordant auditory and tactile information about the location of the same object, compensated rapidly for an auditory re-arrangement when asked to point at an unseen auditory target. Unlike most perceptual compensation studies, movement by observer was not permitted. It is suggested that discordance between or among different kinds of spatial information may be the condition that leads to compensation for re-arrangement.
I 10

32,316
Ammons, R.B. & Ammons, Carol H. PERCEPTION BIBLIOGRAPHY: LI. PSYCHOLOGICAL ABSTRACTS, 1936, VOLUME 10, SECOND HALF. Percept. mot. Skills, Dec. 1967, 25(3), 869-872. (University of Montana, Missoula, Mont.).

One hundred and seven items concerned with perception are listed in alphabetical order.
R 107

32,317
Mortimer, R.G. DRIVING WITH A CRT DISPLAY. Percept. mot. Skills, Dec. 1967, 25(3), 899-900. (Highway Safety Research Institute, University of Michigan, Ann Arbor, Mich.).

Subjects drove a car using a synthetic display. Lateral position alone was a weak cue for lateral control. The addition of either lateral velocity or peripheral vision cues greatly improved performance.
R 2

32,318
Robinson, G.H. & Leifer, R.P. GENERALITY OF FITTS' LAW UNDER DIFFERENTIAL ERROR INSTRUCTION. Percept. mot. Skills, Dec. 1967, 25(3), 901-904. (Industrial Engineering Div., University of Wisconsin, Madison, Wisc. & USAF Edwards AFB, Calif.).

This experiment examines the applicability of Fitts' "channel capacity" model for discrete motor movements in a situation where the error rate (missing the target) is substantially increased and the resulting movement time decreased. Two experimental groups averaged approximately 5% and 19% error but yielded essentially the same information transmission rate in bits per second. The generality of the law over a wide error range is therefore indicated.
R 3

32,319
Barrett, G.V., Williamson, T.R. & Thornton, C.L. PERCEPTION OF DEPTH AS MEASURED BY MAGNITUDE ESTIMATION. Percept. mot. Skills, Dec. 1967, 25(3), 907-908. (Goodyear Aerospace Corporation, Akron, Ohio).

Eleven subjects used the magnitude estimation technique to judge depth in three three-dimensional scenes of varying complexity. Also subjects' perceptual style, as measured by the rod-and-frame test, was determined to test the hypothesis that perception of depth is significantly related to subjects' perceptual style. Each subject was given thirty trials under five eye conditions, i.e., left eye occluded, right eye occluded (both aware and unaware of occlusion), and neither eye occluded. No significant relationship was found between various eye conditions and judgment of depth or between subjects' perceptual style and judgments. A significant relationship was found among scenes, with the more complex scene judged as having greater depth.
R 6

32,320
Levonian, E. SHORT-LATENCY ELECTRODERMAL REACTION AND TRAFFIC ACCIDENTS. Percept. mot. Skills, Dec. 1967, 25(3), 913-916. (University of California, Los Angeles, Calif.).

For seven of twenty-four subjects, a single light flash evoked an unanticipated short-latency (100-200 msec.) increase in voltage between two fingertip electrodes passing a two μa. of direct current. The occurrence of this electrodermal phenomenon and the occurrence of a traffic accident over a three year period were related at the .059 level. This finding is discussed in relation to simple reaction time and driving galvanic skin response. In addition, consideration is given to possible reasons why this short-latency phenomenon has not been reported in some 1000 electrodermal studies covering a century.
R 19

32,321
Levy, C.M., Hartnagle, Karen & Levy, Eleanor. THE PSYCHOLOGY OF MEMORY--1960-1964: A BIBLIOGRAPHY. Percept. mot. Skills, Dec. 1967, 25(3), 921-948. (University of Florida, Gainesville, Fla.).

Seven hundred sixty contributions to the psychology of memory and forgetting published between 1960 and 1964 are listed.
R 760

32,322
Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: LXXVII. PSYCHOLOGICAL INDEX NO. 25, 1918. Percept. mot. Skills, Dec. 1967, 25(3), 963-964. (University of Montana, Missoula, Mont.).

Fifty-one citations of work on motor skills are listed alphabetically.
R 51

32,323
Yensen, R. REPLICATION STUDY OF RESPONSIVENESS ON A SIMPLE FIVE-BUTTON PRESSING TASK. Percept. mot. Skills, Dec. 1967, 25(3), 965-966. (Massey University, Palmerston North, New Zealand).

Twenty-four subjects were used in a replication of Howarth's study of responsiveness on a five-button pressing task. The original finding of a lack of influence of reactive inhibition in this task was confirmed. However, obtained sex differences were opposite to those reported earlier and no significant relationships between responsiveness and extraversion were revealed. Finally, this task may be useful in discriminating intensities of intrinsic motivation.
R 4

32,324
Criaiano, J.F. & Whalen, Patricia M. EFFECTS OF AUDITORY STIMULATION UPON DECREMENT AND REMINISCENCE IN ROTARY PURSUIT TRACKING. Percept. mot. Skills, Dec. 1967, 25(3), 981-988. (USN Training Device Center, ONR, Port Washington, N.Y.).

Two experiments were carried out to determine the effects of an auditory stimulus which was considered to be activating upon rotary pursuit tracking performance. In Experiment I 70-db stimulation presented during a tracking period tended to prevent the occurrence of decrement for 20 of 27 subjects. In Experiment II both 70 db and 100 db presented during a rest period appeared to enhance the amount of subsequent reminiscence for 15 subjects of 21. The results were interpreted as supporting the hypothesis that changes of activation level may contribute to such performance changes as decrement and reminiscence.
R 6

32,325
Miller, A.R., Frauchiger, R.A. & Kiker, V.L. TEMPORAL EXPERIENCE AS A FUNCTION OF SENSORY STIMULATION AND MOTOR ACTIVITY. Percept. mot. Skills, Dec. 1967, 25(3), 997-1000. (California State College, Los Angeles, Calif.).

This study was concerned with establishing quantifiable continua of phenomenal temporal judgments. Using six levels of sensory input and three levels of motor behavior, a linear relationship was found between sensory input and temporal estimations for a ninety second interval. Both sensory input and motor behavior had significant effects, but not the interaction. It was postulated that the so-called unfilled interval could be better understood if it could be related to various levels of information input.
R 8

32,326
Klipple, A.G. VARIABLES AFFECTING THE PERCEPTION OF ANGULAR CHANGE. Percept. mot. Skills, Dec. 1967, 25(3), 1025-1032. (US Traffic Systems Div., Bureau of Public Roads, Washington, D.C.).

A study was made of the effects of four variables (initial angle size, rate of change, direction of change and percentage of change) on the accuracy of judgments of size changes in visual angles. Two groups of subjects in a darkened room reported their judgments of the expansion or contraction of a variable bar of light. The accuracy of these judgments was affected by rate of change, direction of change, and percentage of change but not directly by initial angle size. Significant interactions were found for initial angle size by percentage of change, direction of change by percentage of change, percentage of change by rate of change and direction of change by percentage of change by groups.
R 6

32,327
Rodtke, R.C. EFFECTS OF VERBALLY MEDIATED DRIVE ON A MOTOR RESPONSE AND EVALUATIVE RATINGS. J. exp. Psychol., Jan. 1967, 73(1), 22-27. (University of Rochester, Rochester, N.Y.).

Three groups of thirty subjects were run in a design similar to an A-B, B-C, A-C mediation paradigm. In the A-B stage all subjects learned dissyllables as responses to instances of three verbal concepts. In the second stage one group of subjects (R-Sh) received three levels of electric shock associated with the dissyllables, another group (I-Sh) received the same levels of shock with different dissyllables, and a third group (N-Sh) received no shock. In the third stage all subjects evaluatively rated the concept instances and also pulled a lever in response to the presentation of the concept instances. The R-Sh group rated the concepts more negatively and pulled the lever with greater vigor than the other two groups. Within the R-Sh group those concepts associated with stronger shock elicited more negative ratings and more vigorous lever responses.
R 12

32,328
Posner, M.I., Goldsmith, R. & Welton, K.E., Jr. PERCEIVED DISTANCE AND THE CLASSIFICATION OF DISTORTED PATTERNS. J. exp. Psychol., Jan. 1967, 73(1), 28-38. (University of Wisconsin, Madison, Wisc.).

This work is a continuation of efforts to develop a psychophysics of form similarity appropriate to the study of concept learning. Five configurations of dots (Triangle, Diamond, H, F, and Random) were studied. The psychophysical functions relating perceived distance from the original to each level of distortion were linear. The level of distortion was calculated from the statistical rule generating the distortions and expressed in terms of uncertainty. It also reflected the mean distance that each dot actually gravitated over random samples of the rule. The perceived distance between any pair of distortions increased with the level of the more distorted from the original. The level of distortion of a sample of patterns was related to the rate at which subjects learned a common response to that sample. Rate of learning in classifying these patterns, like multivariate concept learning, is a function of the uncertainty within a category.
R 18

32,329
Lewis, G.H. DETRIMENTAL EFFECTS OF DISTRACTION, ADDITIONAL RESPONSE ALTERNATIVES, AND LONGER RESPONSE CHAINS IN SOLVING SWITCH-LIGHT PROBLEMS. J. exp. Psychol., Jan 1967, 73(1), 45-55. (University of Wisconsin, Madison, Wisc.).

Three experiments involved a task which required subject to attain a particular pattern of lights in a matrix by locating relevant switches on his response panel. The results indicated that: a) the reinforcement or incorrect or distracting switches (response alternatives) was highly detrimental to performance, b) performance worsened in a negatively accelerated fashion with an increased number of available switches, c) performance worsened linearly with increases in the number of switches required for solution, and d) overt trial-and-error behavior was replaced by implicit behavior when subjects were pretrained with the necessary S-R (stimulus response) relationships. It was suggested that implicit problem-solving behavior may also involve basically a trial-and-error process.
R 19

32,330
Peterson, C.R. & DuCharme, W.M. A PRIMACY EFFECT IN SUBJECTIVE PROBABILITY REVISION. J. exp. Psychol., Jan. 1967, 73(1), 61-65. (University of Michigan, Ann Arbor, Mich.).

Two experiments presented subjects with sequences of data that first favored one hypothesis, and then changed to favor a second hypothesis. After each datum subjects became more or less sure of which hypothesis was correct. They reflected this change of opinion with probability estimates, which were compared with probabilities calculated by means of Bayes's theorem. Estimated probabilities changed from favoring the first hypothesis to favoring the second hypothesis later than did corresponding Bayesian probabilities. Data that occurred early in a sequence influenced subjects more than did later data--a primacy effect. This result agrees with results of comparable experiments on impression formation.
R 11

32,331
Lair, M.W. AGE AND MEMORY AS FACTORS IN PROBLEM SOLVING. J. exp. Psychol., Jan. 1967, 73 (1), 78-84. (University of Illinois, Urbana, Ill.).

Six-year olds, nine-year olds, and adults were provided with an accurate record of past responses and their outcomes in a 3-choice task, in which one of the alternatives was reinforced 66% of the time it was chosen, and the other two were never reinforced. When compared with subjects not provided such information, nine-year olds with a memory aid were found to choose the payoff alternative more frequently, and make fewer simple response patterns, while adults were not effected by such information. Five-year olds, however, made fewer choices of the payoff alternative with a memory aid present than did subjects of the same age with no aid to memory provided. A second study showed that the effect of the memory aid on the nine-year olds was not simply the result of subjects being aware that only one of the three alternatives paid off. These results are discussed in relation to those of an earlier study, and the role of memory in developmental changes in problem-solving strategies is emphasized.
R 10

32,332
Efstathiou, Aglaia, Bauer, J., Greene, Martha & Held, R. ALTERED REACHING FOLLOWING ADAPTATION TO OPTICAL DISPLACEMENT OF THE HAND. J. exp. Psychol., Jan. 1967, 73(1), 113-120. (Massachusetts Institute of Technology, Cambridge, Mass.).

Shifts in reaching for a visible target generalize to nonvisible targets. Such shifts should all be of equal magnitude if, as has been claimed, they result from a changed felt position of the adapted arm. Contrary to this expectation, reaching for the contralateral hand yielded shifts smaller than those obtained in reaching for a visible target and no shift was found for relocating a remembered position of the adapted arm. These results implicate two independent modes of reaching: one based upon the matching of arm movements with potential head orientations towards a target, the other dependent upon the felt position of the arm. The former is changed by adaptation, the latter is unaltered and constrains the shifts produced by the former.
R 13

32,333
Poulton, E.C. TRACKING A VARIABLE RATE OF MOVEMENT. J. exp. Psychol., Jan. 1967, 73(1), 135-144. (Applied Psychology Research Unit, MRC, Cambridge, England).

Matching and nulling a variable rate of movement using a position display were compared with tracking the same input function presented as a size of displacement on a rate or speedometer display. Position and rate control systems were used with both pursuit and compensatory display modes in a random-group design involving seventy subjects. Control groups tracked normally with the position display. In all conditions rate tracking using the position display produced reliably ($p<.01$) more mean rate error than displacement tracking with the rate or speedometer display, and was hardly better than the control conditions. The data suggested that in rate tracking subject must have responded primarily to changes in length, rather than to rate of movement. The order of the display was found to interact with the order of the control system ($p<.001$), each control being more compatible with the display of the same order. The pursuit display mode resulted in a better performance than the compensatory mode.($p<.001$).
R 8

32,334
Colquhoun, W.P. & Baddeley,A.D. INFLUENCE OF SIGNAL PROBABILITY DURING PRETRAINING ON VIGILANCE DECREMENT. J. exp. Psychol., Jan. 1967, 73(1), 153-155. (Applied Psychology Research Unit, MRC, Cambridge, England).

The role of pretest expectancy in vigilance decrement was reexamined in a replication of an earlier experiment, with signals presented in the auditory, rather than the visual, mode. Decrements observed paralleled those obtained previously, and were analyzed in terms of the theory of signal detectability.
3

32,335
Marcum, E.R. VISUAL DETECTION AND RECOGNITION OF TARGETS WITH VARIOUS DEPENDENCY CONTRASTS IN MICROSTRUCTURE. J. exp. Psychol., Jan. 1967, 73(1), 155-159. (College of William & Mary, Williamsburg, Va.).

This study corroborates and extends the conclusions of Marcum (1958) concerning the detection and recognition of forms having various degrees of dependency between adjacent black and white units of surface microstructure, presented against similarly varied backgrounds. Detection and recognition of 8 forms increased in frequency when the difference between dependencies within target and background increased. Generally, increased dependency within the target improved accuracy of performance. Intermediate dependency in the background resulted in fewest detections and recognitions, whereas perfect dependency produced the most detections and recognitions.
R 2

32,336
Kahneman, D., Norman, J. & Kubovy, M. CRITICAL DURATION FOR THE RESOLUTION OF FORM: CENTRALLY OR PERIPHERALLY DETERMINED? J. exp. Psychol., March 1967, 73(3), 323-327. (Hebrew University of Jerusalem, Jerusalem, Israel).

Bloch's law is shown to hold for a visual acuity task with monocular and binocular viewing as well as in a condition where the target was presented to the right and left eyes in immediate succession. The critical duration (t_c) in the latter condition was found to be approximately double the t_c in the other experimental conditions. It is concluded that t_c for the resolution of form is not determined at a visual station where binocular summation occurs, i.e., a station in the visual cortex. Moreover, the hypothesis that t_c corresponds to a central "moment" fails to be supported.
R 22

32,337
O'Connell, D.C., Weintraub, D.J., Lathrop, R.G. & McHale, T.J. APPARENT VERTICALITY: PSYCHOPHYSICAL ERROR VERSUS SENSORY-TONIC THEORY. J. exp. Psychol., March 1967, 73(3), 347-353. (Harvard University, Cambridge, Mass.).

Judgments of verticality have been found previously to deviate systematically from true vertical due to initial tilt of a luminous rod. In Experiment I, starting position did not explain such deviations; subjects exhibited a psychophysical error of anticipation varying directly with number of degrees turned. Sex and handedness proved nonsignificant. Settings with right and left hands were significantly different--the sole finding in accord with sensory-tonic theory. In Experiment II, two points of light defined a rod (center or end pivot) to obtain angular symmetry or asymmetry). Attention of subjects was directed to one light, in either the right or left half of the visual field (right-left asymmetry). There was no significant effect of angular asymmetry, right-left asymmetry, or their interaction, and therefore no confirmation of sensory-tonic theory. Direction of turn was the sole significant effect: an error of habituation rather than anticipation.
R 11

32,338
Gilbert, Doris C. A FACTOR ANALYTIC STUDY OF AUTOKINETIC RESPONSES. J. exp. Psychol., March 1967, 73(3), 354-357. (Harvard University, Cambridge, Mass.).

Results from different methods of measuring the autokinetic phenomenon are not comparable. The present study presents results of a factor analysis of five response measures of autokinetic movement under the conditions of a moving pinpoint of light and of a stationary light. A three principal-factor structure of the five measures was obtained which highlights the importance of procedural differences between tracing methods and timed-event recording. The results give empirical evidence for the paradoxical fact that some subjects experience the light as moving without the light's spatial displacement.
R 11

32,339
Kimmel, H.D. & Goldstein, A.J. RETENTION OF HABITUATION OF THE GSR TO VISUAL AND AUDITORY STIMULATION. J. exp. Psychol., March 1967, 73(3), 401-404. (Ohio University, Athens, Ohio & University of Florida, Gainesville, Fla.).

Subjects came to the laboratory on three successive weekly sessions and received repeated presentations of a white light or a 1,000-cps tone until a criterion of habituation of the GSR (galvanic skin response) was reached. There was a significant reduction in the number of trials to criterion from session to session for both stimuli, while neither sense modality nor the Modality X Sessions interaction effects were significant. On the first session, habituation was characterized by a drop in response magnitude, followed by some increase, and, finally, an additional drop. The average magnitude of response on the first trial of each session did not reduce significantly from session to session, but the average magnitude of response on the second trial of each session did. The results were interpreted to mean that some retention of habituation from session to session occurred (i.e., there is something "learned" in habituation) and it was conjectured that conditioned inhibition associated with response-produced stimuli might have been responsible for some of the retention effect.
R 4

32,340
Modine, C.F., Modine, Barbara F. & Thomas, R.C. TEMPORAL VARIABLES IN PAIRED-ASSOCIATES LEARNING: THE ROLES OF REPETITION AND NUMBER TRACKING DURING STIMULUS INTERVALS. J. exp. Psychol., March 1967, 73(3), 439-445. (Carnegie Institute of Technology, Pittsburgh, Penn.).

Paired-associates learning was investigated as functions of interstimulus intervals (ISI) and interunit intervals (IUI) under three experimental conditions: Condition IR (inhibited rehearsal), in which stimulus intervals were filled with number tracking; Condition CR (controlled rehearsal), in which stimulus intervals were filled with overt repetitions of the PA items; and Condition FR (free rehearsal), in which stimulus intervals remained unfilled. Orthogonal combinations of 0-, 2-, 4-sec. ISI and IUI were used in a 3 X 3 X 3 X 2 design which included difficulty level. Emission patterns in which correct responses and intralist errors were examined indicated filling stimulus intervals, particularly IUI, with repetitions increased response availability but reduced correct responses due to greater information-processing demands on subjects which curtailed time utilized for hooking up stimulus response pairs. Filling stimulus intervals with number tracking further increased information-processing demands on subjects thereby reducing effects of ISI, IUI, these decrements being more pronounced for hard than easy pairs.
R 8

32,341
Gilbert, A.J. TACTILE SPATIAL AFTEREFFECT OR ADAPTATION LEVEL? J. exp. Psychol., March 1967, 73(3), 450-455. (University of Western Australia, Perth, Australia).

A tactile spatial aftereffect from cutaneous stimulation on the anterior surfaces of the forearms has been claimed in a recent report. It has been demonstrated in the present study that covariation of the stimulators employed to induce the aftereffect and the series of comparison stimuli used in measuring it, confounded the results of the previous experiment and that most of the variance was due to adaptation to the different series. It is suggested also that the remaining variance possibly may be due to tactile stimulation.
R 2

32,342
Erikson, C.W. & Lappin, J.S. INDEPENDENCE IN THE PERCEPTION OF SIMULTANEOUSLY PRESENTED FORMS AT BRIEF DURATIONS. J. exp. Psychol., March 1967, 73(3), 468-472. (University of Illinois, Urbana, Ill.).

One to four different forms were presented in a single tachistoscopic exposure under each of three exposure durations. Four practiced subjects were run. The subject attempted to identify each form in the display, designating its position. The result were well described by a concept of perceptual independence which assumes that error factors are uncorrelated for different foveal locations at a point in time and that form stimuli falling on separated foveal areas do not interact.
R 9

32,343
Johnston, W.A., Howell, W.C. & Zajkowski, M.M. REGULATION OF ATTENTION TO COMPLEX DISPLAYS. J. exp. Psychol., March 1967, 73(3), 481-482. (Ohio State University, Columbus, Ohio).

Eight practiced observers monitored an 8 X 8 matrix for 30 min. and detected additions and deletions of alpha-numeric stimuli. One-half the stimuli contained the same number (similar stimuli), and one-half contained different numbers (dissimilar stimuli). Detection latencies were shortest for additions of similar stimuli and longest for deletions of dissimilar stimuli. Vigilance effects were confined to dissimilar stimuli: a decrement and end spurt for deletions, a compensatory increment and terminal decline for additions. The notion that signals reinforce direction of attention was supported.
R 4

32,344
Carlson, V.R. & Tassone, E.P. INDEPENDENT SIZE JUDGMENTS AT DIFFERENT DISTANCES. J. exp. Psychol., April 1967, 73(4)Part 1, 491-497. (National Institute for Mental Health, Bethesda, Md.).

Three groups of 36 subjects each made size judgments under objective, apparent, or projective instructions at different distances on different days. The variable test object was located 10 ft. from subject, the standard test object at 10, 20, 30, or 40 ft. When the means for different subjects at the 20-, 30-, and 40-ft. locations of the standard were compared, there was no statistical evidence for a trend with distance, in spite of clear trends in the nonindependent means within the same subjects. In a similar experiment utilizing a much larger range of standard-to-variable distance ratios, Epstein (J. exp. Psychol., 1963, 66, 78-83) found significant trends with distance in the independent means. It has been previously suggested that systematic deviations from size constance arise from a tendency on the part of subjects to make their size judgments conform to an assumed perspective relationship between the test objects. This hypothesis requires a steeper slope in the size-distance function for nonindependent size judgments as compared with the independent values and is not at variance with Epstein's results.
R 10

32,345
Lathrop, R.G. PERCEIVED VARIABILITY. J. exp. Psychol., April 1967, 73(4)Part 1, 498-502. (Chico State College, Chico, Calif.).

Recent studies have shown that man is mathematically inaccurate as an intuitive statistician. The current studies are an attempt to determine the parameters of perceived variability. Pilot studies indicated that the coefficient of variation is not a sufficient explanation and that subjects also relate sequence effects to variability. In the first study, mean, standard deviation, and lambda (a measure of sequence effects) were independently manipulated. The data were given an excellent fit by: Perceived Variability = f $(\sigma^2 X/\bar{X}-c)$. In the second study, the standard deviation and lambda were manipulated under instructions to ignore sequence effects. The results show that sequence effects are not eliminated by instructions to disregard them. The combined results of these studies were discussed with respect to decision theory and subjective probability.
R 14

32,346
Pitz, G.F. & Downing, L. OPTIMAL BEHAVIOR IN A DECISION-MAKING TASK AS A FUNCTION OF INSTRUCTIONS AND PAYOFFS. J. exp. Psychol., April 1967, 73(4)Part 1, 549-555. (Southern Illinois University, Carbondale, Ill.).

Statistical decision theory was used as a model of human decision making. One of two dice, D1, was 3 8s and 3 0s on its 6 faces, or D2 with 4 8s and 2 0s, was selected, and thrown five times. Subjects guessed which die had been selected, on the basis of the results of the five throws. One hundred twenty trials were given with an unbiased payoff matrix, followed by 60 trials with each of four biased payoff matrices. Three groups of eight subjects each were used, the groups being given differing amounts of information relevant to the decision task. With the unbiased payoffs, subjects' responses were more than 90% optimal, except when a normative model would predict confusion. Biasing the payoffs did affect responses, but not to the extent predicted by the model. Differential instructions apparently had no effect upon the optimality of behavior. Some possible amendments to a normative model of behavior were suggested to account for the observed behavior.
R 11

Levine, M., Miller, P. ' Steinmeyer, C.H. THE NONE-TO-ALL THEOREM OF HUMAN DISCRIMINATION LEARNING. J. exp. Psychol., April 1967, 73(4)Part 1, 568 57[illegible]. (State University of New York, Stony Brook, N.Y.).

Adult human subjects received 2-choice discrimination problems [illegible] sets of blank trials (E said nothing) interspersed among outcome trials (E said "right" or "wrong"). The subject's hypothesis (H) was inferred from [illegible] pattern of choices during each set of blank trials. The backwards learning curve (percen[illegible] correct on each outcome trial before the last error) showed not only stationarity but performance suppression: The probability of a correct response was less than .4. The none-to-all theorem, that the correct H never occurs before the last error and always occurs following it, was confirmed in two experiments. It was also shown that H theory predicts the performance suppression
R 7

32,348
Hasmith, R. & Rodman, A.S. EFFECT OF DURATION OF VIEWING ON FORM AND SIZE JUDGMENTS. J. exp. Psychol., May 1967, 74(1), 26-30. (Emory University, Atlanta, Ga.).

Two microgenetic hypotheses were tested: perception would become more stable with an increase in duration of viewing; and this increase is different for form and for size. One hundred plane figures, all combinations of 10 heights and 10 widths varying in increments of .01 in., constituted the stimulus set. They were presented singly as back-lighted figures in a completely dark surround. Seven male subjects had at least 20-20 vision uncorrected or with contact lens. There were nine durations of viewing and two types of judgments: form, squares and rectangles, or size, large and small. Discrimination measures were computed and showed that subjects could discriminate form better than they could discriminate size. There was no significant effect of duration on either type of discrimination, nor was there any interaction between type of judgment and duration.
R 12

32,349
Dominowski, R.L. & Ekstrand, B.R. DIRECT AND ASSOCIATIVE PRIMING IN ANAGRAM SOLVING. J. exp. Psychol., May 1967, 74(1), 84-86. (De Paul University, Chicago, Ill. & Northwestern University, Evanston, Ill.).

Anagram problems were attempted after five presentations of a 10-word list; three different lists were used. Compared to a control condition with no list, positive transfer was produced by prior exposure of the solutions, or of words associatively related to the solutions, with greater facilitation produced by exposure of the solutions. When words unrelated to the solutions were presented, but instructions stated that associations existed, negative transfer occurred. The findings were interpreted in terms of differences in the availability of solutions and were related to studies of category sets in problem solving.
R 10

32,350
Bartz, W.H., Satz, P. & Fennell, Eileen. GROUPING STRATEGIES IN DICHOTIC LISTENING: THE EFFECTS OF INSTRUCTIONS, RATE, AND EAR ASYMMETRY. J. exp. Psychol., May 1967, 74(1), 132-136. (University of Florida, Gainesville, Fla.).

Grouping strategies and ear asymmetry (EA) were investigated in the Yntema and Trask (J. verbal Learn. verbal Behav., 1963, 2, 65-74) dichotic listening (DL) paradigm. Trials consisting of three word-digit pairs were recorded at two rates, two pr. and one pr/sec. Eight groups of 20 right-handed subjects differed in terms of rate and instructions for recall: Pairs, Types, Ears, and Free. Results showed that Types and Ears strategies did not differ at either rate, the Ear strategy was most frequent under free recall, and EA effects were significant. Results indicate significant EA effects in DL experiments and should be a factor in models of DL.
R 9

32,351
Attneave, F. & Olson, R.K. DISCRIMINABILITY OF STIMULI VARYING IN PHYSICAL AND RETINAL ORIENTATION. J. exp. Psychol., June 1967, 74(2)Part 1, 149-157. (University of Oregon, Eugene, Ore.).

In two discrimination reaction-time experiments, adult human subjects responded faster to horizontal and vertical stimuli (lines or rectangles) than to stimuli tilted 45° right and left. When subject viewed the stimuli with his head tilted 45°, so that physical and retinal orientation were in opposition, it was on the physical rather than the retinal horizontals and verticals that performance was superior. In another experiment head position was changed 45° after a period of learning. Subjects required to give the same responses to the same physical orientations did much better on the transfer task than those required to give the same responses to the same retinal orientations. The latter were not significantly superior to a pure transposition group for whom the stimulus response (S-R) relationships were shifted both physically and retinally.
R 16

32,352
Webb, W.B. & Agnew, H.W., Jr. SLEEP CYCLING WITHIN TWENTY-FOUR HOUR PERIODS. J. exp. Psychol., June 1967, 74(2)Part 1, 158-160. (University of Florida, Gainesville, Fla.).

Subjects were studied while sleeping in the laboratory during the afternoon hours. The sleep of these subjects neither resembled that found during the last two hours of nocturnal sleep nor that found in the first two hours. The data indicated that the amount of Stage 4 and 1 rapid eye movement (REM) found during an interjected sleep event is a function of its proximity to the onset or the termination of the regular sleep period.
R 10

32,353
Royer, F.L. SEQUENTIAL COMPLEXITY AND MOTOR RESPONSE RATES. J. exp. Psychol., June 1967, 74(2)Part 1, 199-202. (US Veterans Administration Hospital, Brecksville, Ohio).

Keeping pace with an auditory click presented 1 per sec. and accelerated at a rate of .2 per sec. per 8 clicks, 16 subjects reproduced binary sequences, by pressing 2 telegraph keys. Mean maximum rates of response varied 3.32-5.61 per sec. The explanation of the order of difficulty holds that runs of the same element and single alternations constitute response units (RUs). Response rate is influenced by the number of junctures of RUs in a sequence: those with longer runs are easier and have few junctures. At a more analytic level, longer sequences are strings of RUs drawn from the 4 different 2-element or the 8 different 3-element sets. Mixtures of 2- and 3-element RUs increase the difficulty. Where the number of junctures in a sequence is the same, the sequence having repetitions of the same RU is easier.
R 2

32,354
Gould, J.D. & Schaffer, Amy. EYE-MOVEMENT PARAMETERS IN PATTERN RECOGNITION. J. exp. Psychol., June 1967, 74(2)Part 1, 225-229. (IBM Research Center, Yorktown Heights, N.Y.).

In visually scanning 9 simultaneously presented patterns, human subjects fixated significantly longer a) on patterns they were looking for (i.e., on targets) than on patterns they were not looking for; and b) on patterns that exactly matched a memorized standard pattern than on patterns that differed from this standard. These results suggest that: a) subjects may have a generalized tendency, within certain limits, to look longer at stimuli they are looking for than at stimuli they are not looking for; and b) subjects make definite analytic comparisons of the details and differences between a memorized standard pattern and a given fixated pattern, as opposed to detecting a fixated pattern in a more immediate or holistic manner.
R 7

32,355
Meneghini, Kathleen A. & Leibowitz, H.W. EFFECT OF STIMULUS DISTANCE AND AGE ON SHAPE CONSTANCY. J. exp. Psychol., June 1967, 74(2)Part 1, 241-248. (Pennsylvania State University, University Park, Penn.).

Development of shape constancy as a function of age was investigated with distance as a parameter. In Experiment I, 60 adult subjects matched the shape of an inclined, circular test object with one of a series of comparison ellipses under either binocular or monocular viewing conditions, with the test object at 3, 15, or 30 ft. With binocular vision, the matches at 3 ft. represented a compromise between the true shape of the test object and its projected shape, while matches under monocular viewing corresponded more closely to the retinal shape. With increasing distance, all matches approached the retinal shape. In Experiment II, 160 children (6-16 yr.) and an adult group (mean age = 19.4) made shape matches with the test object at either 3 or 15 ft. At 3 ft., shape constancy was inversely related to age, while at 15 ft. constancy was minimal at all ages. It was concluded that either the observed function is a result of variation in the interpretation of the instructions with increasing intellectual development or the adaptive value of shape constancy is diminished in importance as the maturing organism learns and utilizes additional cues for object identification.
R 18

32,356
Over, R. EFFECT OF THE ANGLE OF TILT OF THE INSPECTION FIGURE ON THE MAGNITUDE OF A KINESTHETIC AFTEREFFECT. J. exp. Psychol., June 1967, 74(2)Part 1, 249-253. (University of Otago, Dunedin, New Zealand).

The magnitude of a kinesthetic aftereffect, specified in terms of the difference between post- and preinspection settings of a bar to the apparent horizontal, has been measured as a function of the angle of tilt of the bar during the inspection period. Postinspection settings were found to be displaced from preinspection settings in the direction of the tilt of the inspection figure at all angles between 15° and 75°. The maximum aftereffect was found at 60°. These results differ from those found by other experimenters for visual aftereffects and indicate that aftereffects involving judgments of tilt cannot be considered solely in terms of the dimensional relationship between the inspection figure and the test figure. It is suggested that an explanation of an aftereffect must be sought in terms of the operating characteristics of the sensory system involved in inspection and making spatial judgments.
R 11

32,357
Turvey, M.T. REPETITION AND THE PREPERCEPTUAL INFORMATION STORE. J. exp. Psychol., June 1967, 74(2)Part 1, 289-293. (Ohio State University, Columbus, Ohio).

The Sperling (Psychol. Monogr., 1960, 74(11), Whole No. 498) procedure of partial report was used with tachistoscopically presented digit slides of 50-msec. duration. One slide was repeated 54 times with a digit slide of a nonrepeat series interpolated between repetitions. No cumulative effect in terms of percentage of recall was obtained. A second experiment using interpolated letter slides replicated this observation. An interpretation in terms of the lack of a structural change with repetition of a nonencoded stimulus was offered.
R 10

32,358
Goff, Genevieve D. DIFFERENTIAL DISCRIMINATION OF FREQUENCY OF CUTANEOUS MECHANICAL VIBRATION. J. exp. Psychol., June 1967, 74(2)Part 1, 294-299. (University of Virginia, Charlottesville, Va.).

Measurements of differential threshold (delta f) of a cutaneous mechanical vibratory stimulus are accurate only if concomitant changes in subjective intensity of the stimulus are eliminated. In this study, curves of equal subjective intensity were first obtained from 4 subjects at 2 intensity levels, 20 and 35 db. above the absolute threshold of the 100 cps standard. Delta f was then measured at 25, 50, 100, 150, and 200 cps, all amplitudes being within the equal intensity curve of the particular subject. With intensity cues thus eliminated, delta f is small below 100 cps but then increases markedly. It is lower at the higher intensity level.
R 19

32,359
Gescheider, G.A. & Niblette, R.K. CROSS-MODALITY MASKING FOR TOUCH AND HEARING. J. exp. Psychol., July 1967, 74(3), 313-320. (Hamilton College, Clinton, N.Y.).

Auditory stimulation by a click was found to increase the tactile thresholds for mechanical pulses by as much as 5 db. The amount of auditory-tactile masking was related to the time interval between the click and pulse and the intensity of the click. Intense tactile pulses slightly increased the auditory click threshold, the maximum amount of masking being about 1.5 db. The amount of tactile-auditory masking was related to the time interval between the pulse and the masking was related to the time interval between the pulse and the click. When the ring and index fingertips of the same hand were stimulated by two pulses separated by a small time interval the probability of resolving two successive sensations was greatly reduced by presenting subject with an intense auditory click. Furthermore, the reduction of temporal acuity of the fingertips was a function of the time interval between the auditory click and the tactile pulses.
R 7

32,360
Smith, E.E. EFFECTS OF FAMILIARITY ON STIMULUS RECOGNITION AND CATEGORIZATION. J. exp. Psychol., July 1967, 74(3), 324-332. (University of Michigan, Ann Arbor, Mich.).

In two different tasks subjects were instructed to press a "Yes" button if the stimulus word was a member of a predefined set of target words, and a "No" button otherwise; target sets were defined by enumeration in the E task, and by category membership in the C task. The size of the target set was either 1, 2, or 4 words or categories, and stimulus words varied in familiarity. Familiarity facilitated response times (RTs) in both tasks. The functions relating RT to size of target set in the E task were shown to reflect a memorial comparison process that follows recognition, and it was this memory process that was facilitated by familiarity.
R 14

32,361
Swink, J., Trumbo, D. & Noble, M. ON THE LENGTH-DIFFICULTY RELATION IN SKILL PERFORMANCE. J. exp. Psychol., July 1967, 74(3), 356-362. (Kansas State University, Manhattan, Kan.).

Sequence length in an irregular step function tracking task was varied in order to evaluate the effect of sequence length on acquisition and retention of a motor skill. A 5 X 2 X 2 X 2 factorial design was used with five sequence lengths, two degrees of task coherence, two training criteria (equal practice vs. equal repetitions), and two long-term retention intervals. The results support Duese's contention, based on verbal serial learning, that repetitions per item do not increase with length of the series, although total learning time and total number of repetitions do increase approximately as suggested by Thurstone's exponential equation.
R 12

32,362
Leibowitz, H.W. & Harvey, L.O., Jr. SIZE MATCHING AS A FUNCTION OF INSTRUCTIONS IN A NATURALISTIC ENVIRONMENT. J. exp. Psychol., July 1967, 74(3), 378-382. (Pennsylvania State University, University Park, Penn.).

The sizes of human being test objects were matched under three sets of instructions in an outdoor environment at distances from 340 to 1,680 ft. Matches obtained under "objective" instructions corresponded to the true size of the test object at all distances. With "apparent" instructions, matches ranged from 36% to 20% of test-object size, decreasing as a function of distance. Under "retinal" instructions, matches were from 18% to 9% of true size. It is concluded that there is a family of functions relating matched size to distance, with instructions as an important parameter. Theoretical implications of the observed effect of instructions and the differences between perceived phenomenal size and matched size are discussed.
R 22

32,363
Willis, M.P. STRESS EFFECTS ON SKILL. J. exp. Psychol., Aug. 1967, 74(4)Part 1, 460-465. (Montana State University, Bozeman, Mont.).

During 60 one-hour acquisition trials on a rifle marksmanship task, 20 subjects (high school males) encountered low stress (2 ft. lb. of recoil) while another 20 subjects encountered high stress (25 ft. lb.). Subsequently, all subjects received 24 transfer trials, half of each group operating under unchanged stress levels and half under reversed stress levels. The results suggest that stress affects transfer performance in three distinguishable ways: a) through stimulus generalization, b) through acquisition skill level, and c) directly, i.e., independently of stimulus generalization and acquisition skill level.
R 4

32,364
Eriksen, C.W. & Collins, J.F. SOME TEMPORAL CHARACTERISTICS OF VISUAL PATTERN PERCEPTION. J. exp. Psychol., Aug. 1967, 74(4)Part 1, 476-484. (University of Illinois, Urbana, Ill.).

Visual stimuli were constructed so that any given stimulus by itself appeared to be a random collection of dots. However, when 2 corresponding stimuli were superimposed by means of a 2-field tachistoscope, a 3-letter nonsense syllable was perceived. Temporal organization in perception was studied in Experiment I by varying the interval between the presentation of the 2 corresponding patterns over 300 msec. Identification accuracy of syllables was a decreasing function of interstimulus interval over a range in excess of 100 msec. Experiment II used unequal energy levels for the 2 corresponding patterns and also varied the sequence of occurrence of the high and low energy members of corresponding sets. The relevance of such concepts as perceptual memory, afterimages, and psychological moments to the data was considered. It was suggested that mechanisms in the visual system such as the "off" response that detect the emination of a stimulus may be responsible for inhibition of integration over time.
R 16

32,365
Bernstein, I.H., Schurman, D.L. & Forester, G. CHOICE REACTION TIME AS A FUNCTION OF STIMULUS UNCERTAINTY, RESPONSE UNCERTAINTY, AND BEHAVIORAL HYPOTHESES. J. exp. Psychol., Aug. 1967, 74(4)Part 1, 517-524. (Arlington State College, University of Texas, Arlington, Tex.).

Two studies were concerned with the effects of stimulus and response uncertainty upon reaction time (RT). In Experiment I, it was found that changes in stimulus uncertainty produced linear changes in RT but changes in response uncertainty produced a step function with a maximum at one bit of response uncertainty. Correct pretrial guesses as to which stimulus event would occur tended to facilitate RT only in the more complex response-uncertainty conditions. Experiment II replicated the finding that stimulus uncertainty per se is a variable effecting RT. The results were discussed relative to the role of attention and response conflict.
R 12

32,366
Lichte, W.H. & Borresen, C.R. INFLUENCE OF INSTRUCTIONS ON DEGREE OF SHAPE CONSTANCY. J. exp. Psychol., Aug. 1967, 74(4)Part 1, 538-547. (University of Missouri, Columbia, Mo. & Wichita State University, Wichita, Kan.).

The subjects were instructed to respond either to "real" shape (object instructions), how the stimulus looked (apparent instructions), or the stimulus silhouette (image instructions). Three groups of 15 subjects were used each with only one kind of instruction. The four standard stimuli (SS) were complex and unfamiliar. The subject manipulated the shape of the variable stimulus (VS) to equal that of the turned SS. Obtained Brunswik ratios (BRs) for the Object, Apparent, and Image groups were .90, .62, and .45; the first differed significantly from the others. Distributions of individuals' mean BRs for Object and Image groups did not overlap; that of the Apparent group was U shaped and overlapped the others. Results suggested that, in a "normal" situation, a) object instructions produce nearly "perfect" constancy, b) the image instruction cannot eliminate constancy, and c) the conventional apparent instruction is ambiguous, resulting in either an object or image set.
R 7

32,367
Egeth, H. & Smith, E.E. PERCEPTUAL SELECTIVITY IN A VISUAL RECOGNITION TASK. J. exp. Psychol., Aug. 1967, 74(4)Part 1, 543-549. (Johns Hopkins University, Baltimore, Md. & Behavioral & Clinical Studies Research Center, St. Elizabeth's Hospital).

The present experiment is an attempt to localize the mechanism or mechanisms of selectivity through which recognition accuracy may be influenced by instructional sets. Sets of 4 stimuli (pictures) each were displayed before, after, or before and after the tachistoscopic presentation of a single critical picture. The subjects had to report which one of the 4 alternatives was used as the critical picture. The stimuli within each set of 4 alternatives were either highly similar to one another or distinctively different from one another. The results indicated that perceptual processes were capable of being selectively tuned. The result stands in contrast to some previous research which indicated that recognition accuracy was influenced solely by memorial processes.
R 10

32,368
Hersen, M. EXPERIMENTALLY INDUCED RESPONSE BIASES AS A FUNCTION OF POSITIVE AND NEGATIVE WORDING. J. exp. Psychol., Aug. 1967, 74(4)Part 1, 588-590. (Psychotherapy Associates of Fairfield, Fairfield, Conn.).

The present investigation was conducted to determine whether the experimental induction of response biases, demonstrated to occur in other studies, is a function of positive and negative wording. The experiment was designed to examine whether subjects, consistent with their training series history, respond according to these specific aspects of the items in testing. The results indicate that the direction of wording in testing is a factor that either facilitates conditioning or acts as a suppressor variable, irrespective of subject's ability to specify the experimental arrangements.
R 3

32,369
Estes, W.K. & Da Polito, F. INDEPENDENT VARIATION OF INFORMATION STORAGE AND RETRIEVAL PROCESSES IN PAIRED-ASSOCIATE LEARNING. J. exp. Psychol., Sept. 1967, 75(1), 18-26. (Stanford University, Stanford, Calif.).

Paired-associate items were presented to subjects under either intentional or incidental training procedures, then tested under either recognition or recall conditions. Recognition scores indicated very little difference in amount learned following incidental as compared to intentional training conditions. Initial recall tests revealed large decrements in performance following incidental training, supporting the assumption that recall performance involves a retrieval process which can be modified independently of the information storage required for recognition performance. Data for shifts from recall to recognition or the reverse over a sequence of unreinforced tests indicated that learning occurring on test trials may be facilitatory or detrimental to correct responding depending upon particular conditions.
R 8

32,370
Tversky, A. UTILITY THEORY AND ADDITIVITY ANALYSIS OF RISKY CHOICES. J. exp. Psychol., Sept. 1967, 75(1), 27-36. (Hebrew University, Jerusalem, Israel).

Utility theory was investigated in a study in which 11 subjects bid for risky options. Additivity analysis supported utility theory but rejected an alternative additive model. The data were accounted for, within the limits of experimental error, by a power utility function with different exponents for positive and negative outcomes. The utility functions of most subjects were linear over gains and concave over losses. The subjective probability functions of most subjects overestimated low (objective) probabilities and underestimated high ones. Theoretical implications of the findings were discussed.
R 23

32,371
Simon, J.R. EAR PREFERENCE IN A SIMPLE REACTION-TIME TASK. J. exp. Psychol., Sept. 1967, 75(1), 49-55. (University of Iowa, Iowa City, Iowa).

This paper reports three experiments concerned with the effects of ear(s) stimulated, responding member, handedness, and age on simple auditory reaction time (RT). A 1,000-cps stimulus tone was presented to either the left ear, the right ear, or to both ears simultaneously. The subjects responded to the tone onset by depressing a finger key. Right- and left-hand blocks of trials were used. In Exps. I and II, subjects did not know prior to a trial which ear(s) would be stimulated. Under these conditions, they responded faster to right-ear stimulation than to left and, with the exception of an older group, were faster on binaural trials than on monaural trials. When subjects were informed in advance as to which ear would be stimulated (Exp. III), the differences previously noted were no longer apparent.

32,372
Ekstrand, B.R. EFFECT OF SLEEP ON MEMORY. J. exp. Psychol., Sept. 1967, 75(1), 64-72. (University of Colorado, Boulder, Colo.).

Two experiments were done investigating the effect of sleep on the processes involved in single-list (SL) retention, retroactive (RI), and proactive (PI) inhibition. In SL conditions, subjects learned and recalled one list of paired associates. In RI and PI conditions, subjects learned two lists (A-B, A-C) and recalled the first list (RI) or the second list (PI). In each condition, half the subjects spent the retention interval (8 hr.) sleeping in the laboratory and half were awake. The SL results indicated that sleep produced a positive effect in retention, forgetting after sleep being reduced to 11%. Of the forgetting produced in the awake condition (23%) 52% was prevented by sleep. The RI and PI results indicated that sleep facilitated recall in both conditions, with a substantially larger facilitation in the RI condition than in the PI condition. Further analyses indicated that sleep produced absolute spontaneous recovery of extinguished first-list responses.
R 7

32,373
Hunsinger, H. & Gummerman, K. IDENTIFICATION OF FORM IN PATTERNS OF VISUAL NOISE. J. exp. Psychol., Sept. 1967, 75(1), 81-87. (University of California, San Diego, Calif.).

Two studies are reported which assess the effects of differing types or visual noise on accuracy of identification of random shapes presented tachistoscopically. Second grade, fifth grade, and college adult subjects (N = 34) were presented grids (noise), which were either systematic or random in their distribution of lines along the X and Y coordinates, and of either low or high density. The results of the studies support the following conclusions. Identification of forms under conditions of visual noise is a complex function of density of noise, type of noise, age of subject, and amount of experience with the types of visual disturbance. Specifically, older subjects are better able to separate signal from low-density noise than from high; high-variability forms are less disturbed by high-density noise than are low-variability forms; subjects are able to take account of predictable aspects of background noise to separate systematic noise from signal. Finally, children can more efficiently learn to extract signal from systematic noise than from random noise through experience.
R 7

32,374
Fox, R.H., Bradbury, Pamela A., Hampton, I.F.G. & Legg, C.F. TIME JUDGMENT AND BODY TEMPERATURE. J. exp. Psychol., Sept. 1967, 75(1), 88-96. (National Institute for Medical Research, London, England).

The effects of raising body temperature on subjects' time judgments were investigated in two experiments. Experiment I: 8 subjects performed five tasks (production of 1, 10, and 30 sec. and tapping 1 and 3 taps/sec) at three body temperatures (normal, 38.0° and 39.0°C) These results were inconclusive. Experiment II: 12 subjects judged 10 sec. by production at five body temperatures (normal 37.5°, 38.0°, 38.5°, and 39.0°C) in the same session and during exposure to a cold stress. Despite large individual variations, group mean-time judgments shortened (i.e., the internal clock speeded up) as body temperature increased. Cold stress produced similar but smaller effects. This and previous studies seem consistent with the hypothesis that time judgment is a learned skill in which some function of cerebral neural activity acts as a time base.
R 22

32,375
Posner, M.I. CHARACTERISTICS OF VISUAL AND KINESTHETIC MEMORY CODES. J. exp. Psychol., Sept. 1967, 75(1), 103-107. (University of Oregon, Eugene, Ore.).

This study compares retention of kinesthetic information from blind positioning movements with information from similar visually guided movements. Reproduction of the visually guided movement shows little or no forgetting when the interval (20 sec) is unfilled and forgetting is greatly increased by an interpolated attention-demanding task. The blind movements show clear forgetting even with an unfilled interval and are not much affected by the interpolated task. These results confirm previous findings that storage in these tasks involves more than verbal labels and suggest that visual and kinesthetic STM (short-term memory) codes have different central processing requirements.
R 8

32,376
Vitz, P.C. & Todd, T.C. A MODEL OF LEARNING FOR SIMPLE REPEATING BINARY PATTERNS. J. exp. Psychol., Sept. 1967, 75(1), 108-117. (New York University, New York, N.Y.).

A model predicting how subjects learn simple repeating patterns of binary events is presented. The model assumes subject codes the event sequence into runs and then conditions the response following each run. The structure of the learning task is interpreted as the same as in the typical paired-associate learning experiment. With the exception of the "coding-into-runs" assumption, the model is formally identical with Bower's (Psychometrika, 1961, 26, 255-280) 1-element model and is essentially an extension of it. The results of two experiments provide a generally good fit. The discrepancies which are found are interpreted as due to the failure of subject's short-term memory.
R 9

32,377
Pompi, K.F. & Lachman, R. SURROGATE PROCESSES IN THE SHORT-TERM RETENTION OF CONNECTED DISCOURSE. J. exp. Psychol., Oct. 1967, 75(2), 143-150. (State University of New York, Buffalo, N.Y.).

A training list of words was presented in a meaningful syntactic order or in random order. In Experiment I, a recognition test was administered containing an equal number of distracter words of high or low thematic association (TA). The TA words were preselected by judges. In Experiment II, the TA words were interpolated between training and a free-recall test. Predicted interactions between Word Order and TA were obtained in both studies. The results suggest that the meaning of connected discourse may be stored as surrogate structures (themes, images, schemata, and words) and that lexical associations to the surrogate system may occur during retrieval.
R 12

32,378
Suedfeld, P., Glucksberg, S. & Vernon, J. SENSORY DEPRIVATION AS A DRIVE OPERATION: EFFECTS UPON PROBLEM SOLVING. J. exp. Psychol., Oct. 1967, 75(2), 166-169. (Rutgers-The State University, New Brunswick, N.J.).

Sensory deprivation and financial incentive had parallel effects upon problem-solving performance, supporting the view that sensory deprivation is a drive-arousing operation. Problem-solving performance varied nonmonotically with overall drive level, consistent with the Yerkes-Dodson inverted-U hypothesis.
R 12

32,379
Ross, P.L. ACCURACY OF JUDGMENTS OF MOVEMENT IN DEPTH FROM TWO-DIMENSIONAL PROJECTIONS. J. exp. Psychol., Oct. 1967, 75(2), 217-225. (Johns Hopkins University, Baltimore, Md.).

Moving 2-dimensional projections were seen by subjects who were required to judge the shape of the 3-dimensional path in which the stimuli supposedly producing the projections were moving. The subjects were able to discriminate between different elliptical 3-dimensional paths for all stimulus sets, but the judged path was also a function of the number and arrangement of the elements in a set. Increasing the number of elements and their symmetry led to more stable percepts, but not necessarily to more accurate ones.
R 4

32,380
Dominowski, R.L. ANAGRAM SOLVING AS A FUNCTION OF BIGRAM RANK AND WORD FREQUENCY. J. exp. Psychol., Nov. 1967, 75(3), 299-305. (University of Illinois, Chicago Circle, Ill.).

Two experiments were conducted to investigate the effects of language variables on anagram solving. In addition to varying the frequency of solution words, the bigram-rank totals (BR) of anagrams and of solution words were manipulated. The rank of a bigram (minus 1) indicates the number of more frequent bigrams with the same initial letter; totals are obtained by summing the ranks of successive bigrams in a letter sequence. Performance improved with increasing word frequency. Anagrams with high BR were easier to solve than those with low BR. In Experiment I, each subject solved for words with similar BR, and performance first deteriorated, then improved as word BR increased. In Experiment II, each subject solved for words with widely varying BR, and performance decreased linearly with increasing word BR. Several interactions and practice effects were also obtained.
R 19

32,381
Leppin, J.S. ATTENTION IN THE IDENTIFICATION OF STIMULI IN COMPLEX VISUAL DISPLAYS. J. exp. Psychol., Nov. 1967, 75(3), 321-328. (Carnegie University, Pittsburgh, Penn.).

The identification of three stimuli embedded in brief foveal displays was studied under conditions varying the relationship between the relevant stimuli; the stimulus displays and responses were the same in all conditions. Performance was best when the stimuli were the three dimensions of a single object, and better when they were the same dimension than when a different dimension of each of three objects. In the multiple-object conditions, accuracy was correlated with serial order of the responses. However, the three responses to each display were independently accurate within all conditions. It was suggested that the "span of attention" is not fixed. In a supplementary experiment, the spatial separation of the relevant stimuli was found to have no effect.
R 18

32,382
Kaiser, P.K. PERCEIVED SHAPE AND ITS DEPENDENCY ON PERCEIVED SLANT. J. exp. Psychol., Nov. 1967, 75(3), 345-353. (University of California, Los Angeles, Calif.).

Koffka's suggestions that perceived shape and perceived slant "will be coupled together so that if one changes, the other changes also" and that errors in perceived shape vary as some function of errors in perceived slant were examined. Subjects described, by means of appropriate response mechanisms, the shapes and slants of trapezoids. Shape and slant responses were made both monocularly and binocularly. The changes in reported shape varied as a function of changes in reported slant. Also, shape response errors varied as a function of slant response errors under monocular viewing when subjects had no prior binocular experience with the trapezoid. The functions relating perceived shape to perceived slant were comparable to the function predicted by the Beck and Gibson shape-slant invariance hypothesis.
R 13

32,383
Beach, L.R. & Phillips, L.D. SUBJECTIVE PROBABILITIES INFERRED FROM ESTIMATES AND BETS. J. exp. Psychol., Nov. 1967, 75(3), 354-359. (University of Washington, Seattle, Wash. & University of Michigan, Ann Arbor, Mich.).

The similarity among veridical event probabilities, subjective probabilities inferred from subjects' estimates of the event probabilities, and subjective probabilities inferred from choices among bets involving the same events was examined. In one condition, subjective probabilities were based on two levels (high and low) of experience with the relative frequencies of the event occurrences. The similarity between the two kinds of inferred subjective probabilities and the veridical probabilities increased with experience and, as would be expected if both estimates and bets were based on the same underlying subjective probabilities the two sets of inferred subjective probabilities were equally similar to each other (r = .93) at both experience levels. In a second condition, event probabilities were displayed and subjects used them to make choices among bets; the inferred subjective probabilities were highly correlated with the displayed values (r = .96). It was possible to account for at least some of the response error variance by individual differences in test anxiety.
R 9

32,384
Karrer, R. VISUAL BEAT PHENOMENA AS AN INDEX TO THE TEMPORAL CHARACTERISTICS OF PERCEPTION. J. exp. Psychol., Nov. 1967, 75(3), 372-378. (Research Dept., Illinois State Pediatric Institute, Chicago, Ill.).

Visual beats, produced by the combination of intermittent light pulses in both binocular and dichoptic vision, gave evidence of temporal resolution. The perceived beat rate indicates that the "photopic" and "scotopic" visual systems follow flicker frequency accurately up to critical flicker frequency (CFF); above fusion no beats are perceived. Beats occur between different vestigial flicker frequencies disputing the concept of a constant rate of phenomenal flicker and neural firing just prior to fusion. The temporal resolution of the visual system can adapt to the temporal conditions of stimulation to an extent not previously indicated by 2-pulse and short-train studies.
R 16

32,383
Bartz, A.E. FIXATION ERRORS IN EYE MOVEMENTS TO PERIPHERAL STIMULI. J. exp. Psychol., Dec. 1967, 75(4), 444-446. (Concordia College, Moorhead, Minn.).

Eye movements to peripheral visual stimuli were analyzed for duration and frequency of occurrence of over- and undershoots. The mean duration of undershoots was significantly greater than the duration of overshoots. When these errors occurred, subjects tended to undershoot the stimuli at large angles and overshoot the stimuli at smaller angles. This was shown to be consistent with pursuit tracking studies of body limbs where similar analyses were made.
R 9

32,386
Boulter, L.R. & Appley, M.H. TIME AND EFFORT AS DETERMINERS OF TIME-PRODUCTION ERROR. J. exp. Psychol., Dec. 1967, 75(4), 447-452. (York University, Toronto, Ontario, Canada).

In three experiments series of successive estimates (productions) of 1-min. periods were required of human subjects under resting (R) and effortful (E) conditions. In Experiments I and II all subjects served in both conditions, their successive productions being made alternately under R and E. In Experiment III independent groups served in R and E, but all productions were made during a resting state. Mean time-production error markedly increased as a function of successive judgments in all three experiments, uniformly in the direction of increasingly longer judgments. In Experiments II and III judgments were significantly longer in E than R, and this effect was greater in Experiment III than II. In Experiments I and II, interruption of the sequential task was followed by a temporary reduction in the magnitude of judgment errors. Discussion included the possible significance of these results with respect to properties of a presumed time-keeping mechanism.
R 6

32,387
Treichler, F.R., Hann, Barbara & Way, Sally J. EFFECTS OF RESPONSE-INDUCED STIMULUS CHANGE ON HUMAN DISCRIMINATION. J. exp. Psychol., Dec. 1967, 75(4), 453-456. (Kent State University, Kent, Ohio).

Two experiments on the effects of manipulating the display of discriminanda at the time of alternative selection were conducted. In the first, human subjects demonstrated superior performances when only the correct alternative or both discriminanda were visible after choice. Termination of both stimuli or persistence of only the incorrect alternative yielded more error and this pattern of results was displayed throughout a range of problem difficulties. A second experiment indicated that performances under conditions of selective persistence of correct stimuli were dependent upon the nature of displayed information rather than solely upon its position.
R 5

32,388
Howell, W.C. AN EVALUATION OF SUBJECTIVE PROBABILITY IN A VISUAL DISCRIMINATION TASK. J. exp. Psychol., Dec. 1967, 75(4), 479-486. (Ohio State University, Columbus, Ohio).

Subjective probability (SP) was measured for 16 visual discrimination problems using a technique requiring riskless choices between specific discrimination problems and a series of objective probability (OP) displays. Each SP was expressed in terms of the OP which was found to be indifferent from it. Discrimination problems differed with respect to difficulty level, difficulty composition, and information level. Obtained SPs varied as a function of difficulty, information level, and their interaction, but not difficulty composition (the only variable not affecting OP). Systematic deviations of SP from OP, while in the general direction of conservatism, were not entirely consistent with this concept. OP values which occurred within both easy and difficult problem contexts produced different SPs. Adaptation-level theory was used to integrate these and earlier SP findings.
R 16

32,389
Doll, T.J. & Thomas, D.R. EFFECTS OF DISCRIMINATION TRAINING ON STIMULUS GENERALIZATION FOR HUMAN SUBJECTS. J. exp. Psychol., Dec. 1967, 75(4), 508-512. (Kent State University, Kent, Ohio).

Three groups of fifteen human subjects each were given wavelength discrimination training to respond to the S+ (530 mμ) but not to S- (540 mμ, 550 mμ, and 590 mμ, respectively). A fourth (control) group (n = 15) received instructions to respond only to S+ but no discrimination training. All subjects were then tested for generalization to wavelengths on both sides of the S+. Relative to the control gradient, both the 540 mμ S- and 550 mμ S- groups showed displacement of the mode of responding from S+ in the direction opposite to S-. Contrary to the animal literature, however, the 550 mμ S- group exhibited the greater displacement, and the 590 mμ S- group yielded a gradient reliably flatter than that of the control group. These discrepancies are attributed to human subjects' use of stimulus labeling and categorization.
R 10

32,350
Ohwaerstein, A.J. IMAGE SIZE AND INSTRUCTIONS IN THE PERCEPTION OF DEPTH. J. exp. Psychol., Dec. 1967, 75(4), 525-528. (New York Medical College, New York, N.Y.).

A life-size postage stamp was paired with one of three different sized pictures of a matchbook so as to isolate the variable of familiar size from heterogeneity of image size. Instructions preceding the stimulus stressed judging distances or were nondirective. Among both instruction groups familiar size determined the direction of perceived depth but not the choice between three dimensionality and two dimensionality. Heterogeneity of image size increased reports of three dimensionality, but only following nondirective instructions. The use of nondirective instructions uncovers effects of stimulation on perception which are concealed by traditional procedures.
R 7

32,351
Kasle, L.W. COMPATIBILITY AND TIME-SHARING IN SERIAL REACTION TIME. J. exp. Psychol., Dec. 1967, 75(4), 529-539. (University of Wisconsin, Madison, Wisc.).

The degree of similarity between arrangements of stimulus lights and response contacts, the degree of sequential dependency in the order of the lights, and the difficulty of a time-shared task were manipulated in two studies of performance on a serial reaction-time task. Sequential dependencies had no significant effect on performance. Speed of performance was directly related to the similarity of the light and contact arrangements and was an inverse function of the difficulty of the time-shared task. A given time-shared task interfered more with dissimilar light and contact arrangements than with similar arrangements.
R 13

32,352
Gordon, N.B. & Cottlieb, M.J. EFFECT OF SUPPLEMENTAL VISUAL CUES ON ROTARY PURSUIT. J. exp. Psychol., Dec. 1967, 75(4), 566-568. (Yeshiva University, New York, N.Y.).

The effects of supplemental visual cues on performance and learning of a rotary pursuit (RP) task were studied. Two forms of augmented visual feedback (AF) were compared with a no-feedback condition in which fifteen naive, male, right-handed, undergraduate subjects participated per group. The supplementation consisted of a yellow light which illuminated the RP display when subject was either on target (Group ONTAF), or off target (Group OFTAF). Thirty-three training and nine transfer 20-sec. trials (when AF was withdrawn) were given in two testing sessions, twenty-one trials to a session. Both modes of AF presentation were superior to the no-AF condition during both training and transfer. A slight superiority was noted for off-target AF.
R 3

32,353
Geschelder, G.A. AUDITORY AND CUTANEOUS TEMPORAL RESOLUTION OF SUCCESSIVE BRIEF STIMULI. J. exp. Psychol., Dec. 1967, 75(4), 570-572. (Hamilton College, Clinton, N.Y.).

The temporal resolution thresholds for pairs of brief stimuli presented in rapid succession were found to be 5-10 times higher for stimulation of the ring and index fingertips of the same hand than for binaural hearing. The sensation level of the stimuli and the intensity relations between the first and delayed stimulus had remarkably similar effects on auditory and cutaneous temporal resolving power. It was concluded that similar neural mechanisms may operate for both modalities in the resolution of successive stimuli.
R 7

32,354
Pitts, D.G. VISUAL ILLUSIONS ASSOCIATED WITH ACCELERATION. Amer. J. Optom. Arch. Amer. Acad. Optom., Jan. 1967, 44(1), 21-33. (USAF School of Aerospace Medicine, Brooks AFB, Tex).

A definition and description of the oculogyral and oculogravic illusions are given. A summary of the differences between these two illusions is presented. Their differences serve to emphasize that different divisions of the vestibular system are responsible for each illusion. The importance of these illusions in maintaining spatial orientation for pilots has been stressed. Good instrument discipline appears to afford the best method of minimizing these illusory effects. It is concluded that satisfactory theoretical explanations as to the cause of the illusion have not been reached. Correlation of psychophysical data with recommended electrophysiological research appears to afford the most direct route in approaching an acceptable theoretical hypothesis.
R 32

32,355
Allen, M.J. CHROMIUM HEADLIGHT COVERS--A POSSIBLE HAZARD. Amer. J. Optom. Arch. Amer. Acad. Optom., Jan. 1967, 44(1), 34-41. (Optometry Div., Indiana University, Bloomington, Ind.).

Tests on a commercially available chromium headlight cover purporting to improve vision, increase safety and decrease eye strain were conducted to checkout the claims. Test data showed that the covers cause a decrease in headlight efficiency using the standard set by this study. They reduce the seeing distance because they reduce useful light when compared to unshielded headlights and they seem to cause a relative increase in glare to the oncoming motorists. In particular, the claim of the manufacturer is open to question that more useful light and less glare are provided with the shields when high beams are used for all driving than is provided by conventional use of unshielded headlights. According to this study the claims on the device are misleading.

32,396
Carlfe, R.P. & Hebbard, F.W. INVOLUNTARY EYE MOVEMENTS OCCURRING DURING FIXATION: EFFECTS OF CHANGES IN TARGET CONTRAST. Amer. J. Optom. Arch. Amer. Acad. Optom., Feb. 1967, 44(2), 73-90. (Ohio State University School of Optometry, Columbus, Ohio).

The involuntary eye movements occurring during attempted steady monocular fixation were photographed for nine different contrast levels of a fixation target, using an optical lever method involving a small plane mirror attached to a contact lens. It was found that: a) as the contrast of the fixation target was decreased below 50 per cent, there was an increase in the mean amplitude of saccades and in the standard deviation of the eye position during fixation. The increase in amplitude was shown to be highly significant statistically, b) for target contrasts between 50 and 100 per cent, the mean amplitude of saccades and mean standard deviation of eye position do not change with contrast. c) There is a small and less consistent increase in frequency of saccades as target contrast increases. d) Standard deviation of eye position may be used interchangeably for some purposes with amplitude of saccades in evaluating eye movements during fixation. The former measure can lend itself more readily to electronic analysis, which may facilitate the investigation of the effects of various variables on eye fixation.
R 19

32,397
Allen, M.J., Strickland, J. & Adams, A.J. VISIBILITY OF RED, GREEN, AMBER AND WHITE SIGNAL LIGHTS IN A HIGHWAY SCENE. Amer. J. Optom. Arch. Amer. Acad. Optom., Feb. 1967, 44(2), 105-109. (Optometry Div., Indiana University, Bloomington, Ind.).

Three subjects were asked to respond to signal lights while counting approaching cars in movie scenes of fast highway traffic projected on the rear of a translucent screen. A total of 2900 observations were made for the four colors (white, amber, green and red) and six intensities employed. The data were averaged for all three subjects and presented graphically as relative brightness vs. reaction time. All points are well represented by a single curve which indicates that the detectability of the light, as indicated by the subject's reaction times, is governed by its relative brightness and not by its color. The minimum reaction time is about 0.55 second. Researchers have reported that the minimum reaction time to be expected on the highway is about 0.55 second, hence the task of counting cars in a motion picture display of a highway appears to be reasonably realistic so far as detecting signal lights is concerned. It is concluded that current claims that red and amber are signal colors of superior visibility, probably, in part, at least, are based upon faulty methods of measuring the luminosity of the filters and light source combinations. There is nothing in these data to justify reduced signal luminance because of color. In perceptual situations such as driving an automobile where the signal must rise above a differential, an absolute and/or a temporal threshold before it can be detected, stimulus intensity and not color appears to be the controlling variable.
R 5

32,398
Bergevin J. & Millodot, M. GLARE WITH OPHTHALMIC AND CORNEAL LENSES. Amer. J. Optom. Arch. Amer. Acad. Optom., April 1967, 44(4), 213-221. (University of Montreal School of Optometry, Montreal, Quebec, Canada).

Glare sensitivity was measured with corneal and ophthalmic lenses, by means of the Night-Sight Meter. The sensitivity to glare with contact lenses was found to be greater than with ophthalmic lenses. This was found to remain so even after subjects had worn their contact lenses for periods of several months. The transmission of contact lenses resting on the eye and of ophthalmic lenses is calculated to be the same and therefore to be of no influence upon the results. It is speculated that a deprivation of the oxygen of the cornea may interfere with the metabolism of the cornea which consequently would alter the transparency and reduce the mesopic acuity necessary to identify the letter in the Night-Sight-Meter.
R 13

32,399
Pesso, P.L. & Allen, M.J. LOW CONTRAST VISUAL ACUITY AND THE EFFECTS OF AMBIENT ILLUMINATION, FILTERS AND SCATTER. Amer. J. Optom. Arch. Amer. Acad. Optom., April 1967, 44(4), 226-232. (Pennsylvania College of Optometry, Philadelphia, Penn. & Optometry Div., Indiana University, Bloomington, Ind.).

A variable luminance low contrast letter target was used to measure the effect upon vision of changing room illumination, of increasing optical scatter, and of reducing over-all transmission of light into the eye. It was found that changing from a room illumination of 12.5 to zero footcandles required about a 25 per cent increase in luminance of the 20/20 test letter background in order for the average subject to read the test letter. The addition of neutral density filters before the eyes, to simulate increased ocular absorption, required an increase in the luminance of the test letter background proportional to, but less than, the filter density. The introduction of lycopodium powder to simulate opacities or glaucomatous scatter made it necessary to increase the test luminance from 6 to 15 times to recognize the test letters again.
R 6

32,400
Ringstorff, R.H. THE TYPES AND INCIDENCE OF HAND-EYE PREFERENCE AND ITS RELATIONSHIP WITH CERTAIN READING VARIABLES. Amer. J. Optom. Arch. Amer. Acad. Optom., April 1967, 44(4), 233-238. (Pacific University College of Optometry, Forest Grove, Ore.).

In a study of 5,5[illegible] subjects from six different population samples there was little variance in the distribution and percentage of subjects demonstrating unilateral and mixed hand-eye preference. Based on two simple tests, 32.5 per cent of this population had mixed preference. Lower reading speed and comprehension appeared to have a positive relationship with mixed hand-eye preference in studying 76 U.S. Army officers. In comparing the subjective reading speed in 303 different subjects, a more positive relationship between mixed hand-eye preference and slow reading was found.

32,401
Ludlam, W.M., Wittenberg, S., Rosenthal, J. & Harris, C. PHOTOGRAPHIC ANALYSIS OF THE OCULAR DIOPTRIC COMPONENTS. PART III. THE ACQUISITION, STORAGE, RETRIEVAL AND UTILIZATION OF PRIMARY DATA IN PHOTOKERATOSCOPY. Amer. J. Optom. Arch. Amer. Acad. Optom., May 1967, 44(5), 276-296. (Vision Research Labs., Optometric Center of New York, New York, N.Y.).

Modifications in the Knoll instrument to enable photokeratoscopic measurements to conform with the theoretical considerations enumerated in the previous paper of this series were described. The practical limitations inherent within the components of the modified system of photokeratoscopy were evaluated as to accuracy and precision, the experimental values reported, and related to the ultimate data derived. The precision of the system in toto was found to be considerably better than results claimed by recent investigators for photokeratoscopy. The improved reliabilities could be accounted for on the basis of the instrument and procedural modifications. In addition the use of repeated photographs resulted in still greater precision. Photokeratoscopic determinations were found to show good agreement with those of small mire keratometry. Suggestions were made for improvements in the system which would further enhance precision of measurement. The information obtained from the keratograph was related to a system of analysis which avoids those assumptions which have been shown to distort the conclusions drawn by previous investigators. The misalignments of the early model Knoll Photokeratoscope used, while not affecting a qualitative study of the cornea, such as that reported by Knoll, preclude its use in the application of the system of analysis summarized in the text. The long awaited determination of the analytic nature of the corneal form thus depends only on the construction of a photokeratoscope of sufficient precision. Such an instrument is being fabricated taking into account the additional requirements of a system of automated measurement.
R 14

32,402
Crosley, J.K. & Allen, M.J. AUXILIARY LIGHTING TO IMPROVE REAR VISIBILITY OF TRUCKS AND BUSES. Amer. J. Optom. Arch. Amer. Acad. Optom., May 1967, 44(5), 311-315. (Optometry Div., Indiana University, Bloomington, Ind.).

A literature review shows that present vehicular lighting practices are hazardous. Space perception criteria indicate that present designs dictate a high accident and fatality rate. Flood-type auxiliary lighting of the rear of a truck was judged to be easier to localize than ordinary taillighting. Observations were made on a simulated truck rear-end with and without floodlighting at closing speeds of 20 m.p.h. The floodlighted "truck" was judged correctly to be stopped when the observer was an average of 638 feet away, compared to an average of 279 feet when normally spaced taillights alone were used. It is recommended that the entire rear of trucks and buses be lighted, thus improving the distance and differential speed judgments by a following driver.
R 7

32,403
Welton, W.C., Jr. VISUAL PROBLEMS OF THE INSTITUTIONAL AGED. Amer. J. Optom. Arch. Amer. Acad. Optom., May 1967, 44(5), 319-335. (Pennsylvania College of Optometry, Philadelphia, [illegible]).

This study utilized 74[illegible] individuals residing in Riverview, the city of Philadelphia's municipal home for the aged and indigent. All newly admitted residents and a large number of other residents were seen. The clinical procedures included in this study follow: a) visual acuity determination, b) external examination, c) ophthalmoscopic examination, d) electronic tonometry, e) refraction, f) visual field screening (using variously the one meter tangent screen and the Harrington Flocks tachistoscopic field screener). No significant differences were found between male and females nor between right and left eyes. A higher incidence of aphakia was noted among residents of long standing at Riverview than among new admittees. The best correctable visual acuity was found to diminish with age. It was not always possible to obtain good intraocular pressure measurements using the Mackay-Marg electronic tonometer without anesthesia and moderate binocular pressure differentials obtained with this instrument may be less significant than when they are obtained with the Schiotz tonometer. The Harrington-Flocks tachistoscopic screener was found more effective as a visual field screening device for Riverview residents than the tangent screen, as result in the former test it could be used successfully more often than the tangent screen test. Patients who failed the tangent screen test generally failed the Harrington-Flocks test. However, five per cent of those who failed the Harrington-Flocks test passed the tangent screen test. This is probably of little consequence since it is normal clinical practice to retest patients with the tangent screen when they fail a tachistoscopic visual field test.
R 2

32,404
Allen, M.J. & Carter, J.H. THE TORSION COMPONENT OF THE NEAR REFLEX. A PHOTOGRAPHIC STUDY OF THE NON-MOVING EYE IN UNILATERAL CONVERGENCE. Amer. J. Optom. Arch. Amer. Acad. Optom., June 1967, 44(6), 343-349. (Optometry Div., Indiana University, Bloomington, Ind. & Pennsylvania College of Optometry, Philadelphia, Penn.).

A brief review is presented of the problems of measuring cyclophoria and cyclotorsion of the eyes, as these relate to the characteristics of the apparatus used for making such measurements. That convergence produces excyclotorsion of the eyes is shown for all elevations when classical data, such as Landolt's, are converted to Listing's system of axes. It is apparent that these cyclotorsional efforts, as accompany convergence, are measurable directly in any instrument, so long as zero elevation is used. Measurements at other elevations can be converted mathematically to any system of axes. Photographic recordings of binocular torsional eye positions, during uniocular convergence movements at zero degrees of elevation, show that the fixed eye rotates about its line of sight by approximately the amount normally expected for one of the two eyes, when convergence-induced cyclophoria changes are measured. It is recommended that the "near reflex" definition be expanded to include excyclotorsion, in addition to convergence, miosis, and accommodation.
R 6

32,405
Smith, G.F. PHOTOCHROMIC GLASSES: PROPERTIES AND APPLICATION. Amer. J. Optom. Arch. Amer. Acad. Optom., June 1967, 44(6), 350-364. (Corning Glass Works, Corning, N.Y.).

This paper discusses the composition and behavior of photochromic glasses, i.e., glass compositions which darken in sunshine or other suitable light, and recover to a clear state when the light is removed. The mechanism of silver halide photolysis will be presented as an aid in exposition of the photochromic phenomena exhibited by these glasses. Ranges of available properties are given, with particular attention to the glass--trademarked SERTLITE--glass--developed for ophthalmic use. Other applications which suggest themselves are as windows in buildings and vehicles, in paints or coatings for radiation control, as container for light-sensitive drugs or foods--and the greatest of these is boon--and perhaps even a sun-tanning freckled doll.
R 15

32,406
Bell, R.J. & Bartley, S.H. THE INDUCTION AND REDUCTION OF COLOR DEFICIENCY BY MANIPULATION OF TEMPORAL ASPECTS OF PHOTIC INPUT. Amer. J. Optom. Arch. Amer. Acad. Optom., July 1967, 44(7), 411-418. (Psychology Dept., Michigan State University, East Lansing, Mich.).

Several brief studies have previously shown that color deficiency could be induced in color-normal observers by temporal means. Presented in this article are data from a much more exhaustive study of these temporal factors and also the substantiation of the earlier findings. However, this study utilized both color-normal and color-deficient observers and shows that color deficiency cannot only be induced or increased but substantially decreased by temporal means. Differences in results between different types of color-deficient observers were also found. These results clearly make the main point that the temporal characteristics of the stimulus input are an extremely important influence on the resultant perception. Stimulus timing has once again been shown to affect strongly perceptual attributes that have often been thought to be controlled only by the intensive or wavelength characteristics of the photic energy.
R 9

32,407
Schmidt, Ingeborg. EFFECT OF VISION ON HEARING. Amer. J. Optom. Arch. Amer. Acad. Optom., Aug. 1967, 44(8), 490-501. (Optometry Div., Indiana University, Bloomington, Ind.).

Experiments to determine the absolute auditory thresholds and the differential thresholds for loudness with spectacles and without, were carried out in an anechoic chamber on 28 subjects. In one series of tests the subjects set the absolute appearance threshold for hearing of tones of the frequencies 500, 1500 and 5000 cps; in a second series a Békésy audiometer was used to determine the auditory thresholds on 500 and 5000 cps. The ability to discriminate between loudness differences in tones of the same frequency 3000 cps was tested by a forced-choice method. The results did not seem to be affected in a significant way whether or not the subjects wore glasses.
R 12

32,408
Richards, O.W. NIGHT MYOPIA AT NIGHT AUTOMOBILE DRIVING LUMINANCES. Amer. J. Optom. Arch. Amer. Acad. Optom., Aug. 1967, 44(8), 517-523. (Research Center, American Optical Company, Southbridge, Mass.).

The acuity and contrast vision of two populations of 74 and 241 people, ages 15-30, were measured at 10, 1, 0.1, and 0.01 fL. Tests for night myopia were made at the lower luminances with added spherical power lenses of +0.75 D to -1.50 D. Four individuals saw better with a plus correction at 0.1 fL, but only one at 0.01 fL (slight presbyopia?). The vision of 25 and 10 per cent of the people was improved with minus corrections from -0.25 D to -1.50 D and the amounts, frequencies and age relations are reported. Insofar as these small populations are representative, some 10-15 per cent of people could benefit by a special night driving glass based on a refraction made with a 0.1 to 0.3 fL object brightness approximating night driving luminances. An arbitrary minus add can be used for all people without handicapping the vision of most people. The large individual variations found probably result from the diameter of pupil and the focusing ability of the accommodative mechanism.
R 17

32,409
Boucher, J.A. COMMON VISUAL DIRECTION HOROPTERS IN EXOTROPES WITH ANOMALOUS CORRESPONDENCE. Amer. J. Optom. Arch. Amer. Acad. Optom., Sept. 1967, 44(9), 5[illegible]-578.

The purpose of this investigation was to determine if reliable horopters could be determined in periodic alternating exotropes and, if they could, to determine their characteristics and compare them with normal binocular subjects. Two alternating exotropes with anomalous correspondence were used as subjects along with a normal binocular control subject. Horopters obtained for the control subject were similar in shape and position to horopters obtained in a similar manner by other investigators for normal binocular subjects. It was concluded that the horopter apparatus built was a valid method to determine common visual direction horopters. Reliable horopters were determined for alternating exotropes with anomalous correspondence. However, one subject's horopter data had to be corrected for eye position before a valid horopter could be determined. One subject could be both a normal binocular subject and an alternating exotrope with anomalous correspondence. He had two distinctly different shaped horopters, one for his normal binocular condition and one for his strabismic position. It was concluded that alternating exotropes with anomalous correspondence used in this investigation have some form of binocular vision and have some form of common visual direction while in this strabismic position. It was also concluded that exotropes with anomalous correspondence do not have a uniform change in their common visual direction and that their distance localization is similar to a normal binocular subject's distance localization.
R 10

32,411
Bedwell, C.H. THE DESIGN OF INSTRUMENTATION FOR THE EFFICIENT INVESTIGATION OF THE VISUAL FIELDS. Amer. J. Optom. Arch. Amer. Acad. Optom., Oct. 1967, 44(10), 663-[illegible]. (Ophthalmic Optics Dept., The City University, London, England).

This article reviews briefly previous instruments for studying visual fields and describes the construction and application of a Visual Field Analyser. The aim in design of the analyser was to produce an instrument that would allow quick, accurate, and yet sensitive, quantitative visual field investigation that was convenient to use clinically and that was in keeping with modern trends in instrumentation. With small stimuli employing short duration of exposure, there is no need to employ the customary one meter working distance. Therefore, a third of a meter viewing distance was chosen so that a compact instrument would result which could be used easily in conjunction with other stand instruments and on multiple-position instrument tables. The instrument consists essentially of a base carrying a housing containing an integrating bowl hemisphere, the light source and its accessories, and the front-plate assembly for exposing the patterns on the front of this housing. At the other end of the base is carried the external illuminator, on which is also mounted an adjustable double-position chin rest for right and left eye examination. The major part of the instrument is constructed in glass-fiber for strength and lightness.
R Many

32,412
Allen, M.J. & Vos, J.J. OCULAR SCATTERED LIGHT AND VISUAL PERFORMANCE AS A FUNCTION OF AGE. Amer. J. Optom. Arch. Amer. Acad. Optom., Nov. 1967, 44(11), 717-727. (Optometry Div., Indiana University, Bloomington, Ind. & Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

Visual performance of 52 healthy subjects, age 5-87 years, on Landolt C variable contrast visual acuity targets was related to an index of ocular scatter obtained by slit lamp photometry. All subjects wore an optimum lens correction determined by retinoscopy. Visual performance decreased with age, and the ocular scatter index increased, but the relationship appears to be color-[illegible]. It is concluded that the deterioration of visual performance with age cannot be [illegible]ted by measuring the back scatter in the cornea and the lens.
R 3

32,413
Allen, M.J. HEADLIGHT RING RETROREFLECTORS. Amer. J. Optom. Arch. Amer. Acad. Optom., Dec. 1967, 44(12), 765-768. (Optometry Div., Indiana University, Bloomington, Ind.).

Retroreflective rings that fit around the headlight were tested in a highway meeting situation to determine the range at which they permitted identification of a single headlight as that of an automobile with a burned-out headlight. As much as a 7.5x increase in identification range with the ring reflectors compared to without was noted. Identification ranges without reflectors were 88 and 177 feet. With reflectors the ranges were from 430 to 600 feet, depending upon the number and size of rings. It is concluded that the rings are effective and help solve one of the hazards of a burned-out headlight.
R 3

32,414
Weiss, N.J. A NEW METHOD OF PLOTTING AND RECORDING THE BLIND SPOT. Amer. J. Optom. Arch. Amer. Acad. Optom., Dec. 1967, 44(12), 803-809.

A method to plot and to record directly the blind spot using the retinoscope, a special recording sheet, and a modified Bausch & Lomb hand slit lamp was described. The reliability and the validity were studied using 50 subjects (100 spots). The results are compatible with the existing standards for the size of the blind spot. Additional improvements are being planned such as a [illegible] lens system to allow a plot of the entire central [illegible]. Also, investigations are underway to consider the value of ultra-violet light in this procedure. A table which summarizes the [illegible] due to the lenses, prisms, and ametropia has been constructed which will eliminate these factors from the [illegible] findings if necessary. It is expected that this table and pads of recording sheets will be made available soon.
R 3

32,416
Kilbin, B. RECENT DEVELOPMENTS IN OPTICAL AIDS IN THE UNITED STATES AIR FORCE. Amer. J. Optom. Arch. Amer. Acad. Optom., Dec. 1967, 44(12), 8.3-817. (USAF School of Aerospace Medicine, Brooks AFB, Tex.).

...bers of the Air Force on flight status wear spectacle sunglasses. Those who require ... limits obtain comfortable frame fits through personal examination. Those who ... require prescriptions are usually handed the spectacles. The Air Force has developed ... and hoods to keep such spectacles comfortably in place when wearing helmets.
(USAF)

32,417
Fleishman, E.A. DEVELOPMENT OF A BEHAVIOR TAXONOMY FOR DESCRIBING HUMAN TASKS: A CORRELATIONAL-EXPERIMENTAL APPROACH. J. appl. Psychol., Feb. 1967, 51(1), 1-10. (American Institutes for Research, Washington, D.C.).

... may identify a set of unifying dimensions underlying skilled behavior is discussed. ... on problems of generalizing principles from laboratory to operational ... and from one task to another. Combinations of experimental and correlational approaches ... to be required. The conceptual framework and research strategy utilized by ... in his research on perceptual-motor abilities is described and its relevance to ... discussed. The integrative nature of the framework developed is illustrated by a wide variety of studies, in laboratory and operational situations, ranging from those of skill learning and retention to the effects of environmental factors on human performance, and in the standardization of laboratory tasks for performance assessment.
A 49

32,417
Schwartz, H.A. & Long, H.S. A STUDY OF REMOTE INDUSTRIAL TRAINING VIA COMPUTER-ASSISTED INSTRUCTION. J. appl. Psychol., Feb. 1967, 51(1), 11-16. (IBM Corporation, Poughkeepsie, N.Y.).

During the latter half of 1965, several field engineers received their required training in new computer technology through remote computer-assisted instruction (CAI). Students at terminals located in four major cities communicated, through Tele-processing facilities, with a computer system located centrally. Students' examination scores, course completion times, and attitudes were compared with those of other students who received the material through self-study texts in use at the time. CAI students scored lower on one part of the examination, but completed the course in considerably less time than the self-study students. Attitude scores were somewhat equivocal. Students who had been exposed to both CAI and self-study texts indicated a strong preference for the former. When compared to a "regular classroom" type of presentation, however, the self-study students rated their method slightly higher than did the CAI students. CAI students' attitudes appear to be related to the availability of assistance when course material problems are encountered. Additional findings from locally trained CAI students are presented in support of this interpretation.
R 2

32,418
Trumbo, D., Rogers, S. & Avant, L.L. COMPATIBILITY EFFECTS IN A TWO-HAND CRANKING TASK. J. appl. Psychol., Feb. 1967, 51(1), 35-38. (Kansas State University, Manhattan, Kan.).

Forty-eight subjects were run on a 2-hand cranking task in four independent groups with different control-display linkage. Within-group conditions included three stimulus codes and four response combinations. Total adjustment time and response latencies for each hand served as response measures. Results for total adjustment time showed significant Stimulus Code and Practice effects, but no differences for Response Combinations or for the Stimulus Code-Response Combination interaction. Latency data revealed a pronounced Stimulus Code effect consistent with that for total adjustment time and demonstrated that control of the lateral dimension yielded shorter latencies than the in-out dimension, regardless of the hand involved. Thus, there was evidence of S-R (stimulus-response) but not R-R (response-response) compatibility effects.
R 3

32,419
Andrews, I.R. WAGE INEQUITY AND JOB PERFORMANCE: AN EXPERIMENTAL STUDY. J. appl. Psychol., Feb. 1967, 51(1), 39-45. (University of California, Berkeley, Calif.).

Ninety-six students worked at one of three piece rates: equitable wage (20¢), underpay (15¢), or overpay (30¢). Half of these students worked on an inherently interesting task while the other half worked on an inherently dull task. As predicted, underpaid subjects maintained equity by increasing work quantity at the expense of work quality, whereas overpaid subjects maintained equity by reducing work quantity and increasing work quality. Over and above the job-performance difference between piece-rate groups, there were pronounced differences within piece-rate groups as a function of individual differences in previous wage experience. Two other hypotheses, one about task difference and one about the motivative effects of underpay and overpay inequity, were not consistently supported by the data.
R 9

32,420
Hammerton, M. & Tickner, A.H. VISUAL FACTORS AFFECTING TRANSFER OF TRAINING FROM A SIMULATED TO A REAL CONTROL SITUATION. J. appl. Psychol., Feb. 1967, 51(1), 46-49. (Applied Psychology Research Unit, MRC, Cambridge, England).

Three experimental groups, each of twelve subjects, were trained to control a trolley moving on a miniature railway so as to carry out an acquisition task. They were trained using: a) a TV display; b) a cathode ray tube (CRT) with correctly scaled photographic transparency, c) CRT without-of-scale transparency, and d) plain CRT. A control group of twelve subjects trained on the real trolley ab initio. These conditions produced markedly different transfer (a > b > c > d) both initially and with a savings measure. In six of twelve comparisons made, differences were highly significant ($p < .01$); in four they were significant ($p < .05$) and in two not significant. A further experimental group (12 subjects), using a TV display, and trained to carry out a pursuit task, also showed very good transfer. Conclusions are: ideal simulation must take account of both: a) adequate background texture and b) accurate depth scaling. Absence of (a) can produce stimulus compounding; absence of (b) leads to misestimations.
R 7

32,421
Korman, A.K. SELF-ESTEEM AS A MODERATOR OF THE RELATIONSHIP BETWEEN SELF-PERCEIVED ABILITIES AND VOCATIONAL CHOICE. J. appl. Psychol., Feb. 1967, 51(1), 65-67. (New York University, New York, N.Y.).

This research tested the hypothesis that high-self-esteem students are more likely to choose those occupations which they perceive to require their high abilities than those with low self-esteem. The hypothesis was supported, thus emphasizing further the role of self-esteem as a moderator on the choice of occupational roles. Some implications of these findings for a closed-loop system whereby choice patterns which are a function of self-esteem also tend to reinforce the level of self-esteem were discussed.
R 5

32,422
Dillehay, R.C., Bruvold, W.H. & Siegel, J.P. ON THE ASSESSMENT OF POTABILITY. J. appl. Psychol., April 1967, 51(2), 89-95. (Texas Christian University, Fort Worth, Tex.).

Potability, the acceptance of water for drinking purposes, may be conceptualized and studied through the assessment of consumer attitudes toward domestic water. Three attitude scales were developed and tested in six community studies utilizing the hypothesis that potability is a function of the total dissolved solids (TDS) in drinking water. Reliabilities of the scales were found to be .82 and higher. The hypothesis was strongly supported by the data: mean attitude scores were found to be inversely related to the TDS in community drinking water. A theory of consumer attitudes toward taste in water was briefly outlined, and the recommendation of limiting standards for TDS in domestic water was discussed.
R 8

32,423
Locke, E.A. & Bryan, Judith F. PERFORMANCE GOALS AS DETERMINANTS OF LEVEL OF PERFORMANCE AND BOREDOM. J. appl. Psychol., April 1967, 51(2), 120-130.. (American Institutes for Research, Washington, D.C.).

Six experiments (2 pilot studies and 4 main experiments) are reported dealing with the relationship of performance goals to level of performance and degree of boredom or interest in the task. Tasks used included simple addition, perceptual speed, and psychomotor coordination. Trial times ranged from 2 min. to 2 hr. In the 2 pilot studies postexperimental goal descriptions were significantly related to performance level, and subjects indicated that trying for a specific goal or score was the major source of task interest. In the four main experiments a specific hard goal led to a higher level of performance and more task interest than a goal of "do your best." There was no consistent relationship between changes in boredom or interest and changes in performance within the experimental groups.
R 20

32,424
Tucker, M.F., Cline, V.B. & Schmitt, J.R. PREDICTION OF CREATIVITY AND OTHER PERFORMANCE MEASURES FROM BIOGRAPHICAL INFORMATION AMONG PHARMACEUTICAL SCIENTISTS. J. appl. Psychol., April 1967, 51(2), 131-138. (University of Utah, Salt Lake City, Utah).

A 160-item Biographical Inventory (BI) was administered to 157 pharmaceutical scientists who were randomly assigned to two groups of 79 and 78 subjects each. Each alternative from each item in the BI was correlated with nineteen criterion measures obtained on each of the scientists. These primarily involved ratings of creativity, quantity of work produced, skill with people, etc., obtained from supervisors, peers, and subordinates. There existed remarkably little relationship between supervisory ratings and peer ratings of the scientists on most variables. Using a double cross-validation design, BI predictor keys were developed for each of the criterion ratings and applied across to the new independent sample. Significant cross validities were obtained, notably in the prediction of the creativity criterion, where correlations of .36 and .42 resulted across the two subsamples.
R 10

32,425
Porter, L.W. & Mitchell, V.F. COMPARATIVE STUDY OF NEED SATISFACTIONS IN MILITARY AND BUSINESS HIERARCHIES. J. appl. Psychol., April 1967, 51(2), 139-144. (University of California, Berkeley, Calif.).

Seven hundred three commissioned officers and 594 noncommissioned personnel serving in an overseas Air Force Command completed a questionnaire measuring need fulfillment and satisfaction. Results for three levels of the commissioned officers were compared to previous results for analogous levels of civilian managers. The findings showed that the military officers were less fulfilled and less satisfied than their civilian counterparts. However, fulfillment and satisfaction increased in relation to military rank in the same way as for civilian managers. When commissioned officers were compared with noncommissioned officers, higher NCOs reported more fulfillment but less satisfaction than lower-ranking commissioned officers.
R 11

32,426
Johnston, W.A. & Rowrocki, L.H. EFFECT OF SIMULATED SOCIAL FEEDBACK ON INDIVIDUAL TRACKING PERFORMANCE. J. appl. Psychol., April 1967, 51(2), 145-151. (Ohio State University, Columbus, Ohio).

Individual tracking performance was examined under conditions of simulated social feedback. Each of 60 subjects was told he had a partner and that postrial feedback represented their team performance relative to average tracking ability. Actually, subject's feedback represented his individual performance relative to a lenient, moderate, or stringent criterion. These criteria simulated partners of varying ability. Subjects blamed their contrived partners for poor scores received under the stringent criterion. Performance of good trackers was not affected by criterion difficulty, but poor trackers performed best under the moderate criterion. The inhibitory influence of the stringent criterion was magnified during a terminal extinction session. The results suggest that criterion difficulty is an important determinant of performance in team and perhaps individual tasks.
R 10

32,427
West, L.J. VISION AND KINESTHESIS IN THE ACQUISITION OF TYPEWRITING SKILL. J. appl. Psychol., April 1967, 51(2), 161-166. (Teacher Education Div., City University of New York, New York, N.Y.).

Two hundred sixty-six subjects at typing skill levels from 9 through 108 words per minute typed from ordinary prose under visual and nonvisual conditions, under instructions to indicate when they sensed having made an error. Results confirmed the hypothesis of a swift rise in kinesthetic dependability from low levels among beginning typists but showed a plateau from intermediate through expert levels of skill; an r = .36 was found between kinesthetic dependability and skill level. Kinesthetic feedback was at significantly lower levels than all-senses feedback throughout the range of typing skill, while deprivation of vision had no effects on speed but resulted in large and significant increases in errors. These findings suggest the free use of vision in early stages of learning to typewrite, as contrasted with the conventional insistance on so-called "touch" operation at the start.
R 6

32,428
Rowe, Patricia M. ORDER EFFECTS IN ASSESSMENT DECISIONS. J. appl. Psychol., April 1967, 51(2), 170-173. (University of Waterloo, Waterloo, Ontario, Canada).

This study was concerned with the effects of order of presentation on judgments of people. Three groups of twenty-five subjects each judged descriptions of individuals containing varying proportions of favorable and unfavorable adjectives. Three orders of presentation were used: ascending (all unfavorable adjectives through to all favorable), descending, and random. More descriptions were accepted with the ascending order than with the descending order. Furthermore, order of presentation significantly affected individual differences in category width. The results were interpreted in terms of assimilation and contrast notions.
R 13

32,429
Droege, R.C. EFFECTS OF APTITUDE-SCORE ADJUSTMENTS BY AGE CURVES ON PREDICTION OF JOB PERFORMANCE. J. appl. Psychol., April 1967, 51(2), 181-186. (US Employment Service, Washington, D.C.).

This study was conducted by the United States Employment Service to determine the relative validity of unadjusted and age-adjusted General Aptitude Test Battery (GATB) scores for predicting occupational success. Eleven longitudinal occupational validation studies, conducted on samples varying in size from 56 to 124 cases, were selected for the analysis. For each sample the validities of unadjusted and age-adjusted aptitude scores for predicting occupational success were compared for the nine GATB aptitude measures. Differences between validities tended to be small.
R 5

32,430
Colquhoun, W.P. SONAR TARGET DETECTION AS A DECISION PROCESS. J. appl. Psychol., April 1967, 51(2), 187-190. (Applied Psychology Research Unit, MRC, Cambridge, England).

In a vigilance task which simulated sonar target detection, twelve subjects were required to report the occurrence of 200 msec pulses in a 900 cps tone, which was continuously modulated in amplitude by a low-bandwidth noise source. In three 45-min sessions subjects reported signals only when quite certain of their identification (Sure procedure); in a further three sessions they reported any signal-like sound (Unsure procedure). A substantially higher percentage of both "weak" and "strong" signals was detected with the Unsure procedure. False report rate was also higher with the Unsure procedure, but analysis showed that this reflected a change in decision criterion rather than in discrimination efficiency. Within-session decrement was slight, and unrelated either to signal strength or reporting procedure. The results support the contention that decision processes play a major role in determining performance at this kind of task.
R 10

32,431
Minrichs, J.R. & Mischkind, L.A. EMPIRICAL AND THEORETICAL LIMITATIONS OF THE TWO-FACTOR HYPOTHESIS OF JOB SATISFACTION. J. appl. Psychol., April 1967, 51(2), 191-200. (Data Processing Div., IBM Corporation, White Plains, N.Y. & Systems Manufacturing Div., IBM Corporation, San Jose, Calif.).

The salient reasons for current job satisfaction were compared for high- and low-satisfaction respondents (611 technicians) in the framework of Herzberg's 2-factor hypothesis. An alternate notion stated that "motivators" are the prime influencers of satisfaction while "hygiene" factors act to limit complete satisfaction for highs and complete dissatisfaction for lows. The data, while strictly supporting neither formulation, were more adequately co-ordinated with the alternate conception. The mounting body of contradictory results and the inability of the 2-factor theory to handle deviant cases calls for a fresh look at the satisfiers/dissatisfiers concept. A new construct is offered in terms of Rotter's Social Learning Theory.
R 16

32,432
Landis, D., Silver, C.A., Jones, J.M. & Hassick, S. LEVEL OF PROFICIENCY AND MULTIDIMENSIONAL VIEWPOINTS ABOUT PROBLEM SIMILARITY. J. appl. Psychol., June 1967, 51(3), 216-222. (Franklin Institute Research Laboratories, Philadelphia, Penn.).

The object of this research was to determine whether individual consistencies in judgments of problem similarity are related to the proficiency level of the judges. Fifty-one radar controllers of varying levels of experience and competency were asked to judge the degree of similarity among thirty air-traffic control stimuli using the method of successive intervals. These data were analyzed according to the "points-of-view" procedures developed by Tucker and Messick. Four dimensions of viewpoint were extracted representing four major sub-groups of subjects, each of which exhibited consistently different emphases in their judgment of stimulus similarity. Results indicated that: a) assignment to a viewpoint group was related to training and competency level, and b) subjects with greater proficiency tended to view the stimuli, not in terms of their physical characteristics, but rather in terms of the responses that would be required for air-traffic control.
R 9

32,433
Hunter, J.T. VOCATIONAL INTERESTS AND ACCIDENT PRONENESS. J. appl. Psychol., June 1967, 51(3), 233-235. (University of Washington, Seattle, Wash.).

The interrelationships of an index of accident proneness (AP) obtained from the Strong Vocational Interest Blank (SVIB) with accident rate, age, job tenure, and job hazard were investigated. A sample of sixty-two industrial employees including unskilled and professional workers was studied. The following results were obtained: a higher than average accident rate was significantly related to high job hazard (phi = +.31) and high AP scores (phi = +.28). A longer than average job tenure was significantly related to a low accident rate (phi = -.38) and current placement in less hazardous jobs (phi = -.27). Subjects having long tenure also had significantly lower AP scores (phi = -.29), and older subjects also tended to have lower AP scores.
R 6

32,434
Grant, D.L., Katkovsky, W. & Bray, D.W. CONTRIBUTIONS OF PROJECTIVE TECHNIQUES TO ASSESSMENT OF MANAGEMENT POTENTIAL. J. appl. Psychol., June 1967, 51(3), 226-232. (American Telephone & Telegraph Company, New York, N.Y.).

The contributions of projective techniques to assessment-center staff evaluations and the relationships of projective variables to progress in management are presented. The projective data were obtained by coding reports written by a clinical psychologist from three projective instruments. Analyses of the data show that the projective reports particularly influenced the assessment staff in rating such characteristics as work motivation, passivity, and dependency. In addition, several of the projective variables are reliably related to progress in management, especially those pertaining to leadership and achievement motivation. In brief, the findings clearly indicate that relevant information on managerial motivation was obtained from the projective reports.
R 9

32,435
Garrett, G.V., Svetlik, B. & Prien, E.P. VALIDITY OF THE JOB-CONCEPT INTERVIEW IN AN INDUSTRIAL SETTING. J. appl. Psychol., June 1967, 51(3), 233-235. (Goodyear Aerospace Corporation, Akron, Ohio).

Interviews by psychologists were used to predict employee attitudes and job performance. Correlations were computed between the psychologist's predictions and employee ratings of their job attitudes and supervisor ratings of employee job performance. The psychologists were most accurate in predicting employee attitudes toward advancement and general morale. They were least accurate in predicting employee attitudes toward supervision and rewards. The psychologists were unable to predict employee performance as rated by the supervisors.
R 5

32,436
Chen, M.K., Podshadley, D.W. & Throck, J.G. A FACTORIAL STUDY OF SOME PSYCHOLOGICAL, VOCATIONAL INTEREST, AND MENTAL ABILITY VARIABLES AS PREDICTORS OF SUCCESS IN DENTAL SCHOOL. J. appl. Psychol., June 1967, 51(3), 236-241. (US Public Health Service, Dental Health Div., San Francisco, Calif.).

A total of thirty-two mental ability, past-achievement, manual skill, personality, and vocational interest variables believed to be potentially useful in the selection of dental students were factor analyzed to determine their factor pattern in relation to the criterion variable, the dental grade-point average (GPA). Then those variables which shared common factors with the criterion variable were used as independent variables in a multiple-regression equation for predictive purposes. For the seventy-two dental juniors studied, it was found that there were two common factors between the "predictor" variables and the dental GPA. One factor, decided to be academic aptitude, was significantly loaded in four "predictor" variables besides the dental GPA. The other factor, related to manual skill, was significantly loaded in three subtests of a manual skill test and the dental GPA. All but one of the seven "predictor" variables were used in the predictive equation, one variable being dropped because of its low, though statistically significant, factor loading. Of all the variables, the predental GPA was found to be the most important predictor of success in dental school.
R 13

32,437
Hunt, R.A. SELF AND OTHER SEMANTIC CONCEPTS IN RELATION TO CHOICE OF A VOCATION. J. appl. Psychol., June 1967, 51(3), 242-246. (Texas Christian University, Fort Worth, Tex.).

Criterion groups (engineers, managers, ministers, teachers) composed of 258 professional men judged sixteen self-, other, and vocational concepts on twenty-five semantic differential scales. Concept interrelationships were measured with a modified, normalized D score. A multiple-discriminant analysis produced three significant functions (each $p < .001$) between the criterion groups. In a cross-validation group of male undergraduates, semantic differential profiles correctly classified seventy of 139 subjects according to Kuder Occupational Interest Inventory (OII) scores and eighty-three of 125 of these subjects according to first choice of vocation. Complex, real-life decisions can be predicted from individual patterns of self- and other concepts. Results support assumption about the self-concept in the theories of Rogers and Super.
R 9

32,438
Bole, A.A. & Bergen, J.M. FACTORS IN COLLEGE ATTENDANCE. J. appl. Psychol., June 1967, 51(3), 247-253. (University of Hawaii, Honolulu, Hawaii).

Purpose of this research was to identify factors, obtained from a self-report inventory, determining the decision to attend college. Two hundred fourteen male and 306 female academics from the state university completed a 76-item inventory, Reasons for Going to College, as freshmen and again as seniors. Analyses and matching procedures yielded 13 major factors: Social Reason, Conformity, Curiosity, Vocational Reason, Academic Value, Material Value, Altruistic Value, School Influence, Experience, Avocational Influence, Science Interest, Humanities Interest, and Verbal Interest. Additional factor analyses of a dismissed college group and 3 diverse public-school samples suggested that these major factors had considerable generality. Implications for educational decision making and for further research were considered.
R 19

32,439
Bryan, Judith F. & Locke, E.A. GOAL SETTING AS A MEANS OF INCREASING MOTIVATION. J. appl. Psychol., June 1967, 51(3), 274-277. (American Institutes for Research, Washington, D.C.).

On the basis of differences in performance in relation to maximal ability and differences in attitude ratings on an addition task, a low-motivation and a high-motivation group were selected for 2 retests on the same task. The low-motivation group was given specific goals to reach, and the high-motivation group was told to do their best on each trial of each retest. By the end of the second retest, the group given specific goals had "caught" the Do-Best group both in terms of performance and in terms of favorable attitudes toward the task. The results suggested that specific goals can be used to motivate subjects who bring a low degree of motivation to the task situation.
R 10

32,440
Blood, M.R. & Hulin, C.L. ALIENATION, ENVIRONMENTAL CHARACTERISTICS, AND WORKER RESPONSES. J. appl. Psychol., June 1967, 51(3), 284-290. (University of Illinois, Urbana, Ill.).

Data gathered from 1,900 male workers located in 21 plants in the eastern United States are presented. These data are analyzed to determine the influence of environmental characteristics presumed to index feelings of alienation from middle-class norms. Predictions were made that workers in communities which should foster integration with middle-class norms would structure their jobs differently and would respond differently than alienated workers. Workers in communities fostering integration with middle-class norms should report higher satisfaction on highly skilled jobs. They should value retirement and should plan for it while working. Alienated workers should report lower satisfaction on highly skilled jobs. Pay should have a stronger effect on the satisfaction of alienated workers, and these workers would be more likely to look for other work after retirement. The predictions were regarded as confirmed for blue-collar workers. The implications of these findings for striving need-theoretic models of human motivation are discussed.
R 23

32,441
Simon, J.R. & Rudell, A.P. AUDITORY S-R COMPATIBILITY: THE EFFECT OF AN IRRELEVANT CUE ON INFORMATION PROCESSING. J. appl. Psychol., 51(3), 300-304. (University of Iowa, Iowa City, Iowa).

Two experiments demonstrated the existence of a strong population stereotype which affected the processing of verbal commands. In a choice RT task, subjects pressed the right- or left-hand key in response to the words "right" or "left" which were presented to the right or left ear. RT was significantly faster when the content of the command corresponded to the ear stimulated than when it did not; i.e., information processing was affected by a cue irrelevant to the task itself, the ear in which the command was heard. Removing subject's uncertainty regarding the ear to be stimulated resulted in significantly faster RT, and reduced but did not eliminate the effect of the irrelevant directional cue.
R 19

32,442
Rigney, J.W. & DeBow, C.H. MULTIDIMENSIONAL SCALING ANALYSIS OF DECISION STRATEGIES IN THREAT EVALUATION. J. appl. Psychol., Aug. 1967, 51(4)Part 1, 305-310. (University of Southern California, Los Angeles, Calif.).

Similarities analysis was used to identify the combinatorial strategy used by naval officers in evaluating the relative threat of paired air-raids presented on an air summary plot. Sixty-three Combat Information Center (CIC) watch officers judged the similarity, in terms of threat value, of all different pairs of 20 air raids, varying in range, course, bearing, composition, altitude, and speed. The threat value of each raid subsequently was estimated, using a 9-point scale. It was found that the judgments of threat value were based primarily on range and course of the raids.
R 13

32,443
Chaney, F.B. & Teel, K.S. IMPROVING INSPECTOR PERFORMANCE THROUGH TRAINING AND VISUAL AIDS. J. appl. Psychol., Aug. 1967, 51(4)Part 1, 311-315. (Autonetics Div., North American Aviation, Inc., Anaheim, Calif.).

An experimental study was performed to evaluate, singly and in combination, the effectiveness of a 4-hr. training program and a set of visual aids designed to improve the performance of 27 experienced machined-parts inspectors. The criterion used was the percentage of true defects detected in a selected sample of machined parts. Findings indicated that a) use of training alone resulted in a 32% increase in defects detected, b) use of visual aids alone resulted in a 42% increase, and c) use of both resulted in a 71% increase, while d) performance of the control group did not change.
R 2

32,444
Bergum, B.O. & Lehr, D.J. AFFECT LEVEL, CAPILLARY PULSE PRESSURE, AND RESPONSE LATENCY. J. appl. Psychol., Aug. 1967, 51(4)Part 1, 316-319. (Fundamental Research Lab., Xerox Corporation, Rochester, N.Y.).

An experiment was conducted in which the effects of the interest value of stimuli on pulse rate, capillary pulse pressure, and overt evaluation response latencies were examined. A group of 12 subjects evaluated 20 4-letter words in terms of an interesting-dull dimension under both visual and auditory presentation conditions while the 3 measures of interest were simultaneously and continuously recorded. The results indicated no relationship between pulse rate and interest level, but significant functional relationships between both capillary pulse pressure and overt response latencies and levels of interest. These results substantiated the findings for the latter 2 measures demonstrated in an earlier study which employed pictorial stimuli and a pleasant-unpleasant overt response dimension. The relationships were demonstrated to be unaffected by presentation conditions, and it was concluded that capillary pulse pressure and overt response latencies may discriminate among general affect levels over a broad range of conditions.
R 3

32,445
Paine, F.T., Deutsch, D.R. & Smith, R.A. RELATIONSHIP BETWEEN FAMILY BACKGROUNDS AND WORK VALUES. J. appl. Psychol., Aug. 1967, 51(4)Part 1, 320-323. (Business Administration Dept., University of Maryland, College Park, Md.).

Previous evidence has indicated that work values play an important role in vocational choice and job satisfaction and begin to stabilize in adolescence. This questionnaire study further investigated the relationship between family-background characteristics and expected work values for college undergraduates. Different, distinct, family-background patterns, e.g., including family income, number of times moved, emphasis on discipline, emphasis on material things, closeness of family, etc., existed for those youths who stress humanitarian service (helping others); those who stress security and pleasant associations and working conditions; those who emphasize prestige, responsibility, and independence; those who stress creativity; and those who emphasize monetary benefits.
R 12

32,446
Locke, E.A. MOTIVATIONAL EFFECTS OF KNOWLEDGE OF RESULTS: KNOWLEDGE OR GOAL SETTING? J. appl. Psychol., Aug. 1967, 51(4)Part 1, 324-329. (American Institutes for Research, Washington, D.C.).

Research on knowledge of results (KR) has generally not controlled for motivational effects resulting from differential goal setting. The present experiment was carried out to separate the effects of KR and goal setting using a 2 x 2 fixed-model design; the variables were KR versus no KR; and specific hard goals versus "do-best" goals. The goals (manipulated by instructions) were representative of the goals typically assigned (explicitly or implicitly) to KR and No KR subjects in previous studies, respectively. No difference was found between KR and No KR groups, but a significant goal effect was found in favor of subjects given specific hard goals. The results indicated that effects previously attributed to differential KR were actually due to different levels of motivation produced by the different goals.
R 30

32,447
Shipley, T., Jones, R.W. & Fry, A. DYNAMIC CENTRAL SCOTOMETRY. J. appl. Psychol., Aug. 1967, 51(4)Part 1, 340-345. (Ophthalmology Dept., University of Miami, Coral Gables, Fla.).

Using radioactivated light sources and 2 levels of preadaptation, with 7 subjects, the size of the central scotoma is measured as a function of time in the dark. The recovery time to initial sighting is shown to be a function of the level of preadaptation, but the subsequent rate of scotoma collapse is not. Thus this rate of decrease in size is a reliable psychophysical index of vision in normal observers. The possible applicability of this measure to questions of vision screening is noted.
R 15

32,448
Goldstein, I.L., Southard, J.F. & Schum, D.A. FEEDBACK IN A COMPLEX MULTIMAN-MACHINE SYSTEM. J. appl. Psychol., Aug. 1967, 51(4)Part 1, 346-351. (Ohio State University, Columbus, Ohio).

Human decision makers provided hypotheses and made diagnoses, in the form of conditional probability judgments, to account for the occurrence of certain critical events in a simulated hostile environment. The decision makers' probabilistic estimates were compared with similar estimates provided by a Bayesian model for several levels of percentage of knowledge of results (KR; 0%, 33%, 67%, and 100%) and 2 levels of specificity of KR (access or no access to model estimates). The data indicated that there were no significant differences in the probabilistic estimates provided for 33%, 67%, and 100% KR but that all 3 were superior to 0% KR. The human decision makers with access to Bayesian model estimates as feedback were not able to improve their judgments significantly even though the model-generated solutions were significantly superior to human estimates at all KR levels above 0%.
R 14

32,449
Brown, W., Avant, L.L. & Lankford, H.G. INFLUENCE OF INTERPOLATED PERIODS OF ACTIVITY AND INACTIVITY UPON THE VIGILANCE DECREMENT. J. appl. Psychol., Aug. 1967, 51(4)Part 1, 352-356. (Kansas State University, Manhattan, Kan.).

Four independent groups were observed in a simple visual detection task. The control group, which monitored the display continuously for 90 min., suffered a reliable decrement in performance during the course of observation. One experimental group engaged in vigorous physical exercise for 5 min. after each 30 min. of watch-keeping, the second group solved anagrams for 5-min. periods, and the third was subjected to 5-min. periods of sensory restriction. All of the experimental groups performed the vigilance task at a high level--with no decrement--throughout. The implications of these results for the significance of successive change in input are discussed.
R 32

32,450
Healy, S.M. & Goodale, J.G. WORKER PREFERENCES AMONG TIME-OFF BENEFITS AND PAY. J. appl. Psychol., Aug. 1967, 51(4)Part 1, 357-361. (University of Illinois, Urbana, Ill.).

One hundred ninety-seven industrial workers expressed their preferences among six proposals for additional paid time off the job. Preference for a comparable pay raise was also measured. Extra vacation was most preferred while a proposal to shorten the workday was least preferred. The pay raise was fifth in preference. Differences in preference were related to [illegible], age, marital status, and job satisfaction. Foremen were able to predict overall worker preferences with high accuracy.
R 11

32,451
Smith, W.A., Jr. ACCURACY OF MANUAL ENTRIES IN DATA-COLLECTION DEVICES. J. appl. Psychol., Aug. 1967, 51(4)Part 1, 362-368. (Computing Lab., Lehigh University, Bethlehem, Penn.).

This experiment examined the accuracy of manually recorded messages similar to those encountered in field studies on the accuracy of data collection in production information systems. The high efficiency in correcting errors detected at the time a message was recorded and the relative contributions of format and content mistakes to residual error found in field studies were sufficiently universal that they were reproduced and confirmed under laboratory conditions. Under controlled conditions, manual messages which were 3-, 6-, and 10-digits long contributed significantly different quantities of both total and residual errors. Imposition of a time restraint did not affect the total quantity of mistakes, but it did contribute to significant differences in residual errors, affecting both the ability to detect and correct mistakes at point of entry. About half of all the mistakes in observed manual messages under field and laboratory conditions were caused by single-digit substitution. Omission of a digit accounted for another 20%. Transposition mistakes were more frequently encountered in the laboratory experiment than in field studies but they were a less important contributor to inaccurate data recording.
R 7

32,452
Lawler, E.E., III. THE MULTITRAIT-MULTIRATER APPROACH TO MEASURING MANAGERIAL JOB PERFORMANCE. J. appl. Psychol., Oct. 1967, 51(5)Part 1, 369-381. (Administrative Sciences Dept., Yale University, New Haven, Conn.).

The advantages of using the multitrait-multirater approach to measuring managerial job performance are considered. It is pointed out that, with this approach, it is possible to determine the convergent and discriminant validity of ratings, and because of this considerably more information can be obtained about the meaning of the ratings than could be obtained if a single-rater or single-trait approach were used. Multitrait-multirater data gathered from a sample of managers are analyzed and the convergent and discriminant validity of the ratings is determined. Encouraging levels of convergent and discriminant validity are obtained indicating that ratings potentially can be valid measures of managerial job performance. In addition, several off-quadrant analyses are performed that indicate looking at the disagreement among raters can lead to further understanding of the rating process. It is concluded that this approach has advantages for establishing criteria where they are needed, either for research purposes or for personnel decision-making purposes.
R 50

32,453
Scott, R.D. & Johnson, R.W. USE OF THE WEIGHTED APPLICATION BLANK IN SELECTING UNSKILLED EMPLOYEES. J. appl. Psychol., Oct. 1967, 51(5)Part 1, 393-395. (University of Massachusetts, Amherst, Mass.).

The effectiveness of the weighted application blank (WAB) in differentiating between long-term and short-term unskilled employees was evaluated. The WAB scores correlated .45 with job tenure for subjects in the holdout group (N=50). When compared with a multiple-regression equation (r=.31 between predicted tenure and actual tenure), the WAB technique fared well. Factor analysis of the predictor variables yielded 2 factors, "convenience" and "family responsibility," which accounted for most of the explained variance in the criterion. Females who lived close to the plant and workers with a fair amount of family responsibility (e.g., married, older, several dependents, live in own home) were more likely to become long-term employees.
R 4

32,454
Mulin, C.L. & Smith, Patricia A. AN EMPIRICAL INVESTIGATION OF TWO IMPLICATIONS OF THE TWO-FACTOR THEORY OF JOB SATISFACTION. J. appl. Psychol., Oct. 1967, 51(5)Part 1, 396-402. (University of Illinois, Urbana, Ill.).

Two implications of the 2-factor theory of job satisfaction are derived and tested empirically using data from 670 office employees, supervisors, and executives employed by the same company. The results indicate that the predictions of the 2-factor theory were provided no support whatsoever. The traditional model of job satisfaction, which holds that any variable in the job situation can be both a satisfier and a dissatisfier and that if the presence of a variable tends to make a job desirable then the absence of the same variable makes a job undesirable, was supported.
R 12

32,455
Lawler, E.E., III & O'Gara, P.W. EFFECTS OF INEQUITY PRODUCED BY UNDERPAYMENT ON WORK OUTPUT, WORK QUALITY, AND ATTITUDES TOWARD THE WORK. J. appl. Psychol., Oct. 1967, 51(5)Part 1, 403-410. (Administrative Sciences Dept., Yale University, New Haven, Conn.).

This study provides a further test of Adams' theory of equity. Subjects on a piece-rate plan were paid with an equitable wage ($.25) or an unfairly low wage ($.10) for doing an interviewing job. As predicted, the results showed that the underpaid subjects produced more interviews than the equitably paid subjects, but the interviews were of lower quality. The underpaid subjects tended to see the job as more interesting than did the equitably paid subjects, but they saw it as less important and challenging. Each subject was given the California Personality Inventory (CPI), and the relationships among the CPI scale scores and subjects' job attitudes and job performance were considered. The results of the study generally supported equity theory but suggested that further elaboration is needed if it is to predict what inequity-reduction methods will be chosen by a given individual.
R 14

32,456
Smith, R.L., Lucaccini, L.F. & Epstein, M.H. EFFECTS OF MONETARY REWARDS AND PUNISHMENTS ON VIGILANCE PERFORMANCE. J. appl. Psychol., Oct. 1967, 51(5)Part 1, 411-416. (University of California, Los Angeles, Calif.).

In a complex visual vigilance task lasting one hour, subjects in 5 experimental groups were rewarded for correct detections and punished either for missed targets or for false alarms. Subjects in a control group performed the task without possibility of reward or punishment. Three levels of monetary incentive were used as rewards. The major results of the study indicated that a) some combinations of reward and punishment facilitated detection performance while others did not; and b) subjects punished for missed targets performed better than subjects punished for false alarms. Implications for vigilance research and theory are discussed.
R 19

32,457
Poulton, E.C. SEARCHING FOR NEWSPAPER HEADLINES PRINTED IN CAPITALS OR LOWER-CASE LETTERS. J. appl. Psychol., Oct. 1967, 51(5)Part 1, 417-425. (Applied Psychology Research Unit, MRC, Cambridge, England).

Altogether 264 adults searched for headlines which were printed 3 times in various members of the Times group of typefaces. There were 2 newssheets, and a 2 x 2 factorial design was used to compare pairs of alternative printings. Headlines printed in Titling or Extended Titling capitals with heights of about 4.5, 4.0, 3.0, and 2.5 mm. according to their importance, took reliably ($p<.01$) longer to locate than when printed in bold lower-case letters whose x-heights approximately matched the heights of the capital letters. Subsidiary headlines printed in smaller letters above or below the main headlines distracted attention from the main headlines ($p<.05$). When most of the main headlines were printed in lower-case letters, the subsidiary headlines were more likely to attract attention when they were printed in capitals than when printed in lower-case letters of the same point size ($p<.05$).
R 5

32,458
Deep, S.D., Bass, B.M. & Vaughan, J.A. SOME EFFECTS ON BUSINESS GAMING OF PREVIOUS QUASI-T GROUP AFFILIATIONS. J. appl. Psychol., Oct. 1967, 51(5)Part 1, 426-431. (Management Research Center, University of Pittsburgh Graduate School of Business, Pittsburgh, Penn.).

Ninety-three graduate business students at the University of Pittsburgh were assigned to 9 "companies" to play the Carnegie Tech Management Game. The game was the major portion of a 15-week course in integrated decision-making. Men were assigned to "companies" according to whether they had been in the same or different quasi-training (T) groups 15 weeks earlier. "Companies" composed of 2 and 3 subdivided quasi-T groups performed significantly more effectively in the game than "companies" made up of wholly intact quasi-T groups. The latter reported less internal conflict but appeared to be less effective as companies because of overconfidence in each other's dependability.

32,459
Miller, J.W. & Rowe, Patricia M. INFLUENCE OF FAVORABLE AND UNFAVORABLE INFORMATION UPON ASSESSMENT DECISIONS. J. appl. Psychol., Oct. 1967, 51(5)Part 1, 432-435. (University of Waterloo, Waterloo, Ontario, Canada).

The differential influence of favorable and unfavorable information on assessment decisions was examined. Five sets of 100 hypothetical stimulus persons were constructed. Thirty-two subjects made assessment decisions to descriptions containing 3 favorable adjectives and 1 unfavorable adjective (3F-1U), 53 subjects to descriptions of the type 3F-2U and 3F-3U, 30 subjects to descriptions of the type 2F-3U, and 30 subjects to descriptions of the type 1F-3U. The results demonstrated that in 4 of the 5 conditions (3F-2U, 3F-3U, 2F-3U, 1F-3U) the unfavorable adjectives were more influential upon the assessment than were the favorable adjectives. The significance of the results for assessment decisions in the employment interview was discussed.
R 7

32,460
Landy, F.J. & Gilbert, A.J. SCALING ASSUMPTIONS UNDERLYING WEIGHTING IN JOB-CLASSIFICATION SYSTEMS. J. appl. Psychol., Oct. 1967, 51(5)Part 1, 442-443. (Bowling Green State University, Bowling Green, Ohio & Persons College, Fairfield, Iowa).

The present study applied Thurstone's Law of Comparative Judgment to a job classification of hourly employees in a food-processing plant. Supervisors rated 11 job elements on importance for overall production using a paired-comparison format. The 11 elements were scaled using 3 different methods: Case V solution, Case III solution, and the Composite-Standard method. Reversals in element positions were found as a function of the scaling method used. The Composite-Standard method appeared to be the least appropriate of the 3 while the Case III solution seemed most applicable, taking the inequality of element dispersions into account. A classification inequity might have resulted had the Case V or Composite-Standard values been used as element weights.
R 3

32,461
Conrad, R. & Hull, A.J. COPYING ALPHA AND NUMERIC CODES BY HAND: AN EXPERIMENTAL STUDY. J. appl. Psychol., Oct. 1967, 51(5)Part 1, 444-448. (Applied Psychology Research Unit, MRC, Cambridge, England).

Different groups of housewives copied alphabetic and numeric codes by hand under 5 different conditions of copying. Factors substantially affecting speed or accuracy of copying or both are: code length, distance between original code and copied code, whether the code was alphabetic or numeric, and, for 12-digit codes, grouping of digits. Detailed analysis of copying errors points to a marked short-term memory component, and this conclusion is supported by the similarity between the present results and those reported from conventional short-term memory studies.
R 13

32,462
Haire, M., Ghiselli, E.E. & Gordon, M.E. A PSYCHOLOGICAL STUDY OF PAY. J. appl. Psychol. Monogr., Aug. 1967, 51(4)Part 2, 1-24. (University of California, Berkeley, Calif.).

A study in three sections of empirical data on managerial compensation for three groups of managers (N = about 90 for each group): a) a description of the distributional characteristics of pay over time (about 25 yr.); b) the correlation of pay with pay over time and presents statistical analyses to explain the observed relationships; c) a statistical model of pay capitalizing on the cumulative character of pay (pay at Year n is composed of pay at Year 1 + raises at Years 2, 3,...n) and the formulas for the distributional and correlational character of composites. The potential psychological leverage of hitherto neglected considered variables stands out--for instance, without increasing the total salary bill, management of the variance of pay over a group in a given year and of the correlation of pay and raises from year to year allows one to deal with the level of aspiration of the individual and his relative standing in the group. The managerial implications of the statistical behavior of pay are discussed in detail.
R 12

32,463
Garn, S.M. & Helmrich, R.H. NEXT STEP IN AUTOMATED ANTHROPOMETRY. Amer. J. phys. Anthrop., Jan. 1967, 26(1), 97-99. (Fels Research Institute, Yellow Springs, Ohio).

The adaptation of print-out measuring devices, a table for recording brief dimensions, to the measurement of x-ray photographs is described.
R 1

32,464
Garn, S.M., Helmrich, R.H., Flaherty, Kathleen M. & Silverman, F.N. SKIN DOSAGES IN RADIATION SPARING TECHNIQUES FOR THE LABORATORY AND FIELD. Amer. J. phys. Anthrop., Jan. 1967, 26(1), 101-105. (Fels Research Institute, Yellow Springs, Ohio).

Skin dosages of penetrating radiation from representative extremity, chest and soft tissue techniques suitable for field investigation with portable radiographic equipment ranged from two to seventeen milliroentgens for screen techniques and eight to forty-three milliroentgens for non-screen techniques. This may be contrasted with the 100-300 milliroentgens yearly natural background total body radiation at sea level and 6000 feet respectively.
R 13

32,465
Garn, S.M., Rohmann, Christabel G., Wagner, Betty & Ascoli, W. CONTINUING BONE GROWTH THROUGHOUT LIFE: A GENERAL PHENOMENON. Amer. J. phys. Anthrop., May 1967, 26(3), 313-317. (Fels Research Institute, Yellow Springs, Ohio).

Cross-sectional data on 2799 subjects from five different populations and longitudinal data on 113 older adults indicate continuing adult bone growth in the second metacarpal. Similar six-decade increases in the size of the cranium confirm continuing bone growth as a general phenomenon not necessarily related to weight-bearing or flexion stress and representing an increase of approximately 10% in skeletal volume concomitant with the major age-associated decrease in skeletal mass.
R 15

32,466
Baker, P.T. CURRENT STATUS OF U.S. PARTICIPATION IN THE INTERNATIONAL BIOLOGICAL PROGRAMME. Amer. J. phys. Anthrop., May 1967, 26(3), 361-365. (Pennsylvania State University, University Park, Penn.).

This program has now progressed to a broad international cooperative venture with over forty countries involved in different aspects. Many already have extensive research programs under way. United States participation is also reaching an advanced planning stage with U.S. program broadly outlined. While there are many aspects to this program the one entitled Program of the Human Adaptability Subcommittee of the U.S. National Committee for the International Biological Program is of primary interest to physical anthropologists. The statement which follows is the most recent and probably final statement of the U.S. Program in Human Adaptability. "The evolutionary success of the human species is based on genetic, morphologic, physiologic, and behavioral variation. The processes and mechanisms of human adaptability are the special concern of this subcommittee. The term 'adaptability' is here used in several senses, including the adaptability of populations and individuals and genetic and phenotypic adaptability. Human adaptability has multiple bases, with consequences for human survival. However, neither the distribution nor the sources of man's variability have been rigorously measured. The International Biological Program presents a unique opportunity for determining the relative importance of these aspects of variability, and of establishing underlying mechanisms on the basis of closely comparable studies of different groups--groups having contrasting genetic, social, nutritional, and climatic backgrounds." The following subjects are described: The Dynamics of Human Populations, Population Genetics, Adaptation to Stress, Morphology, Growth and Aging, Program Planning Regional Planning Centers Conferences, Methodology, Research Design, Training, Endorsement of the Human Adaptability Subcommittee, and Program Progress.

32,467
Laubach, L.L. & McConville, J.T. NOTES ON ANTHROPOMETRIC TECHNIQUE: ANTHROPOMETRIC MEASUREMENTS--RIGHT AND LEFT SIDES. Amer. J. phys. Anthrop., May 1967, 26(3), 367-369. (Anthropometric Research Project, Antioch College, Yellow Springs, Ohio).

In order to discover whether statistically significant differences exist between measurements taken on the right and left sides of the body, twenty-one such anthropometric dimensions were compared. In eight cases significant differences were found. Six of these dealt with the forelimb, in which the dimension measured on the right side was greater. Since data on handedness is lacking, we do not know whether this is related to the handedness of the subjects.
R 7

32,468
Heath, Barbara H. & Carter, J.E.L. A MODIFIED SOMATOTYPE METHOD. Amer. J. phys. Anthrop., July 1967, 27(1), 57-74. (San Diego State College, San Diego, Calif.).

A new and improved somatotype method with universal application to both sexes, for all ages and which is reproducible, is justified, validated and described. Evidence is presented for extension of previous component rating scales. Data on 844 male and female subjects from selected samples were used to develop and validate anthropometric scales for estimating the Heath component ratings. The definitions and rating procedures for the new somatotype method are presented, with descriptions of the anthropometric somatotype and the combined photoscopic and anthropometric somatotype.
R 33

32,469
American Journal of Physical Anthropology. PROCEEDINGS OF THE THIRTY-SIXTH ANNUAL MEETING OF THE AMERICAN ASSOCIATION OF PHYSICAL ANTHROPOLOGISTS. Amer. J. phys. Anthrop., Sept. 1967, 27(2), 231-249.

Abstracts of fifty-seven papers of the meeting held on April 26-29, 1967 at Chapel Hill, North Carolina are given, along with a brief business report.

32,470
Guttman, Ruth, Guttman, L. & Rosenzweig, K.A. CROSS-ETHNIC VARIATION IN DENTAL, SENSORY AND PERCEPTUAL TRAITS: A NONMETRIC MULTIBIVARIATE DERIVATION OF DISTANCES FOR ETHNIC GROUPS AND TRAITS. Amer. J. phys. Anthrop., Nov. 1967, 27(3), 259-276. (Israel Institute of Applied Social Research, Jerusalem, Israel).

The central concern of this paper is to illustrate how four apparently unrelated classes of variables--dental, perceptual, ethnic origin, and other--can be comprehended within a single parsimonious space, even though some of the measures were qualitative, others quantitative. Thirty-five hundred Israeli villagers of varied ethnic origin were examined on several aspects of oral epidemiology, a battery of tests relating to estimation of number, and miscellaneous traits, including eye colour, tasting PTC, tongue rolling, etc. Significant differences between the six Jewish groups--Yemen, Cochin, Kurdistan, Libya, Berber, and Djerba--were found in the scores of most variables. By the use of the Smallest Space Analysis, distances were established between the different ethnic groups which took into account the complex interrelations in each of 3,500 individual subjects of all 43 categories of 16 variables. A three-dimensional model of the interrelations between the ethnic groups and the trait categories was constructed from the 45 sets of coordinates which resulted from the iterative computer procedure. The ethnic group pairs at greatest distance from each other were found to be Kurdistani Cochin, then Kurdistani Djerba, followed by Djerbai Yemen. It is suggested that multivariate analyses of the type presented here, and including interrelations between genetic markers, anthropometric and behavioral variables, would deepen our understanding of the present structure and possible backgrounds of populations of divers origins.
R 28

32,471
Acton, W.I. A REVIEW OF HEARING DAMAGE RISK CRITERIA. Ann. occup. Hygiene, April, 1967, 10(2), 143-153. (Sound & Vibration Research Institute, The University, Southampton, Hampton, Hampshire, England).

At least thirty-five authors have proposed Damage Risk Criteria and these have been reviewed by the present author who considers that 90dB(A), being a single-measurement limit, is the simplest and most practical criterion for everyday applications. For noise control purposes or for the estimation of the effects of short or intermittent exposure, the International Standardization Organization (I.S.O.)noise rating curves should be consulted, the curve corresponding to noise rating number 85 being taken as equivalent to the Damage Risk Criterion. It seems logical to conclude that if the duration of exposure to noise is reduced, then the resulting hearing loss will also be reduced. However, a simple time-intensity relationship does not apply and maximum permissible exposure durations are recommended by Glorig et al. (Archs.Otolaryngol, 1961, 74, 413.). Where the exposure is intermittent, noise rating number, exposure time and recovery time between exposure cycles must also be taken into account. Research is at present in progress on the effects of impulsive noise and it is hoped that a Damage Risk Criterion for this type of noise will soon be formulated.
R 48

32,472
Kay, K. OBSERVATIONS ON THE OCCURRENCE OF ILL-EFFECTS FROM EXPOSURE TO INDUSTRIAL CHEMICALS. Ann. occup. Hygiene, July 1967, 10(3), 189-202. (Occupational Health Div., Department of National Health & Welfare, Ottawa, Ontario, Canada).

Extensive toxicological research is now done on the many new chemicals coming into use in industrial and agricultural operations, but very little is known about the geography and types of ill-effects occurring in industry from exposure to such chemicals. This subject has been examined in the present study by analysing the distribution of occupational ill-effects due to chemicals as reported by Workmen's Compensation agencies in Ontario and California. The study covered a worker population of over six million yearly from 1958 to 1963. On a 5-year average basis, injuries of the inhalation, absorption and ingestion type occurred in the same proportion in the two areas and ran just over 3% of injuries of all types. There was close agreement between Ontario and California on the proportion of injuries caused by dusts--3.6% and 3.1% of all fatal and non-fatal cases; 29.5% and 30% of all fatal cases. Government--State level in California, Provincial and Federal in Ontario--was the most hazardous industry branch in terms of the proportion of inhalation, absorption and ingestion cases to all in the particular branch, the proportion being twice that for all industry. Other features of the experience were examined.
R 16

32,473
Ebbrooke, Clare M. & Edwards, Carolyn. INDUSTRIAL RADIATION CATARACT: THE HAZARDS AND THE PROTECTIVE MEASURES. Ann. occup. Hygiene, Oct. 1967, 10(4), 293-304. (Northampton College of Advanced Technology, London, England).

This article gives a brief resume of some recent investigations into the selective absorption and transmission of the ocular media. (HEIAS)
R 32

32,474
Tanner, P.L. RECENT NOISE MEASUREMENT TECHNIQUES. Ann. occup. Hygiene, Oct. 1967, 10(4), 375-380. (Sound & Vibration Research Institute, University of Southampton, Southampton, Hampshire, England).

This paper is concerned with some aspects of noise measurement that are not generally found in textbooks and apparatus handbooks on this subject. The measurement techniques of loudness and noisiness of continuous sounds require relatively simple equipment so enabling on-site measurement to be made, but the identification or reduction of noise sources requires more expensive equipment which lacks portability, and requires long analysis time to obtain meaningful results. In the latter case, the noise signal is frequently recorded on magnetic tape for subsequent analysis at a central laboratory containing most of the expensive apparatus. It is during the recording, reproduction and interpretation of the noise signal that special techniques are required, otherwise various measurement errors result and may go undetected. This paper highlights the more important techniques of tape recording and surveys the present state of progress in noise measuring instruments.
R 3

32,475
Coles, R.R.A. & Rice, C.G. HAZARDS FROM IMPULSE NOISE. Ann. occup. Hygiene, Oct. 196., 10(4), 381-388. (Sound & Vibration Research Institute, University of Southampton, Southampton, Hampshire, England).

Methods of measurement and auditory evaluation of impulse noise waveforms in terms of peak pressure level, rise time, principal pressure wave duration (A-duration) and pressure wave envelope duration (B-duration) are described. Using the National Academy of Science's Committee on Hearing, Bioacoustics and Biomechanics (CHABA) limits of auditory damage applied to 75% of persons exposed, a specification in terms of the noise's physical characteristics has been derived for exposures to around 100 high-intensity impulses per occasion for about 10 occasions per year; various allowances are applied for other exposure conditions. Three representative types of industrial impact noises are discussed and suggestions made for their auditory evaluation. With occasional discrete impulses, the new damage risk criteria (D.R.C.) can be applied: with impulses closely following each other, when a continuous high-intensity noise with superimposed impulsive components results, conventional sound level meters and straightforward D.R.C. can probably be used. With repetitive discrete impulses, a type of noise lying between the two considered above, much more research is required in order to evaluate the hazard quantitatively.
R 10

32,476
Atherley, G.R.C. & Noble, W.G. RECENT DEVELOPMENTS IN AUDIOMETRY. Ann. occup. Hygiene, Oct. 1967, 10(4), 389-399. (Occupational Health Dept., University of Manchester, Manchester, England).

Subject selection is an important factor in surveys of hearing and its influence is demonstrated. The self-recording audiometer appears to be a little more sensitive than the manual instrument but no more reliable and trace reading needs to be standardised. Audiometer calibration standards should not also serve as "normal" hearing levels. A presbyacusis standard for urban non self-selected males and a new technique for the assessment of "hearing loss" are proposed. The long term recoverability of acoustic trauma is demonstrated and modified definitions of Temporary Threshold Shift (TTS) and Persistent Threshold Shift (PTS) are suggested with regard to short and long term reversal. The question of the role of audiometry in the prevention of acoustic trauma is posed and left open.
R 30

32,477
Robinson, D.W. (Ed.). PROGRESS TOWARDS STANDARDS FOR NOISE AND AUDIOMETRY. Ann. occup. Hygiene, Oct. 1967, 10(4), 401-406. (National Physical Laboratory, Teddington, Middlesex, England).

This note reviews acoustic standards as found in two separate but cooperating international bodies, the International Organization for Standardization and the International Technical Commission. In recent years it has become a firm policy in most countries that the recommendations of these international committees be adopted without change as national standards wherever they are not directly in conflict with current practice. The note details references to acoustics in the standards.

32,478
Erskine, J.B. NOISE SPECIFICATION FOR INDUSTRIAL PLANT. Ann. occup. Hygiene, Oct. 1967, 10(4), 407-414. (Agricultural Div., Imperial Chemical Industries, Ltd., Billingham, Durham, England).

An outline of the thinking behind two different Noise Specifications is outlined. In particular the need for an approach which considers the noise within and without the plant is emphasised. The two Noise Specifications are compared and discussed. In conclusion the need for some unification of the present multiplicity of specification is urged.
R 9

32,479
Ford, R.D. NOISE CONTROL. Ann. occup. Hygiene, Oct. 1967, 10(4) 415-422. (Pure & Applied Physics Dept., The University, Salford, Lancashire, England).

Noise can occasionally be reduced at source, although this is really the job of the plant manufacturer. The user should specify acceptable noise levels, should locate the machine in the least annoying position, and should supervise the installation. Extra protection from noise may then be achieved by erecting barriers, or even total enclosures around the machine. Absorbents can be used to cut down the reflected noise and the reverberant build-up of noise, but they will not reduce directly radiated noise. If access is required through the enclosure, doors and panels should be well sealed, and permanent access for ventilation or material conveyance should be through lined ducts.

32,480
Acton, W.I. EFFECTS OF EAR PROTECTION ON COMMUNICATION. Ann. occup. Hygiene, Oct. 1967, 10(4), 423-429. (Sound & Vibration Research Institute, Southampton University, Southampton, Hampshire, England).

Under some conditions, ear defenders offer communication advantages in noise, and although the same signal to noise ratio might arrive at the ear with and without protection, the maximum advantage is obtained when the signal level reaching the ear is in the optimum range for intelligibility (about 60 dBA). This fact has a bearing on the selection of the type of protection used in a given situation. Although the final choice must be made in the light of an octave band analysis of the noise, ear plugs offer several advantages where lesser amounts of attenuation are required, and fluid-seal ear muffs where higher levels are necessary. On the other hand, over protection, for example by the use of muffs in relatively low sound pressure levels, may be detrimental to communication. The use of any type of ear defender by persons with existing noise induced hearing loss may also be detrimental to communication in their case, although protection of the residual hearing remains the prime requirement. While most types of ear plugs may be amplitude sensitive to some degree and others embody this feature by design, the need exists for a defender which will allow relatively low sound pressure level signals, e.g., speech in quiet, to pass with minimal interference while providing much higher levels of attenuation for noises which are of high intensity.
R 19

32,481
Rabbitt, P.M. LEARNING TO IGNORE IRRELEVANT INFORMATION. Amer. J. Psychol., March 1967, 80(1), 1-13. (Applied Psychology Research Unit, MRC, Cambridge, England).

Two experiments used a training-transfer paradigm to investigate learning of irrelevant symbols in visual search tasks. Groups of subjects were practiced at locating members of particular sets of relevant letters embedded among restricted vocabularies of irrelevant letters. Search-time reduced with practice, but increased when subjects were transferred to displays incorporating a new irrelevant vocabulary. This increase in search-time on transfer provided an index of the extent to which improvement related to learning of cues was specific to discriminations between particular relevant and irrelevant sets. The results of Experiment I suggest that the number of cues used to discriminate relevant from irrelevant letters increases with the number of relevant letters for which the subject is required to search. Experiment II suggested that search time is less affected by the relative sizes of the relevant and irrelevant vocabularies than by the particular physical characteristics of symbols in the relevant and irrelevant sets. These results are discussed in the context of recent experiments investigating the time taken to discriminate between classes of signals.
A 17

32,482
Lurie, S.M. COLOR-NAME AS A FUNCTION OF STIMULUS-INTENSITY AND DURATION. Amer. J. Psychol., March 1967, 80(1), 14-27. (USN Submarine Medical Center, Groton, Conn.).

By the method devised by Boynton, Shafer, and Neun, three color-normals and one deuteranope named the colors of 11 wavelengths from 445-655 mu which were varied from 0.15-35 ft-c. in intensity and from 2-300 msec. in exposure-time. Despite considerable stability of color-naming over this range of conditions, certain marked changes occurred, more as a result of changes in luminance than in duration. These changes exhibited the Bezold-Brucke phenomenon, not only as a function of intensity but to some extent as a function of duration with brightness held constant. The results also showed that with decreasing luminance and exposure-time, the observer's responses became similar to a "low-energy tritanopia" as well as the well-known "small-field tritanopia." The minimal scores for the four colors--blue, green, yellow, and red--conformed to determinations of the spectral locations for the "unique" colors. At these points, the scores always were higher for the brightest-longest condition than for the shortest-dimmest condition. The main change in the blue-scores was a sharp increase with increasing luminance and duration, while red generally decreased. Yellow showed certain reliable variations between wavelengths. The only marked individual differences occurred near 500 mu, but they did not correlate with measurements of the unique green-point. The results for the deuteranopic observer were markedly different from those of the normal observers in nearly all respects.
A 26

32,483
Tulty, J.A., Bockrill, F.J. & Levy, Betty A. THE SUBTHRESHOLD PERCEPTION OF STIMULUS-MEANING. Amer. J. Psychol., March 1967, 80(1), 28-40. (Dalhousie University, Halifax, Nova Scotia, Canada).

Three experiments were conducted to determine whether any information about the meaning of a stimulus could be perceived at exposures too brief to permit complete identification. Results of the first experiment showed that there was no difference in identification-thresholds between the group of subjects who were presented with words similar in meaning to the learned list and the group who received words unrelated in meaning to the words learned earlier. The second experiment was a replication of the first with the exception that all three types of words were presented in the tachistoscope to each subject. Results of this experiment were similar to those of the first. The third experiment employed a recognitive rather than an identificational procedure. The number of words recognized at each exposure-duration was the same when the words had to be recognized from cards containing two words similar in meaning as when the cards contained two alternatives unrelated in meaning. On the basis of these experiments it was concluded that subjects must be aware of the physical structure of a stimulus before its meaning can be perceived.
A 10

32,484
Anstis, S.M. & Loizos, C.K. CROSS-MODAL JUDGMENTS OF SMALL HOLES. Amer. J. Psychol., March 1967, 80(1), 51-58. (University of Bristol, Bristol, England).

Cross-modal judgments of small holes were made in an attempt to determine the existence, if any, and the extent of cross-modal illusions in the judgment of size. Each of the four class-organs used (eye, tongue, right index finger, left little finger) was compared with every other, giving six comparisons in all. Each of nine subjects was tested on all six comparisons, using a simultaneous matching method. Four sizes of standard hole were matched with a comparison-range of 32 hole sizes. Results showed that holes are judged larger when presented to tongue or eye than when presented to fingers. They appear approximately the same size to the tongue as to the eye, and approximately the same size to the right index finger as to the left little finger. The extent of the error decreases as the size of the hole to be judged increases: they are greatest for the smallest holes (0.125 in.) and become minimal at a hole-size of 0.4375 in. The reasons for this discrepancy are discussed.
A 5

32,485
Beck, J. & Shaw, W.A. RATIO-ESTIMATIONS OF LOUDNESS-INTERVALS. Amer. J. Psychol., March 1967, 80(1), 59-65. (Harvard University, Cambridge, Mass. & University of Pennsylvania, Philadelphia, Penn.).

Ratio-estimations of loudness-intervals selected from the sone scale and from the lambda scale were obtained. The results show: a) that equal differences on the lambda scale produce roughly equal judgments regardless of the absolute values of the loudness defining the interval; b) that equal distances on the sone scale do not produce equal judgments; and c) that observers' ratio judgments are not linearly related to interval size on either the sone or lambda scale. Rather, a linear relationship holds between the logarithm of observers' ratio-estimations and the sizes of the intervals in lambda units. Thus, the results suggest that observers interpret the same jnd-differences between loudness-intervals as a distance o as a ratio depending on whether they are asked to make equisectional judgments or judgments of the ratios of loudness-intervals. What is implied is that for the scaling of loudness-intervals the methods of ratio- and interval-scaling represent alternative ways of describing a single sensory relationship.
R 8

32,487
Leibowitz, H.W. & Judisch, J.M. THE RELATION BETWEEN AGE AND THE MAGNITUDE OF THE PONZO ILLUSION. Amer. J. Psychol., March 1967, 80(1), 105-109. (Pennsylvania State University, University Park, Penn.).

The magnitude of the Ponzo illusion was investigated for subjects ranging in age from 3.5 to 88 yr. The illusion increases rapidly up to about age 13 yr., after which it remains stable through age 50 yr. and then decreases markedly. The possible relation between the Ponzo illusion and size-constancy for distant objects is discussed.
R 7

32,488
Gusenik, W.E. & Weiss, B. EFFECTS OF THE RELEVANCE OF INTERPOLATED STIMULI ON TIME-ERROR IN THE COMPARATIVE JUDGMENTS OF WEIGHTS. Amer. J. Psychol., March 1967, 80(1), 115-119. (University of Toledo, Toledo, Ohio).

This experiment investigated the effects, on the Point of Subjective Equality (PSE), of interpolating a weight, heavier than the standard, between the standard and comparison weight, under three different degrees of relevance of the interpolated weight. In the relevant condition, attention to the interpolated weight as a relevant member of the stimulus-series was increased by forcing subject to judge the same comparison weight against the standard and interpolated weights sequentially. In the neutral condition subject was not required to judge the interpolated weight overtly. In the non-relevant condition, the interpolated weight was rendered explicitly non-relevant by the experimenter's stating "don't judge it" each time the interpolated weight was presented. These conditions were compared with a control condition in which no interpolated weight was presented. Presentation of the interpolated weight raised the PSE under the neutral condition, and forced judgment of the interpolated weight under the relevant condition did not change the extent of this effect. Explicit non-relevance of the interpolated weight completely removed the effect of the interpolated weight on the PSE.
R 6

32,491
Ludvigson, H.W. & Caul, W.F. SPATIAL GENERALIZATION AS A FUNCTION OF VARIATION IN A NONSPATIAL ATTRIBUTE, INSTRUCTIONS, AND INDIVIDUAL STRATEGIES. Amer. J. Psychol., Mar., 1967, 80(2) 186-195. (Texas Christian University, Fort Worth, Tex. & University of Pittsburgh, Pittsburgh, Penn.).

Three experiments investigated the spatial generalization of a voluntary response in a multiple probability-learning task presented to Ss as a series of 'horse-races.' Compared with the more frequently studied kinds of generalization, this type of spatial generalization appears to involve relatively complex information-processing and hypothesis-testing behavior. Seven lamps, representing horses, are arrayed on a horizontal line. The lighting of a lamp is a cue for the subject to predict whether that particular horse will win or lose the current race. The basic finding is that if the symbolized horse in the middle of the array wins a large proportion of its races (80%, while the lamps to either side all win a small proportion of their respective races, 20%, then the frequency with which the subjects predict 'win' to the side lamps is an increasing function of the nearness of the lamp to the middle.
R 7

32,492
Epstein, W. PERCEPTUAL LEARNING RESULTING FROM EXPOSURE TO A STIMULUS-INVARIANT. Amer. J. Psychol., June 1967, 80(2), 205-212. (University of Kansas, Lawrence, Kan.).

The chief objective of the present experiment was to determine whether the observer could extract an invariant from a continuous transformation, and whether this newly acquired relationship would modify his responses to an otherwise ambiguous static stimulus. The invariant in question was the ratio of visual angle to physical distance. The ambiguous static stimulus was the retinal subtense corresponding to a single isolated standard. The primary variable was the judgment of distance. The results show that exposure to a sequence of visual angle-distance correlations does significantly modify distance-perception. In addition to the primary response-variable, a secondary response-variable was measured. The selection of judged size as a response-variable was natural, since size- and distance-perception often are considered to be interdependent. The results show that all the training conditions modified the judgments. There was no statistical evidence that the conditions were differentially effective.
R 7

32,493
Schiffman, H.R. SIZE-ESTIMATION OF FAMILIAR OBJECTS UNDER INFORMATIVE AND REDUCED CONDITIONS OF VIEWING. Amer. J. Psychol., June 1967, 80(2), 229-235. (Rutgers University, New Brunswick, N.J.).

An experiment was performed to determine the processes used in estimating the sizes of different kinds of objects under a viewing-condition offering: a) an ample visual information, b) a reduced condition, and c) a connective reduced condition. The results using familiar objects, off-sized versions of familiar objects, and unfamiliar objects, indicated that, with ample visual information, known size was not one of the operative determinants of estimated size, but a memorial process was used in conditions of reduced visual information. The results suggest that the process used in size-estimation of familiar objects is dependent upon the visual information available.
R 4

32,494
Gunn, W.J. & Loeb, M. CORRELATION OF PERFORMANCE IN DETECTING VISUAL AND AUDITORY SIGNALS. Amer. J. Psychol., June 1967, 80(2), 230-242. (USA Medical Research Lab., Fort Knox, Ky.).

Two experiments were performed in which observers were to detect which pulses of noise or pulses of light were slightly more intense than others in a train. It was found in the first experiment that both sensitivity (d') and degree of conservatism in responding (β) were correlated for the two tasks. The auditory task was more difficult than the visual under the chosen conditions. Higher βs were noted for the observers first performing on the visual task. In the second experiment, the tasks were more closely equated in difficulty, and the observers performed both the auditory and the visual task twice. The effect of order previously noted for β was not obtained. β and d' were again significantly correlated for the first session; for the second session significant correlations were obtained for d' but not β. The results suggest that not only are there response biases common to detection in different modalities but also common factors affecting sensitivity.
R 4

32,495
Singer, Estelle. ABILITY AND THE USE OF OPTIMAL STRATEGY ON DECISIONS. Amer. J. Psychol., June 1967, 80(2), 243-249. (Tufts University, Medford, Mass.).

Optimal behavior on a two-choice prediction-task was related to performance on other tasks involving sequentially presented information and on tests of general intellectual aptitude. As predicted, one factor found in a factor analysis of the results included the measures of how well sequential information was used. Contrary to the prediction that optimal performance on the two-choice task would show loadings on that factor, the quality of performance on the two-choice task showed loadings on an independent factor; the scores for intellectual aptitude also showed loadings on that factor but in the opposite direction. It was tentatively concluded that the two-choice task elicits a direct form of probability-matching, based on subjective estimates of the probabilities.
R 8

32,496
Glassing, W.W., Landauer, A.A. & Coltheart, M. THE EFFECT OF FALSE PERSPECTIVE CUES ON DISTANCE- AND SIZE-JUDGMENTS: AN EXAMINATION OF THE INVARIANCE HYPOTHESIS. Amer. J. Psychol., June 1967, 80(2), 250-256. (University of New South Wales, Sydney, New South Wales, Australia).

The relationship between perceived absolute size (S') and perceived absolute distance (D') was examined by using false perspective cues to produce illusory variations in D'. No evidence was found to suggest that S' and D' are not related in the manner specified by the size-distance invariance hypothesis. It was found that this hypothesis can be used to make accurate predictions of S' from D' and vice versa for individual observers.
R 5

32,497
Leibowitz, H.W., Pollard, S.W. & Dickson, D. MONOCULAR AND BINOCULAR SIZE-MATCHING AS A FUNCTION OF DISTANCE AT VARIOUS AGE-LEVELS. Amer. J. Psychol., June 1967, 80(2), 263-268. (Pennsylvania State University, University Park, Penn.).

The results of the present study emphasize that monocular cues simultaneously present in the visual field are important determiners of size-constancy. The inferior performance of children in size-matching would seem to be a result of their inability to utilize fully those monocular cues which are available.
R 8

32,498
Singer, Estelle & Roby, T.B. MEASUREMENT OF SEQUENTIAL BEHAVIOR BY SUCCESSIVE DIFFERENCES. Amer. J. Psychol., June 1967, 80(2), 276-281. (Tufts University, Medford, Mass.).

A group of related measures of binary sequences which represent an extension of the concept of a run was presented. The method employs the notion of successive differences of higher orders. Sensitivity to relevant aspects of sequential patterns was assessed in a standard two-choice prediction-situation by introducing a bias in the proportions measured by higher-order differences. It was found that the subjects did adjust their behavior in a manner appropriate to this bias. Immediate memory appeared to be unrelated to sensitivity to the experimental variable.
R 5

12,499
Jones, G.M., Jr. & [illegible]son, W.W. A DYNAMIC CUE OF THE MAGNITUDE OF TACTILE SENSATION. Amer. J. Psychol., June 1967, 80(2), 287-290. (Auburn University, Auburn, Ala. & University of Florida, Gainesville, Fla.).

Two sets of mechanical stimuli were applied to the skin of human observers. With temperature and area of the skin constant, stimulus rate, force, and order of reference vs. test stimulus presentation were varied systematically in a 2 x 5 x 5 factorial design. The results lend psychophysical support to those electrophysical findings which suggest that the dynamic (velocity or acceleration) results of stimulus-force are a major cue for tactile discriminations.
X 4

12,500
Bell, J.F. RELATIONSHIPS AMONG A NUMBER OF MEASURES OF MEANINGFULNESS. Amer. J. Psychol., June 1967, 80(2), 291-29 . (Pennsylvania State University, University Park, Penn.).

The search for the determinants of the meaningfulness of discrete verbal units has been extensive with measures of association, (single and multiple), pronounciability, subjective frequency or familiarity, and objective frequency, all being examined. What, however, is the relationship among these measures? In the present experiment, the interrelationship among the four listed measures was examined. The mean rated value for each trigram for each of the three scales was obtained. The reliability of each of these scales was obtained by taking the mean values for the 200 trigrams secured from a randomly selected half (N = 50) of the experimental sample and then correlating these values with the corresponding values for the other half. The reliability-coefficients were as follows: Pronounciability = 0.991 Association = 0.97; Subjective Frequency = 0.99. The correlations obtained among the varying measures of meaningfulness using all of the 200 items were determined. The intercorrelationships among the varying measures, with the exception of the Thorndike-Lorge frequency-count are quite high. When we compare the correlation for words and non words, we find lower correlations among the measures for words. An examination of the distributions reveals that restriction of range--especially in the case of pronounciability-ratings--may account for the lowered correlations. It seems obvious from the magnitude of the correlations obtained, that the measures of pronounciability, subjective frequency, and association have much in common, and that a single measure would satisfy the experimental requirements of many investigators.
X 9

12,501
Lebowitz, H.W. & Judisch, J.M. SIZE-CONSTANCY IN OLDER PERSONS: A FUNCTION OF DISTANCE. Amer. J. Psychol., June 1967, 80(2), 295-298. (Pennsylvania State University, University Park, Penn.).

Size-matches obtained from a group of aged observers were found to be highly similar to those made by observers of college age. Since the Ponzo illusion is much less among the older observers, the similarity of their size-matches argues against the assumption that the Ponzo illusion is merely the manifestation of a size-constancy mechanism. Evidence is presented that visual acuity is not a factor.
X 5

12,502
Thomas, J.P. EQUIPMENT FOR VARYING THE INTENSITY OF LIGHT. Amer. J. Psychol., June 1967, 80(2), 297-301. (University of California, Los Angeles, Calif.).

Several techniques have been used to produce continuous and discontinuous variations of intensity. One technique uses rotating disks or cylinders. A second method utilizes diffraction. A third is based upon the fact that varying the area of a source of light, thereby varying the total flux emitted, varies the intensity with which the source illuminates a screen. Shadow casters, slits, and cylindrical lenses can be used to control the area of the source which illuminates different points on the screen and, thus, the intensity at every point. The apparatus described in this article falls in the third category and uses cylindrical lenses to control the intensive distribution along both axes of the screen.
X 8

32,503
Sarris, V. ADAPTATION-LEVEL THEORY: TWO CRITICAL EXPERIMENTS ON HELSON'S WEIGHTED-AVERAGE MODEL. Amer. J. Psychol., Sept. 1967, 80(3), 331-344. (University of Duesseldorf, Duesseldorf, Germany).

For twenty years, since creating his adaptation level (AL)-theory, Helson has taken the scientific value of his basic weighted geometric average AL-model for granted. The mathematical implications of his so-called "quantitative" theory have, however, never been sufficiently tested and developed by means of trend-analytical experimentation. As Helson's theory claims many promising results for it and as it may get perhaps great relevance for whole psychology because of its theoretical versatility, a critical experimental analysis of the quantitative model appears to be all the more indispensible. Therefore, in this study, Helson's fundamental AL-formula from 1947 (also 1964) was tested in respect to two different mathematical implications: a) as to the anchor-AL relationship and b) as to Helson's "d-factor," i.e., the step-interval-AL-relationship. Both tests were carried out in exact replication of Helson's original experimental procedure with liftedweights. In Experiment I, 100 subjects had to judge Helson's series-stimuli of 200, 250, 300, 350, and 400 gm under 10 anchor conditions, the lightest anchor being 12.6 gm, the heaviest being 4500 gm ("randomized groups design"). In Experiment II, again by use of randomized groups design, 40 other subjects had to judge four different series of five weights, the geometric means for these series always being the same and only the step-interval d between the series-stimuli being varied. The statistical analysis based upon parametric trend-analytical techniques resulted in a disproof of the quantitative AL-model concerning both Helson's anchor-AL and step-interval-AL-implication
R Marx

32,504
Fitzgerald, R.E. & Marshall, A.J. LEFT-RIGHT FIELD DIFFERENCES WITH PARTIAL REPORT OF LETTERS. Amer. J. Psychol., Sept. 1967, 80(3), 370-376. (University of Western Australia, Perth, Australia).

Eight letters were exposed horizontally across fixation for 300 msec in a tachistoscope. A signal tone sounding simultaneously with the offset of the exposure-flash instructed subjects to report the letters on the left or the right of fixation. Letters on the right were reported more accurately than those on the left. A control condition with four letters, but with all to be reported, showed a strong left field superiority. This finding of right field superiority with partial report is analogous to that obtained when letters are presented in one field at a time. It was concluded that a major factor determining the field differences in the perception of letter patterns reported in earlier studies is whether the letters to be reported come from one or both sides of fixation, irrespective of the positioning of the letters in the stimulus-pattern.
R 9

32,505
Porsolt, R.D. & Irwin, R.J. BINAURAL SUMMATION IN LOUDNESS OF TWO TONES AS A FUNCTION OF THEIR BANDWIDTH. Amer. J. Psychol., Sept. 1967, 80(3), 384-390. (University of Auckland, Auckland, New Zealand).

The hypothesis was advanced that binaural summation of loudness is similar in origin to the increment in monaural loudness that results when the bandwidth of a stimulus of constant sound-pressure is increased beyond a critical value. Sixteen observers therefore adjusted the level of two tones heard monaurally to equal their loudness when one tone was presented to each ear. The adjustments were made with the two tones at various bandwidths. The results were qualitatively consistent with the hypothesis: as the bandwidth of the tones increased, binaural summation declined. Under some, but not all, conditions equal binaural and monaural loudnesses corresponded to equal binaural and monaural sound-pressures; the limited circumstances under which this equality would be expected to hold were discussed.
R 15

32,507
Katz, M.S. FEEDBACK AND ACCURACY OF TARGET POSITIONING IN A HOMOGENEOUS VISUAL FIELD. Amer. J. Psychol., Sept. 1967, 80(3), 405-410. (USN Naval Training Device Center, ONR, Port Washington, N.Y.).

Three subjects were provided with feedback about error magnitude following each attempt to position a target at the geometric center of an empty visual field. Upon achievement of a criterional level of accuracy, feedback was discontinued, and accuracy of performance was compared with that of a control subject. Experimental feedback of results reduced constant error both during feedback and on subsequent retests without feedback. Variable error (standard deviation) was apparently responsive to practice, rather than to informational feedback, except that extremely accurate feedback seemed to produce a deleterious effect on performance.
R 5

32,508
Siegel, M.H. STIMULUS-REPETITION AND COLOR DISCRIMINATION. Amer. J. Psychol., Sept. 1967, 80(3), 411-415. (USA Edgewood Arsenal Research Labs., Md.).

In the present report, we have investigated the effect of the order of presentation of stimuli upon the discrimination of color sensitivity. The major experimental finding is that sensitivity-scores are in fact dependent upon the stimulus-order. Our finding that sensitivity is directly related to the number of times a stimulus is repeated strongly suggests that any procedure in which stimuli are presented in large blocks can be expected to generate seemingly better discrimination scores than procedures in which stimuli are presented in a random order. This experiment has demonstrated clearly that deviating from a random order presentation of stimuli does indeed change color discrimination-scores. Although it is apparent that the improvement in these scores is artifactual, there appears to be no way a priori to determine what the extent of the change will be.
R 11

32,509
Engle, M.H. THE EFFECT OF LEARNING STRATEGIES UPON FREE RECALL. Amer. J. Psychol., Sept. 1967, 80(3), 421-435. (Yeshiva University, New York, N.Y.).

Two studies were carried out on the relationship between learning strategies and recall. In the first study, subjects who reported using an associative organization, i.e., strategy--linking words in some manner--recalled significantly more words than subjects reporting straight rehearsal. In the second study, strategies were assigned via instructions to different groups. Strategy instructions per se had no direct effect on recall, but, reported strategy significantly influenced amount of recall. In all three instruction-groups, reported associative organization was associated with greater recall than reported rehearsal. The discussion dealt with the concept of "chunking" and the importance of the subject's reports of what he is doing, in predicting recall.
R 16

32,510
Dielman, T.E. & David, K.H. TEMPORAL ARRANGEMENT AND SPECIFICITY OF SET IN AN AUTOKINETIC SITUATION. Amer. J. Psychol., Sept. 1967, 80(3), 426-429. (University of Hawaii, Honolulu, Hawaii).

The temporal arrangement of set and the specificity of a response-category was varied in a three-way design (Sex X Temporal Arrangement X Specificity) using 120 subjects (60 men and 60 women). A variation of the autokinetic word-technique was used. Temporal arrangement of set was defined as the suggestion of stimulus-movement either before or after the onset of the stimulus-light. Specificity of set was defined by the instructions that the light would trace either vowels (high specificity or few alternatives) or consonants (low specificity or many alternatives). A control condition was included, in which the subjects were merely told that the light would move. The results indicated that the presentation of suggestion of movement prior to the onset of the stimulus resulted in a significantly greater number of responses than the suggestion after the stimulus ($p < 0.01$), which supports the position that perception is modified by suggestion. The results failed, however, to support the hypothesis that the specificity of the response-category would be related to the number of responses.
R 4

32,511
Werchel, S. & Burnham, C.A. REDUCTION OF AUTOKINESIS WITH INFORMATION ABOUT THE REGISTRATION OF EYE-POSITION. Amer. J. Psychol., Sept. 1957, 80(3), 434-437. (University of Texas, Austin, Tex.).

The autokinetic effect was significantly reduced when subjects viewed the stimulus light through a non-visible tube. The results were interpreted as supporting the hypothesis that the autokinetic effect results from a misinterpretation of the relationship between the efferent signals to the extraocular muscles and the retinal location of the light. The tube provided information about this relationship and inhibited its misinterpretation.
R 6

32,512
Griffiths, D., Chapman, H. & Campbell, D. AN APPARATUS FOR DETECTING AND MONITORING MOVEMENT. Amer. J. Psychol., Sept. 1967, 80(3), 438-441. (Queen's University, Kingston, Ontario, Canada).

This note describes the design and some functions of an apparatus which will detect and monitor movement. As a detective device, it can report that a movement has occurred (in this respect resembling a stabilimeter), or that some body has entered or left a designated area (in this respect resembling a microswitch or photoelectric cell). As a monitoring device, it can report on the extent and rate of movement (in this respect resembling a strain-gauge or mechanical transducer). The apparatus is small, robust and cheap; and it is not necessary to attach it to the object or person being monitored.

32,513
Maier, N.R.F., Julius, Mera & Thurber, J.A. STUDIES IN CREATIVITY: INDIVIDUAL DIFFERENCES IN THE STORING AND UTILIZATION OF INFORMATION. Amer. J. Psychol., Dec. 1967, 80(4), 492-519. (University of Michigan, Ann Arbor, Mich.).

The purpose of this investigation was to determine whether the process of storing and using previously learned information differs in individuals in a qualitative manner. In other words, if pairs of words are learned by a group of subjects, will those pairs tend to reveal themselves in stories written by the subjects or will new pairs be generated by fragmenting and mixing new pairs out of the learned pairs? The failure to show a relationship between creativity and the reorganization of experience need not exclude the possibility that fragmentation and the reorganization of experience are basic mechanisms in creativity. Since tests of creativity utilize difficult tasks, they may be weighted to measure difficulty rather than a unique process such as the reorganization of experience. The commonly-held notion that creativity is a higher mental process, therefore, may be a misleading one, since it causes one to emphasize the difficulty of the task rather than the differences in function that varied tasks may demand. People can differ in the degree to which they possess the qualitatively different mental functions and these differences in kind may influence the way they approach problem-situations. The point at issue is the need to isolate qualitatively different functions. The investigation of word-usage shows that individuals store and process simple data differently. Whether the term creativity is relevant and should be used depends on whether we wish to use the term "creativity" to designate a cognitive activity or whether we wish to designate a function different from learning and association formation.
R 16

32,514
Fisher, G.H. MEASURING AMBIGUITY. Amer. J. Psychol., Dec. 1967, 80(4), 541-557. (University of Newcastle upon Tyne, Newcastle upon Tyne, England).

Three experiments are reported. In the first, seven ambiguous figures, the probabilities of perceiving either aspect of which are approximately the same, are described and illustrated. In the second, the possibility of inducing fluctuations in the appearance of alternative aspects of ambiguous figures which are other than spontaneous is considered. In the third, an attempt is made to submit the "figure-ground hypothesis" to experimental test.
R 35

32,515
Woodruff, G. & Helson, H. TORQUE SENSITIVITY AS A FUNCTION OF KNOB RADIUS AND LOAD. Amer. J. Psychol., Dec. 1967, 80(4), 558-571. (Kansas State University, Manhattan, Kan.).

When small knobs are turned against various loads the problem of determining actual stimulus-values becomes critical. Measures of sensitivity lose much of their meaning if the stimulus-magnitude is unknown or misrepresented. For this and other reasons the stimuli must be presented in terms other than that of a load of X-gm. being lifted by turning a knob of Y-cm. radius. Though under actual conditions of use, this mode of specifying stimulation can be very informative, a better method of specifying stimulus-magnitude is in terms of the force in equivalent grams (e-gm) the subject must exert to turn the knob. This procedure allows all combinations of knob-size and loading to be ordered along one continuum. It is easy to show that the force the subject must exert to turn the knob increases with larger loads and smaller knobs. Using this procedure of ordering stimulation, we can state, for stimuli of 100 e-gm. or less, that torque sensitivity is inversely related to stimulus magnitude. As stimulation increases from 8.35 to 100 e-gm. the Weber fraction decreases from 0.126 to 0.044.
R 8

32,516
Anstis, S.M. & Atkinson, Janette. DISTORTIONS IN MOVING FIGURES VIEWED THROUGH A STATIONARY SLIT. Amer. J. Psychol., Dec. 1967, 80(4), 572-585. (University of Bristol, Bristol, England).

Figures moving past narrow slits may appear to suffer various distortions. In a series of experiments, it is shown that eye movements play a role in the perceived distortion. The experiments support the view that the perceived distortions are due to distortions of the retinal image. All these effects are purely optical, not psychological.
R 11

32,517
Gilbert, A.J. FACTORS INVOLVED IN JUDGMENTS MADE BY THE METHOD OF CONSTANT STIMULI. Amer. J. Psychol., Dec. 1967, 80(4) 586-593. (University of Western Australia, Perth, Australia).

It has been suggested that with the method of constant stimuli the comparative adaptation-level (CAL) is a weighted geometric mean of both the standard stimulus and the adaptation level (AL) to the series-stimuli. The present results for tactile stimulation of the forearm indicate that there may be several factors involved in making such judgments, and that derived points of subjective equality (PSEs) probably approximate the CAL only when the stimulus-values or the intervals between judgments are such that some of the effects balance out. The factors may include general adaptation, a specific adaptation to the standard stimulus, adaptation to the comparison-stimuli, and some factor or factors related to the interval between judgments. Furthermore, it seems that with the particular method employed there was a relatively constant factor related to cerebral dominance.
R 4.

32,518
Donnelly, M.B. & Rimoldi, H.J.A. EXPERIMENTAL CONSIDERATIONS CONCERNING CATEGORY AND MAGNITUDE SCALING. Amer. J. Psychol., Dec. 1967, 80(4), 602-607. (Loyola University, Chicago, Ill.).

The purpose of this study is a) to investigate the values that subjects assign to a collection of stimuli presented singly and in all their possible paired combinations; and b) to determine the effect of different scaling transformations on these values. The attempt is made, further, to explore experimentally issues concerning the relation between category- and magnitude-scaling. More specifically, the investigators are concerned with how subjects will rate stimuli: a) when asked to assign values to each member of the pair when the sum of the two values would be constant (constant sum method); b) when giving values to each member of the pair without being concerned with a constant sum for each pair; and c) when rating stimuli singly, using the successive category procedure. Findings strongly suggest that an explanation for the concave downward relationship between category and magnitude scales may be due to the mathematical transformations used in the different scaling methods.
R 16

32,519
Wapner, S., Weinberg, J., Glick, J.A. & Rand, G. EFFECT OF SPEED OF MOVEMENT ON TACTUAL-KINESTHETIC PERCEPTION OF EXTENT. Amer. J. Psychol., Dec. 1967, 80(4), 608-613. (Clark University, Worcester, Mass.).

Variation in speed of tactual-kinesthetic tracing a given physical extent significantly affects perception of that extent: with relatively faster (slower) speed a given extent is perceived as relatively shorter (longer).
R 17

32,520
Hayes, D.P. & Meltzer, L. BONE-CONDUCTING MICROPHONES. Amer. J. Psychol., Dec. 1967, 80(4), 619-624. (Cornell University, Ithaca, N.Y.).

The paper describes an audio recording system for those special applications where it is important to exclude all noises other than the vocal sounds of the speaker. The limitations of alternate means of reducing noise relative to speech were discussed. A bone-conductance microphone was proposed and its audio characteristics measured and compared to conventional, good quality microphones. Its principal advantages are shown to be high sensitivity to sounds generated by the subject, and a superior ability to exclude noise from a signal.

32,521
Simons, S.J., Jr. & Ogle, K.N. PUPILLARY RESPONSE TO MOMENTARY LIGHT STIMULATION TO EYES UNEQUALLY ADAPTED TO LIGHT. Amer. Ophthal., Jan. 1967, 63(1), 35-45. (Mayo Clinic & Mayo Foundation, Rochester, Minn.

Carefully controlled experiments with the infrared electronic pupillograph and eight arc degree fields in an attached stereoscope showed that the light threshold for pupillary constriction for foveal stimulation in one eye was essentially independent of the light adaptation level of the other eye. This finding suggests that insofar as pupillary thresholds are concerned there is no interocular influence. It was shown also that, although there is a decrease in latency periods with increase in intensity of the light stimulus, there was no effect of different adaptation luminances between the two eyes on those latencies. These results are contrasted with the psychophysical sensation of resulting brightness in which a type of brightness averaging may occur for light areas of different luminances between the two eyes under certain conditions dependent on contours.
R 15

32,522
Tamler, E. & Jampolsky, A. IS DIVERGENCE ACTIVE? AN ELECTROMYOGRAPHIC STUDY. Amer. J. Ophthal., March 1967, 63(3)Part 1, 452-459. (Presbyterian Medical Center, San Francisco, Calif.).

Electromyographically, active divergence is defined here as the simultaneous increase in electrical activity of both lateral rectus muscles as the eyes perform a fusional divergent movement or maintain fusion beyond the fusion-free position as base-in prisms are added. The existence of active divergence is best demonstrated by simultaneously recording both eyes of an intermittent esotrope making a fusional divergence movement and of a subject maintaining fusion beyond the fusion-free position as base-in prism is added. In such cases, one can record increased activity of both lateral rectus muscles. Multiple-channel simultaneous recordings of all four horizontal rectus muscles suggest the general rule that horizontal fusional movements of an eye are accompanied by increased activity or concontraction of the horizontal rectus muscles of the stationary eye, whereas, a break of fusion is associated with a simultaneous decrease in activity of the horizontal rectus muscles of the fixing stationary eye.
R 6

32,523
Drance, S.M., Berry, Virginia & Hughes, Ann. STUDIES ON THE EFFECTS OF AGE ON THE CENTRAL AND PERIPHERAL ISOPTERS OF THE VISUAL FIELD IN NORMAL SUBJECTS. Amer. J. Ophthal., June 1967, 63(6), 1667-1672. (Ophthalmology Dept., University of British Columbia, Vancouver, British Columbia, Canada).

The findings suggest that the change of size of the peripheral and central isopter with age is a continuous process starting in youth and going on to senescence. The rate of change is linear and independent of senile miosis but is partially accounted for by the position of the lids. The yellowing factor of the lens with age was not assessed in this study even though the subjects had reasonable visual acuity.
R 17

32,524
Zuege, P. & Drance, S.M. STUDIES OF DARK ADAPTATION OF DISCRETE PARACENTRAL RETINAL AREAS IN GLAUCOMATOUS SUBJECTS. Amer. J. Ophthal., July 1967, 64(1), 56-63. (Glaucoma Unit, University of British Columbia, Vancouver, British Columbia, Canada).

A study of the visual parameters which could be used to assess damage produced in the glaucomatous state is desirable. If loss of the visual function is produced by elevated intraocular pressure then the earlier the visual disturbance can be spotted, particularly at a time when it is still reversible, the better the chances of preventing progression or if a parameter could be found which would indicate the susceptibility of an eye to raised intraocular pressure, and serve as a predictor of visual field defects, this would be useful in dividing those eyes which require treatment from those which only need observation. With this in mind, a study to compare the dark adaptation of the Bjerrum area with that of the retina nearer the fovea and further in the periphery was undertaken to find out whether dark adaptation produces earlier changes that can be plotted by means of static and kinetic perimetry. A suggestion that this might be the case came from scotopic circular static perimetry which was said to be more sensitive in picking up glaucomatous abnormality than circular photopic perimetry. In all our patients except one, in whom there were visual field defects and cupped atrophy of the optic nervehead, the rod threshold of the Bjerrum area was clearly separated from that of the normal comitous group of the same age decade. There were two other exceptions, one of whom had a very relative arcuate scotoma with a normal disc. This scotoma has since disappeared. Comparing the dark-adaptation threshold of the Bjerrum area with the dark-adaptation threshold 30° away from fixation, one obtained an even earlier sign of deterioration in dark adaptation of the Bjerrum area. In normal individuals our studies confirmed that the dark-adapted Bjerrum area had a lower threshold than the retina nearer the fovea (5°) or that further away (30°). A change of the threshold of the Bjerrum area in relation to either of the other areas would therefore indicate a relative disturbance of dark adaptation before the absolute threshold became grossly abnormal. R 8

32,526
Fine, B.S., Fine, S., Peacock, G.R., Georgets, W.J., et al. PRELIMINARY OBSERVATIONS ON OCULAR EFFECTS OF HIGH-POWER, CONTINUOUS CO_2 LASER IRRADIATION. Amer. J. Ophthal., Aug. 1967, 64(2), 209-222. (US Armed Forces Institute of Pathology, Ophthalmic Pathology Branch, Washington, D.C.).

The various ocular changes that occur in experimental pigmented rabbit eyes subjected to laser irradiation at 10.6 μ were evaluated clinically, grossly and histopathologically. Corneal thickening and central crater formation occurred that, at high-power levels, penetrated into the anterior chamber, along with ejection of an aqueous stream. Thickened cornea consisted of both "fused" and nonfused lamellae. Some of the lesions that did not penetrate into the eye were accompanied by a depression of the anterior lens surface, apparently a result of heat transmission. Deeper intraocular changes did not occur in the nonpenetrated eye within the limited time interval between irradiation and these preliminary observations. A form of corneal thickening here termed "fusion" of corneal lamellae that occurred at the periphery of the corneal lesion lost affinity for alcian blue, Masson, and Van Gieson stains. Electron microscopy of this region revealed scattered amorphous foci along the collagen fibrils in the stromal lamellae. A clear plastic face shield 0.060 inches thick was found to be an effective protection to the eye under the limited conditions of these experiments. This shield may also serve as an indicator of accidental exposure.
R 9

32,527
Ludvigh, E. & McKinnon, Pauline. THE EFFECT OF ORIENTATION ON THE THREE-DOT ALIGNMENT TEST. Amer. J. Ophthal., Aug. 1967, 64(2), 261-265. (Kresge Eye Institute, Wayne State University, Detroit, Mich.).

A significantly lower limen for the three-dot alignment test has been found when the dots are presented in a vertical orientation than when they are presented 30 or 45 degrees from the vertical. In all orientations tested, the threshold displacement subtends a small fraction of a cone width. A field theory, to account for the superiority of the discrimination in the vertical meridian, is suggested.
R 17

32,528
Helveston, E.M. & von Noorden, G.K. THE APPEARANCE OF THE FOVEA IN STRABISMIC AMBLYOPIA. Amer. J. Ophthal., Oct. 1967, 64(4), 687-688. (Wilmer Institute of Ophthalmology, Johns Hopkins Medical Institutions, Baltimore, Md.).

Minimal changes in the ophthalmoscopic appearance of the fovea, noted in some instances in a study of 26 patients with monocular strabismic amblyopia, occurred nearly as frequently in normal eyes as in amblyopic eyes.
R 5

32,529
Biersdorf, W.R. PURKINJE SHIFT IN THE HUMAN ELECTRORETINOGRAM. Amer. J. Ophthal., Oct. 1967, 64(4), 757-760. (USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.).

A shift from rod functioning under dark adaptation to complete cone functioning in light adaptation (Purkinje shift) has been obtained for the positive wave (b-wave) of the human electroretinogram (ERG). The technique utilized was: a) slow square wave flickering stimulation to allow simultaneous rod and cone functioning, b) full visual field adaptation with a smaller test field to minimize stray light effects and c) a low criterion ERG amplitude obtained by response averaging. The light-adaptation level found necessary for cone functioning is below that required for psychophysical rod saturation. The duplicity theory is thus shown applicable to electroretinal measures of human visual functioning.
R 12

32,530
Robertson, D.M., Ogle, K.N. & Dyer, J.A. INFLUENCE OF CONTACT LENSES ON ACCOMMODATION. Amer. J. Ophthal., Nov. 1967, 64(5), 860-871. (Mayo Clinic & Mayo Foundation, Rochester, Minn.).

When contact lenses are substituted for spectacles, the accommodative requirement becomes greater in an axial myope and less in an axial hyperope. The change in accommodative requirement is directly related to the degree of ametropia and is present in spite of the fact that the power of the contact lens has been adjusted appropriately for the change in vertex distance. This, therefore, can be a factor responsible for the sudden symptoms of presbyopia experienced by a middle-aged myopic person who is fitted with contact lenses. Conversely, since the accommodative requirement for hyperopes decreases, it is possible in some instances for a hyperopic person to read without difficulty with a contact-lens correction only, whereas bifocals might be required with a spectacle correction. These differences in accommodative requirements have been calculated and are conveniently summarized in useful graph form.
R 8

32,531
Sogol, P., Golicki, L., Janiszewski, S. & Skwierczyńska, J. INTRAOCULAR PRESSURE DURING PRESSURE BREATHING. Amer. J. Ophthal., Nov. 1967, 64(5), 956-964. (Institute of Aviation Medicine, Warsaw, Poland).

By means of an apparatus employed in aviation, pressure breathing of about 15-30 mm Hg was developed. Eighty-four healthy men in different age groups were examined. An increase of venous pressure followed by rise of intreocular pressure was observed. These artificially induced pressure rises were maintained for eight to fifteen minutes.
R 22

32,532
Glickman, N., Mitchell, H.H., Keeton, R.W. & Lambert, E.H. SHIVERING AND HEAT PRODUCTION IN MEN EXPOSED TO INTENSE COLD. J. appl. Physiol., Jan. 1967, 22(1), 1-8. (Medicine Dept., University of Illinois, Chicago, Ill.).

Heat production and integrated electrical activity of skeletal muscles related to shivering and muscle tenseness were simultaneously observed in 10 experiments on 9 healthy, clothed male subjects seated in a cold room (-28.9 C) for 4 hr. The integrated electrical activity and heat production generally increased with time reached a peak 2.25-3 hr after entrance, and then fluctuated. Heat production and electrical activity, heat production and expired air volume, and electrical activity and expired air volume had high coefficients of correlation, +0.875, +0.916, and +0.802, respectively, for 142 paired variates. There was no evidence of increased heat production without an increase in muscle tenseness and/or shivering. Heat production during the first, second, third and fourth hour averaged 54, 72, 92, and 96 kcal/m^2, per hour, respectively. Respiratory quotient declined slightly during the exposure. Mean rectal temperature declined during the second and third hour, but was relatively unchanged during the fourth hour. The psychogenic factor was noted during the final 15 min of exposure, i.e., the ability to cease shivering, and in some cases to become relaxed, when the suggestion to relax was given. Accompanying this cessation of shivering was a corresponding drop in heat production.
R 33

32,533
Piwonka, R.W. & Robinson, S. ACCLIMATIZATION OF HIGHLY TRAINED MEN TO WORK IN SEVERE HEAT. J. appl. Physiol., Jan. 1967, 22(1), 9-12. (Anatomy & Physiology Dept., Indiana University, Bloomington, Ind.).

In a study conducted in April 1963, five highly trained distance runners appeared to be well acclimatized to work (HR, 240 kcal/m^2 per hr) in the heat (40 C dry bulb--DB, 23.5 C wet bulb--WB) even though none of them had been exposed to heat since the preceding summer. Four of the men continued their training program, and during April of the following year an attempt was made to acclimatize them further by daily performances of the same work in a more intense heat stress (50 C DB, 28 C WB). They wore shoes, socks, and 8-oz cotton twill suits. All of them experienced marked elevations of body temperature and heart rate in the first exposures followed by significant improvements in heat tolerance in the succeeding days. Their principal adjustments with acclimatization involved a greatly increased cutaneous blood flow and a higher sweat rate per degree rise of rectal temperature. The intensive training program of the runners completely conditioned them for work in moderate heat, and it apparently improved their capacities for acclimatization to a severe heat stress.
R 16

32,534
Williams, C.G., Wyndham, C.H. & Morrison, J.F. RATE OF LOSS OF ACCLIMATIZATION IN SUMMER AND WINTER. J. appl. Physiol., Jan. 1967, 22(1), 21-26. (Human Sciences Lab., Transvaal & Orange Free State Chamber of Mines, Johannesburg, South Africa).

The rate of loss of acclimatization to heat when men are withdrawn from work in hot conditions in a mine to work in cool conditions for periods of 1, 2, and 3 weeks, both in summer and in winter, is examined. Samples of 20 men who had been working in a hot area of a mine were withdrawn and subjected to a 4-day period of acclimatization. This had the effect of bringing all the subjects to the same state of acclimatization. There was a progressive rise in rectal temperature and heart rate and fall in sweat rate in the groups exposed to 4 hr of moderate work at 90 F wet bulb (WB) after being in cool conditions for 1, 2, and 3 weeks. There was no significant difference between summer and winter values. The values for these physiological measurements in a control group of unacclimatized men were significantly higher in winter than in summer. The practical implication of these results is that men who have been away from work in hot conditions for one week should be reacclimatized for one day before going back to work in hot conditions.
R 12

32,535
Lyndhka, C.H. EFFECT OF ACCLIMATIZATION ON THE SWEAT RATE/RECTAL TEMPERATURE RELATIONSHIP. J. appl. Physiol., Jan. 1967, 22(1), 75-80. (Human Sciences Lab., Transvaal & Orange Free State Chamber of Mines, Johannesburg, South Africa).

A sample of 13 acclimatized Bantu males and a fresh sample of between 6 and 10 unacclimatized Bantu at each heat stress condition (making a total of 353 unacclimatized Bantu) were exposed to 45 different combinations of air temperature (with the air saturated with water vapor), wind velocity, and work rate. A table was constructed of the mean sweat rate for 0.3 F class intervals of rectal temperature. The mean sweat rates were based on different sample sizes in the various class intervals of rectal temperature. An exponential equation of the form $Y = K(1 - ae^{-bx^2})$ was used to express the relationship and the curves so derived fitted the data very well indeed. Comparison of the curve for the acclimatized and unacclimatized men showed that they were significantly different (at the 5% level) and that in the acclimatized men: a) the origin of the steep part of the curve is shifted by over 1 F to the left; b) the steepness of the slope of the curve is increased; and c) the asymptote, or maximum value, of sweat rate is higher. From these results it can be concluded that there is an increase in "sensitivity" and an increase in "capacity" of the regulation of sweat rate by the temperature of the hypothalamus (as represented by the rectal temperature).
R 8

32,536
Fox, R.H., Goldsmith, R., Hampton, I.F.G. & Hunt, T.J. HEAT ACCLIMATIZATION BY CONTROLLED HYPERTHERMIA IN HOT-DRY AND HOT-WET CLIMATES. J. appl. Physiol., Jan. 1967, 22(1), 39-46. (National Institute for Medical Research, London, England).

Acclimatization by controlled hyperthermia (38.2 C for 2 hr daily for 12 days) of one group of subjects in hot-dry conditions was compared with the same exposure of a second group in hot-wet conditions. Compared in the same standard tests both groups initially responded equally and after acclimatization both had developed marked and similar improvements in response. However, arm sweat measurements showed that there was a difference in the effects of the two climates on the sweat suppression phenomenon. Arms that had been exposed to hot-wet conditions throughout acclimatization developed a reduced rate of sweat suppression not seen in the arms exposed throughout to hot-dry conditions. This difference between acclimatization in hot-wet and hot-dry conditions could be important in determining the subjects' subsequent tolerance to heat, especially when the exposure is prolonged and the conditions are humid. It is suggested that when sweat rate is used as an index of acclimatization both the maximum sweating capacity for a given increase in body temperature and the rate of sweat suppression need to be measured.
R 18

32,537
Goldsmith, R. COLD EXPOSURE OF FARM AND LABORATORY WORKERS. J. appl. Physiol., Jan. 1967, 22(1), 47-49. (Human Physiology Div., National Institue for Medical Research, London, England).

The time that two groups, one of farm workers, the other of laboratory workers, were exposed to below 5 and 10 C was measured during one week in winter in England. The time spent outdoors and in bed were also elicited. Further, the clothes the men wore and the degree of comfort they maintained were recorded. The two groups differed considerably; the farm workers spent nearly 25% of the 24 hr outdoors, 10% below 5 C and 44% below 10 C, while the laboratory workers were outdoors for only 4% of the 24 hr, 0.6% below 5 C and nearly 10% below 10 C. Farm workers slept a considerably shorter time (7.2 hrs/night in contrast to 8.7 hr for the laboratory workers). The number of layers of clothing worn by the two groups was similar in spite of the differences in exposure to cold. It is suggested that farm workers would be good subjects for cold acclimatization studies and that their relatively light clothing suggests a decreased sensitivity to cold.
R 6

32,538
Greenleaf, J.E., Prange, Elizabeth M. & Averkin, E.G. PHYSICAL PERFORMANCE OF WOMEN FOLLOWING HEAT-EXERCISE HYPOHYDRATION. J. appl. Physiol., Jan. 1967, 22(1), 55-60. (Ames Research Center, NASA, Moffett Field, Calif.).

Twelve healthy women, ages 22 to 33, underwent a 5-month physical training period before being divided into two groups, a control group and a hypohydrated (water-depleted) group. Hypohydration was achieved with the subjects alternately resting and walking (4.8 km/hr) at 49 F until they lost about 3.3% of their body weight. They were then given various physical performance tests to assess the effect of the hypohydration. Statistically significant changes ($P < 0.05$) in the hypohydrated group were observed in a) resting pulse rates, b) recovery pulse rates following a modified Harvard step test, and c) the pulse rates and systolic and diastolic blood pressures during a standard 70° tilt table test. No significant decrements were noted in submaximal O_2 intakes, submaximal V_E (volume of expired gas), total body reaction times, and maximal isometric muscular strength. The submaximal ventilatory exchange ratio was unchanged. It was concluded that there was some deterioration in the cardiovascular system response but there was no gross deterioration in physical performance following 3.3% hypohydration in fit, young women.
R 37

32,539
Stenberg, J., Åstrand, P.-O., Ekblom, C., Royce, J., et al. HEMODYNAMIC RESPONSE TO WORK WITH DIFFERENT MUSCLE GROUPS, SITTING AND SUPINE. J. appl. Physiol., Jan. 1967, 22(1), 61-70. (Physiology Dept., Kungliga Gymnastiska Centralinstitutet, Stockholm, Sweden).

Submaximal and maximal work was performed on bicycle ergometers with arms, with legs, and with arms and legs, in sitting and supine positions, respectively. Six male and four female healthy and well-trained subjects were studied. During maximal exercise with arms, maximal $\dot{V}_{O_2}$ (O_2 consumption/min) and cardiac output (dye-dilution technique) were 66 and 80%, respectively, of the values attained in sitting maximal leg work. Simultaneous work with arms and legs did not allow higher $\dot{V}_{O_2}$ or $\dot{Q}$ (volume flow of blood/unit time) than maximal work with legs in sitting position. At a given submaximal $\dot{V}_{O_2}$, heart rate, intra-arterial blood pressure, and pulmonary ventilation were the same in leg exercise as in combined work, but the values were significantly higher during arm work. Stroke volume (in both positions) was higher during exercise than while resting; the lowest exercise values were registered during arm work in sitting position and the highest during combined work, supine position. Calculated total peripheral resistance was higher during arm work compared with other types of work at corresponding levels of oxygen uptake.
R 15

32,540
Wasserman, K., Van Kessel, A.L. & Burton, G.G. INTERACTION OF PHYSIOLOGICAL MECHANISMS DURING EXERCISE. J. appl. Physiol., Jan. 1967, 22(1), 71-85. (Respiratory Function Lab., Stanford University School of Medicine, Palo Alto, Calif.).

The effects of work intensity and duration on the metabolic circulatory and ventilatory response to exercise are quantitated in healthy male subjects during cycle ergometer exercise. There is a well-ordered relationship between work rate and oxidative energy sources. Steady-state time for O_2 consumption ($\dot{V}_{O_2}$) is dependent on work intensity (the time arterial blood lactate concentration stops increasing). At moderate work, anaerobic metabolism is a very small part of credit oxidation, while at very heavy work the pyruvate-lactate mechanism is the major creditor. The increase in gas exchange ratio (R) reflecting the production of CO_2 from bicarbonate (buffering of lactic acid) is transient. After the steady state is reached, R decreases. The heart rate increase during constant-load exercise parallels the increase in $\dot{V}_{O_2}$. Physiological dead space/tidal volume ratio decreases from .35 to .17 during exercise. The reduction is independent of work duration and only slightly reduced as work intensity increases. Arterial O_2 tension does not decrease during exercise at sea level even at maximal rates of O_2 transport. Arterial-end tidal CO_2 tension differences suggest a fluctuation in pulmonary capillary CO_2 tension of approximately 8 mm Hg during the respiratory cycle of the exercising subject. Changes in minute ventilation are best predicted from the rate of CO_2 production and the extent of respiratory compensation for metabolic acidosis.
R 45

32,541
Mead, J., Turner, J.M., Macklem, P.T. & Little, J.B. SIGNIFICANCE OF THE RELATIONSHIP BETWEEN LUNG RECOIL AND MAXIMUM EXPIRATORY FLOW. J. appl. Physiol., Jan. 1967, 22(1), 95-108. (Physiology Dept., Harvard University School of Public Health, Boston, Mass.).

During forced expirations lateral pressures at points within airways equal pleural pressure, and the pressure drop from alveoli to these points approximates the static recoil pressure of the lungs. The experimenters regard maximum expiratory flow as set by this pressure and the flow-resistance of the airways upstream from these points. The resistance of these segments has a frictional component which increases as lung volume decreases and an accelerative component which decreases as lung volume decreases. The two components show systematic changes with age in normal subjects which are interpreted as reflecting differential loss of parenchymal and airway recoil.
R 33

32,542
Zechman, F.W., Musgrave, F.S., Mains, R.C. & Cuhn, J.E. RESPIRATORY MECHANICS AND PULMONARY DIFFUSING CAPACITY WITH LOWER BODY NEGATIVE PRESSURE. J. appl. Physiol., Feb. 1967, 22(2), 247-250. (University of Kentucky Medical Center, Lexington, Ky.).

Negative pressure (40 cm Hg) was applied below the level of the iliac crests of five human subjects. The following measurements were made: changes in body weight measured at the head and foot, lung volumes, relaxation pressures (Pr), and pulmonary diffusing capacity ($D_{L_{CO}}$) at two levels of inspired oxygen for calculation of diffusing capacity of the pulmonary membrane (Dm) and volume of the pulmonary capillary bed (Vc). The Pr at 100% of vital capacity (VC) was unchanged by lower body negative pressure (LBNP) but shifted to the left (10-15 mm Hg) as percent VC approached 0. Expiratory reserve volume increased during LBNP. Vital capacity and residual volumes were unchanged. By the end of 1 min. LBNP, $D_{L_{CO}}$ decreased from an average of 36 to 28 ml/min. per mm Hg and Vc decreased from 89 to 60 ml. $D_{L_{CO}}$ and Vc remained near these levels until LBNP was removed 6 min., whereupon both approached control values by the fifth minute of recovery. LBN produced a decrease in weight at the head of 640 g. Factors contributing to this change include: diaphragm displacement, compression of soft tissues, and the redistribution of blood to the lower body. Study suggests postural changes in $D_{L_{CO}}$ may be more related to changes in pulmonary capillary blood volume than alteration in distribution of flow.
R 14

32,543
Grodins, F.S., Buell, John & Bart, A.J. MATHEMATICAL ANALYSIS AND DIGITAL SIMULATION OF THE RESPIRATORY CONTROL SYSTEM. J. appl. Physiol., Feb. 1967, 22(2), 260-276. (Mathematics Dept., Rand Corporation, Santa Monica, Calif.).

The basic material balance relationships for the lung-blood-tissue gas transport and gas exchange system have been expressed in a set of differential-difference equations containing a number of dependent time delays. Additional equations were written to define the chemical details of transport and acid-base buffering, concentration equilibria, and blood flow behavior. Finally a control function was written defining the dependence of ventilation upon cerebrospinal fluid (CSF) (H^+), and arterial (H^+) and P_{O_2} at the carotid chemoceptors. A Fortran program was written for convenient digital simulation of the dynamic system responses to a wide variety of forcings including CO_2 inhalation, hypoxia at sea level, altitude hypoxia, and metabolic disturbances in acid-base balance. Both dynamic and steady-state behavior was reasonably realistic.
R 37

32,544
Sonny, L.C., Jr. & Christensen, H.L. RESPIRATION OF DEHYDRATING MEN UNDERGOING HEAT STRESS. J. appl. Physiol., Feb. 1967, 22(2), 282-286. (St. Louis University School of Medicine, St. Louis, Mo.).

Five resting nude male subjects were exposed to 43 C dry bulb (DB), 25-29 C wet bulb (WB) for 12 hours for one rehydration and two dehydration experiments. Body weights were taken hourly; venous blood pH, plasma osmolarity, oral temperatures (T_O), respiratory rate (f), and minute volumes ($\dot{V}_E$) were obtained every two hours. No significant changes were noted for f. A significant correlation was established between ΔT_O and ΔcH. For rehydration $\%\Delta cH = -8.96\ \Delta T_O - 4.65$. for dehydration, $\Delta cH = 10.39\ \Delta T_O - 4.34$. No significant correlations were established for plots of $\%\Delta\dot{V}_E$ versus ΔcH or ΔT_O versus $\%\Delta\dot{V}_E$; Plots for % osmolarity versus $\%\Delta\dot{V}_E$ gave regression coefficients of -6.91 for rehydrating subjects and 5.96 for dehydrating subjects. These data on heat-exposed subjects who progressively lose approximately 5% of their body weight in 12 hours did not support existence of an entity known as "dehydration acrenia." Observed alkalosis in our studies can be accounted for by temperature effects on respiratory mechanisms similar to those operating in hydrated individuals.
R 31

32,545
Klausen, K., Dill, D.B., Phillips, E.E., Jr. & McGregor, D. METABOLIC REACTIONS TO WORK IN THE DESERT. J. appl. Physiol., Feb. 1967, 22(2), 292-296. (Anatomy & Physiology Dept., Indiana University, Bloomington, Ind.).

Oxygen consumption ($\dot{V}_{O_2}$) and ventilation ($\dot{V}_E$) during submaximal and maximal work were measured in comfortable environments and in dry heat. In submaximal work there was no significant change in $\dot{V}_{O_2}$ in heat, although it showed a trend to be lower than in a comfortable environment. In maximal work $\dot{V}_{O_2}$ was significantly decreased in hot environments. Blood lactate concentration 5 min after maximal performance did not show any significant correlation with air temperature. However, a highly significant correlation was found between work time and blood lactate and between $\dot{V}_{O_{2max}}$ and blood lactate. In dry heat the decrease in $\dot{V}_{O_2}$ in maximal work and probably also in higher levels of submaximal work very likely reflects an insufficient blood supply to the working muscles.
R 11

32,546
Goldsmith, R., Fox, R.H. & Hampton, I.F.G. EFFECTS OF DRUGS ON HEAT ACCLIMATIZATION BY CONTROLLED HYPERTHERMIA. J. appl. Physiol., Feb. 1967, 22(2), 301-304. (National Institute for Medical Research, London, England).

Experiments were performed to investigate the influence of aspirin, hyoscine, and pilocarpine, administered orally, on the process of heat acclimatization. Forty male subjects took part. Heat acclimatization was effected by a series of controlled hyperthermia sessions during which sweat and pulse rates were measured under the influence of the drugs. Acclimatization status was assessed at the beginning and end of the experiments by comparing the effects of a standard work-in-the-heat test on sweat and pulse rates and rises in body temperatures. The administration of aspirin (1 g) had no significant effect on either sweat or pulse rates. Pilocarpine (16 mg) did not significantly affect sweat rate, though it did increase the pulse rate at raised body temperature. Hyoscine (2 mg) depressed the sweat rate significantly during controlled hyperthermia, and consequently retarded the development of heat acclimatization.
R 13

32,547
Henkin, R.I. & Christiansen, R.L. TASTE LOCALIZATION ON THE TONGUE, PALATE, AND PHARYNX OF NORMAL MAN. J. appl. Physiol., Feb. 1967, 22(2), 316-320. (National Institutes of Health, Bethesda, Md.).

Detection and recognition thresholds for representatives of the salt, sweet, bitter, and sour modalities of taste were determined on the tongue, palate, and in the pharynx of 11 normal volunteers before and after anesthetization of the tongue, or hard and soft palate, or both. After the tongue was anesthetized detection thresholds for salt and sweet increased 25-fold, recognition thresholds increased 5- to 10-fold; there was no alteration in either threshold for sour or bitter. After the palate was anesthetized there was no significant alteration in either threshold for salt or sweet, however, detection thresholds for sour increased 6-fold while recognition thresholds for both sour and bitter increased more than 5-fold. The data demonstrate a) that each of the four modalities of taste is appreciated separately on the tongue, palate, and pharynx of man and b) that sensitivity for the salt and sweet tastes is greatest on the tongue while sensitivity for the sour and bitter tastes is greatest on the palate.
R 16

32,548
Johnson, R.E., Robbins, Frances, Schilke, E., Hold, P., et al. A VERSATILE SYSTEM FOR MEASURING OXYGEN CONSUMPTION IN MAN. J. appl. Physiol., Feb. 1967, 22(2), 377-379. (Physiology & Biophysics Dept., University of Illinois, Urbana, Ill.).

A system is described for measuring the oxygen consumption of men at rest, during moderate work, or during heavy work. Expired air, measured and sampled from a suitable respirometer, is collected in metallized polyethylene bags. Carbon dioxide does not diffuse measurably from these in several hours. For analysis, gas is drawn successively through a drying column, a paramagnetic oxygen meter, and a thermal conductivity CO_2 meter. Alveolar air may be analyzed directly. Calculation sheets suitable for computer programs are given for respiratory exchange and the metabolic mixture.
R 1

32,549
Paulev, P.-E. & Haerae, N. HYPOXIA AND CARBON DIOXIDE RETENTION FOLLOWING BREATH-HOLD DIVING. J. appl. Physiol., March 1967, 22(3), 436-440. (Physiology Institute, University of Aarhus, Aarhus, Denmark).

Experimental data from six subjects performing repeated breath-hold dives to 62 ft. (18.5 m.) in fresh water are presented. Rate of descent was 0.8 m/sec., ascent 1.5 m/sec., and diving time 36-124 sec. Surface intervals varied between 60 and 120 sec. The divers submerged with a lung volume containing residual volume plus 65% of vital capacity. About 650 ml (STPD--0°, 760 mm Hg, dry) oxygen was transferred from the lungs to the body in 42-sec. dives (mean of seven dives), while 260 ml carbon dioxide was given off from the body to the lungs. During the first 16 min. after a seven-dive series (representing a total submerged time of 330 sec. and a total surface time = 420 sec.) an excess elimination of approximately 3,500 ml (STPD) carbon dioxide was found. Carbon dioxide retention with acute respiratory acidosis may--because of the repetitive factor--be more dangerous to breath-hold divers than hitherto believed.
R 13

32,550
Hoppin, F G., Jr., York, E., Kuhl, D.E. & Hyde, R.W. DISTRIBUTION OF PULMONARY BLOOD FLOW AS AFFECTED BY TRANSVERSE (+G_x) ACCELERATION. J. appl. Physiol., March 1967, 22(3), 469-474. (USN Air Development Center, Johnsville, Penn.).

The distribution of blood flow in the pulmonary vascular bed under +G_x (forward or transverse acceleration) was studied by intravenous injection of radioactive iodine 131-macroaggregated albumin (131I-MAA) in three normal subjects while they were under +1 G_x, +4 G_x, and +8 G_x on a human centrifuge. The resulting distribution of radioactivity in the lungs, representing the distribution of pulmonary blood flow at the time of injection, was assessed 1-3 hours later by lateral radioisotope scanning. The distribution of pulmonary blood flow was not markedly different at +1 G_x, +4 G_x, and +8 G_x despite a difference between anterior and posterior pulmonary arterial pressures estimated to be 68 cm Hg under +8 G_x. These findings indicate that under +G_x (forward or transverse acceleration), unlike +G_z (headward or positive acceleration), the distribution of pulmonary blood flow is not markedly altered and the regional flow of blood in the lung may not be significantly changed by high intravascular pressures.
R 20

32,551
Rowell, L.B., Kraning, K.K., II, Kennedy, J.W. & Evans, T.O. CENTRAL CIRCULATORY RESPONSES TO WORK IN DRY HEAT BEFORE AND AFTER ACCLIMATIZATION. J. appl. Physiol., March 1967, 22(3), 509-518. (Cardiology Div., University of Washington School of Medicine, Seattle, Wash.).

Cardiac output, central blood volume (CBV), aortic blood pressure, heart rate, oxygen consumption ($\dot{V}O_2$), and skin (T_s) and rectal temperatures (T_r) were measured repeatedly during prolonged exercise (70 min.) in six normal young men before and after 11-12 days of acclimatization to work in dry heat (49.4 C dry bulb--25.6 C wet bulb). Heart rate, T_s, T_r, and total sweat loss followed the usual course with acclimatization. Work $\dot{V}O_2$ was unaffected. In five men cardiac output and CBV changed minimally. Stroke volume increased markedly in four men and was unchanged in one. A sixth subject showed very high cardiac output, CBV, and stroke volume before and decreased to normal after acclimatization. Results from five men indicate that decreased heart rate during acclimatization usually attends increased stroke volume, not decreased cardiac output. Increased stroke volume did not result from increased CBV via thoracic redistribution of peripheral blood but by decreased heart rate attending lower surface and "core" temperatures and increased sweating.
R 35

32,552
Horn, H.J., Snell, L.B., Cano, A.B., Brown, E.A., et al. MAINTENANCE OF AORTIC PRESSURE AND TOTAL PERIPHERAL RESISTANCE DURING EXERCISE IN HEAT. J. appl. Physiol., March 1967, 22 (3), 519-525. (Cardiology Div., University of Washington School of Medicine, Seattle, Wash.)

At 25.6 and 43.3 C, pressure aortic blood pressure were recorded with a specially designed manometric system before and after cardiac output determinations in six normal, unacclimatized young men during four grades of treadmill exercise requiring from 43 to 87% of maximal oxygen intake. Unlike peripheral arterial blood pressure, proximal aortic pressure remained almost constant, "uncoupling" close regulation at baroreceptor sites during exercise. Constancy of pulse pressure exceeded that of systolic, diastolic, or mean pressure. At 43.3 C, blood pressure was always slightly lower than at 25.6 C. Total peripheral resistance (TPR) fell as workload increased; it diminished more at low workloads at 43.3 C but equaled values at 25.6 C at the two higher workloads. Exercise to exhaustion in the heat was not associated with peripheral circulatory collapse and hypotension. Inversion of vasodilatation in skin and working muscles was previously shown to initiate even greater regional redistribution of blood flow. This effectively maintained central blood pressure and TPR.
R 30

32,553
Morimoto, T., Slabochova, Z., Naqvi, R.K. & Sargent, F., II. SEX DIFFERENCES IN PHYSIOLOGICAL REACTIONS TO THERMAL STRESS. J. appl. Physiol., March 1967, 22(3), 526-532. (Physiology & Biophysics Dept., University of Illinois, Urbana, Ill.).

Thirteen young men, aged 17-32, and 13 young women, aged 18-23, were exposed five times for two hours to increasing heat with either low or high humidity. Measurements were made of the total body and forearm sweat rate, sweat chloride concentration, rectal and skin temperature, blood pressure, pulse rate, and respiratory metabolism. A remarkable sex difference was observed in the sweat rates; they were significantly higher in the men, especially under higher heat either dry or moist. There was a definite depression of sweating by high humidity in both sexes. As heat stress increased, systolic blood pressure rose slightly in the women, diastolic decreased much more in the men. Total heat production, lower in the women, increased relatively more among them under the influence of heat and treadmill walking. In the other parameters, no influence of the humidity or sex was found. Large individual variations of sweat chloride concentration were observed. No signs of acclimation developed. It is concluded that even at equivalent levels of P_{4SR} (predicted four-hour sweat rate) the effects of dry and moist heat on sweating differ.
R 14

32,554
Weinman, E.P., Slabochova, Z., Bernauer, E.M., Morimoto, T., et al. REACTIONS OF MEN AND WOMEN TO REPEATED EXPOSURE TO HUMID HEAT. J. appl. Physiol., March 1967, 22(3), 533-538. (Physiology & Biophysics Dept., University of Illinois, Urbana, Ill.).

Ten healthy young subjects, five men and five women, underwent a series of experiments, walking on a treadmill for four hours under conditions of 33.9 C dry bulb (DB), 32.2 C wet bulb (WB), and 53% relative humidity. Measurements were made of sweat rate, skin and rectal temperatures, pulse rate, blood pressure, and metabolic rate. Two similar experiments under temperate ambient conditions served as bases for evaluating the influence of the work in humid heat and that of the work itself. The increment of rectal temperature was smaller in the men than in the women and decreased progressively. Total body sweat rate was significantly higher in the men and rose during the course of the repeated exposures. Among women the increment of pulse tended to reach a plateau within two hours; it did not in men. No differences nor changes were found in the blood pressure, skin temperature, and total heat production. The results suggest sex differences in acclimation mechanisms.
R 13

32,555
Adams, W.C. INFLUENCE OF AGE, SEX, AND BODY WEIGHT ON THE ENERGY EXPENDITURE OF BICYCLE RIDING. J. appl. Physiol., March 1967, 22(3), 539-545. (Physical Education Dept., University of California, Davis, Calif.).

Energy expenditure observations were made on 60 normal adult men and women, ranging in age from 20 to 52.2 years, while riding a narrow-tire bicycle at a previously determined average speed. Analysis of variance indicated that age had no effect on gross energy expenditure and that, when the latter was divided by total body weight, there was no significant difference between men and women. The results of multiple regression analysis confirmed the dominant effect of total body weight, in that neither the addition of age, height, body surface area, lean body weight, fat body weight, or triceps skinfold contributed significantly to the prediction of energy expenditure for the ride.
R 31

32,556
Reeves, J.T., Grover, R.F. & Cohn, J.E. REGULATION OF VENTILATION DURING EXERCISE AT 10,200 FT IN ATHLETES BORN AT LOW ALTITUDE. J. appl. Physiol., March 1967, 22(3), 546-554. (Medicine Dept., University of Kentucky, Lexington, Ky.).

Five champion high school track runners from Lexington, Kentucky were studied at low altitude-(1,000 ft.) and during three weeks in Leadville, Colorado (10,200 ft.). Measurements of minute ventilation ($\dot{V}_E$ BTPS--body temperature and pressure saturated with water vapor) respiratory frequency (f), tidal volume (V_T), mixed expired oxygen concentration ($F_{E_{O_2}}$), and oxygen consumption ($\dot{V}_{O_2}$) were obtained at performance levels ranging from the basal state to maximum treadmill exercise. During maximal effort, $\dot{V}_{O_2}$ was approximately 25% less in Leadville than in Lexington, whereas $\dot{V}_E$ BTPS, V_T, f, and $F_{E_{O_2}}$ were similar at both altitudes. When each parameter was related to the absolute values of $\dot{V}_{O_2}$, a distinct curve was obtained for each altitude. However, when related to $\dot{V}_{O_2}$ as a percent of maximum $\dot{V}_{O_2}$ for the respective altitudes, often the altitude variable was virtually eliminated. The complex relationships between ventilation, altitude, and level of exertion were thereby simplified. This method of data analysis was tested against the data of Pugh et al. (Pugh, L.G.C.E., Gill, M.B., Lahiri, S., Milledge, J.S., et al. MUSCULAR EXERCISE AT GREAT ALTITUDES. J. appl. Physiol., 1964, 19, 431-440.) and was found to be in reasonable agreement considering the many altitudes involved. In fact, the similarities in data from a wide range of altitudes suggest that ventilation is regulated in part by some mechanism which senses a given effort in terms of exercise capacity.
R 11

32,557
Costill, D.L., Cahill, P.J. & Eddy, D. METABOLIC RESPONSES TO SUBMAXIMAL EXERCISE IN THREE WATER TEMPERATURES. J. appl. Physiol., April 1967, 22(4), 628-632. (Human Performance Lab., State University College, Cortland, N.Y.).

Eight subjects were studied during 20 min. of submaximal swimming in three different water temperatures (17.4, 26.8, and 33.1 C). During exercise and recovery various body temperatures, heart rates, and respiratory values were recorded. The energy requirements for the performance of exercise were not significantly affected by the water temperatures. Heart rates during recovery were found to be lowest following the exercise in 17.4 C water and highest after the swim in water 33.1 C. The core temperature increase during exercise was positively related to water temperature.
R 13

32,558
Rothstein, J.D. & Hanson, P.G. CARDIAC RATE CHANGES IN HUMANS AFTER ABRUPT DECELERATION. J. appl. Physiol., April 1967, 22(4), 645-647. (USAF Aeromedical Research Lab., Holloman AFB, N.M.).

Transient slowing of the cardiac rate has been observed after experimental abrupt deceleration (impact) when the deceleration inertial vector is directed cranial ($-G_z$). The attempt has been made to clarify the incidence and conditions of this response. Eighteen healthy male subjects (21-41 years) were exposed to $-G_z$ and $+G_z$ impact profiles of 10 G peak deceleration in paired experiments. Cardiac rate was monitored prior to and after impact by vectorcardiography. The data show that $-G_z$ deceleration produces a statistically significant decrease in cardiac rate immediately after impact. An insignificant increase in cardiac rate occurred after $+G_z$ impact. It is suggested that the observed changes in cardiac rate are mediated through the pressoreceptors of the carotid sinus and aortic arch.
R 11

32,559
Paulev, P.-E. NITROGEN TISSUE TENSIONS FOLLOWING REPEATED BREATH-HOLD DIVES. J. appl. Physiol., April 1967, 22(4), 714-718. (Physiology Institute, University of Aarhus, Aarhus, Denmark).

Results for computer calculations of nitrogen tissue tensions following repetitive breath-hold dives are reported. They are based on alveolar nitrogen percentages measured during actual diving to 62 ft. in fresh water. These calculations predict that after repeated skin dives to depths of 62-115 ft. (18.5-35m.), it is possible to obtain tissue nitrogen tensions exceeding the maximum allowable tensions of conventional air-supplied diving. Thus decompression sickness from breath-hold diving is a likely possibility when a series of deep dives is performed. Repeated breath-hold dives to such depths should only be performed with long surface intervals to avoid the risk of decompression sickness. Preoxygenation by breathing compressed air beforehand has been shown to diminish the number of dives necessary to reach a given tissue tension, and thereby increase the risk of decompression sickness. Breath-hold dives to 62 ft. or more should be discouraged if the diver, by simulated or real air-supplied diving, has been breathing compressed air immediately before.
R 12

32,560
Khatri, I.M. & Freis, E.D. HEMODYNAMIC CHANGES DURING SLEEP. J. appl. Physiol., May 1967, 23(5), 866-873. (Georgetown University School of Medicine, Washington, D.C. & US Veterans Administration Hospital, Washington, D.C.).

Cardiac output, mean arterial pressure, central venous pressure, and the digital plethysmogram were recorded during electroencephalograph (EEG)-monitored sleep. In sleep without rapid eye movements (REM) mean arterial pressure and cardiac output were reduced from the level recorded during the resting awake state. The fall in cardiac output was associated with a reduction in heart rate rather than in stroke volume. Vasodilation occurred in the digits with decreased amplitude of alpha and beta waves but total peripheral resistance remained essentially unchanged. Central venous pressure fell slightly in stages III and IV sleep. During REM sleep arterial pressure and heart rate usually rose while changes in cardiac output were variable. Digital vasoconstriction occurred in nearly all instances. The results indicated that the level of sympathetic vasomotor activity had an important influence on the circulatory changes observed during the various stages of sleep.
R 11

32,562
Cruz, J.C., Cerretelli, P. & Farhi, L.E. ROLE OF VENTILATION IN MAINTAINING CARDIAC OUTPUT UNDER POSITIVE-PRESSURE BREATHING. J. appl. Physiol., May 1967, 22(5), 900-904. (Physiology Dept., State University of New York, Buffalo, N.Y.).

Simultaneous measurements of ventilation ($\dot{V}_E$) and cardiac output ($\dot{Q}$) were obtained in normal subjects breathing either at ambient pressure or against a positive pressure (PPB) of 5, 10, or 25 cm H_2O. When this pressure is increased, $\dot{Q}$ tends to decrease. This may, however, be masked by concomitant changes in $\dot{V}_E$. When the latter is constant at 10 liters·min.$^{-1}$, $\dot{Q}$ decreases by approximately 0.2 liter·min.$^{-1}$ for each additional cm H_2O of PPB. Therefore, at this ventilatory level, a PPB of 30-35 cm H_2O would be associated with a $\dot{Q}$ value of zero. At any level of PPB an increase in $\dot{V}_E$ results in an increase in $\dot{Q}$. This increase is 0.3 liter·min.$^{-1}$ per liter·min.$^{-1}$ change in $\dot{V}_E$ when frequency of breathing is constant, but only 0.15 when frequency is increased, which may indicate that tidal volume per se may be involved.
R 17

32,563
Burger, H.C., Koopman, L.J. & van Loon, P. WORK AND EFFORT. J. appl. Physiol., May 1967, 22(5), 913-922. (Medical & Physiological Physics Dept., State University, Utrecht, The Netherlands).

In order to investigate the problem how far man's reaction during daily exercise is determined by work done in physical sense, the reactions of pulse pressure R_p, oxygen consumption R_{O_2} and pulse frequency R_f to a subject's exercise have been studied as a function of time and of force and displacement. The experiments were performed with three male subjects by using a calibrated bicycle ergometer with which the load could be measured and the values of torque T and revolutions n per minute corresponding with the physical quantities force and displacement, could be chosen independently. It was found that the reactions R_p, R_{O_2}, and R_f as a function of time could be described by a linear differential equation of the first order from which the recovery time was derived. For the reactions R_p, R_{O_2}, and R_f occurring during an exercise of 2 min., the relative dynamic, static, and kinetic contributions to the effort could be expressed as a function of force and displacement according to an analytical method. Finally, the efficiency of the O_2 consumption has been determined.
R 14

32,564
von Döbeln, W., Astrand, Irma & Bergström, A. AN ANALYSIS OF AGE AND OTHER FACTORS RELATED TO MAXIMAL OXYGEN UPTAKE. J. appl. Physiol., May 1967, 22(5), 934-938. (National Institute of Occupational Health, Stockholm, Sweden).

Eighty-four male construction workers aged 30-70 years were tested once at submaximal and maximal loads on a bicycle ergometer. Submaximal and maximal heart rates and maximal oxygen uptake (max $\dot{V}_{O_2}$) were measured. The prediction of max $\dot{V}_{O_2}$ from the other variables was analyzed by a fitting procedure using a modified least-square criterion. The best equation gave a SEE of 8.4%. This equation is

$$\max \dot{V}_{O_2} = 1.29 \sqrt{\frac{L}{H - 60}} \cdot e^{-0.00884T}$$

where L is load in kilopondmeters per minute at submaximal work, H is heart rate after 5-6 min. at load L, and T is age in years.
R 15

32,565
Davies, C.T.M. & Neilson, J.M.M. DISTURBANCE OF HEART RHYTHM DURING RECOVERY FROM EXERCISE IN MAN. J. appl. Physiol., May 1967, 22(5), 943-946. (Environmental Physiology Research Unit, London School of Hygiene & Tropical Medicine, London, England & Medical Physics Dept., University of Edinburgh, Edinburgh, Scotland).

The large rhythmical fluctuations which occur in the heart rate after exercise have been studied experimentally in 10 healthy subjects. Contrary to previous findings it has been shown that the phenomenon is respiratory in origin and therefore an exaggerated form of sinus arrhythmia. The greater part of the effect is probably due to bursts of vagal activity, reinforced from receptors in various sites sensitive to blood pressure.
R 5

32,566
Karlsson, J., Åstrand, P.-O., & Ekblom, B. TRAINING OF THE OXYGEN TRANSPORT SYSTEM IN MAN. J. appl. Physiol., June 1967, 22(6), 1061-1065. (Physiology Dept., College of Physical Education, Stockholm, Sweden).

For six subjects, three well trained and three untrained, an individual speed was determined that brought them to complete exhaustion at the end of the fourth minute of running. On the following days the speed of the treadmill (3° slope) was then decreased without changing the total distance of the run. O_2 uptake and pulmonary ventilation were measured after one minute and 4-5 minutes of running, respectively, heart rate was continuously registered, and peak values of blood lactic acid were determined. A reduction in speed, up to 3 km/hr did not decrease the O_2 uptake; a plateau of maximal O_2 uptake was observed. For optimal training of the circulation the load on the O_2 transport system should probably be maximum. Since maximal O_2 uptake can be reached at a submaximal speed, this lower speed may be sufficient and perhaps optimal as a training stimulus.
R 7

32,567
Vogel, J.A. & Harris, C.W. CARDIOPULMONARY RESPONSES OF RESTING MAN DURING EARLY EXPOSURE TO HIGH ALTITUDE. J. Appl. Physiol., June 1967, 22(6), 1124-1128. (USA Medical Research & Nutrition Lab., Fitzsimons General Hospital, Denver, Colo.).

Sixteen young male subjects were exposed to simulated altitudes of 7,000, 11,000, and 15,000 ft. in a hypobaric chamber and studied at sitting rest after 10, 20, 30, and 40 hours of exposure. Of those measurements made, only Pa_{O_2} (arterial O_2 pressure) changed significantly with time of exposure. Cardiac output rose from 41 at 7,000 ft. to 65 and 123 ml/min per kg at 11,000 and 15,000 ft., respectively. This was due to significant increases in heart rate at both higher elevations with no alteration in stroke volume. Mean arterial blood pressure was unaltered and, therefore, peripheral resistance fell concomitant with the rise in cardiac output. Mean Pa_{O_2} for the three altitudes was 96, 53, and 44 mm Hg; and percent Sa_{O_2} (arterial O_2 saturation) 99, 92, and 79. Largest changes in Pa_{CO_2} (partial pressure of CO_2 in arterial blood) and pH were observed between 7,000 and 11,000 ft. and much less between 11,000 and 15,000 ft. Changes in cardiac output appeared best related to alterations in arterial O_2 content or saturation rather than tension, suggesting a peripheral rather than a central origin for the stimulus for the cardiovascular response to high altitude. The cardiac output response appears to follow an exponential relationship with altitude.
R 31

32,568
Hong, S.K., Song, C.H., Kim, P.K. & Suh, C.S. SEASONAL OBSERVATIONS ON THE CARDIAC RHYTHM DURING DIVING IN THE KOREAN AMA. J. Appl. Physiol., July 1967, 23(1), 18-22. (Physiology Depts., Yonsei University College of Medicine, Seoul, Korea).

Electrocardiograms were obtained from 5 men in the summer (water temperature of 17 C) and the winter (water temperature of 10 C) during each of the following apneic maneuvers: a) breath holding (BH) in air, b) BH in water, c) surface swim with head submerged underwater, and d) diving to a depth of 5 m. Although a sinus bradycardia was noted in all cases, the extent of this bradycardia was least during BH in air and was greatest during BH in water as well as during surface swim. Moreover, the bradycardia during diving was less severe than during BH in water. Quantitatively, the extent of bradycardia during each apneic maneuver was approximately 20% greater in the winter than in the summer. Cardiac arrhythmias were uniformly noted in all apneic maneuvers: the incidence being approximately 03% in the summer and 72% in the winter. Of various arrhythmias, abnormal P wave and nodal rhythm were most frequently observed, although idioventricular rhythm, premature atrial beats, and premature ventricular beats were occasionally seen. On the basis of these findings, it is concluded that the diving bradycardia is mainly attributable to both breath holding and water submergence and the cardiac arrhythmia during diving to breath holding alone, and also that cold stimulus plays a valuable role in potentiating the development of both bradycardia and arrhythmia during diving.
R 21

32,569
Faulkner, J.A., Daniels, J.T. & Balke, B. EFFECTS OF TRAINING AT MODERATE ALTITUDE ON PHYSICAL PERFORMANCE CAPACITY. J. Appl. Physiol., July 1967 23(1). 85-89. (Physical Education Dept., University of Michigan, Ann Arbor, Mich.).

Five well-conditioned men and sixteen highly conditioned college swimmers trained daily at an elevation of 20 m (sea level) before and after a period of training at an altitude of 2,300 m. The maximal oxygen uptake was significantly lower at altitude and the pulmonary ventilation (BTPS) significantly higher. After three weeks of training at altitude the five men approximated sea-level control values of maximum oxygen uptake on a bicycle ergometer test. The college swimmers did not regain sea-level control values of maximum oxygen uptake during repeated swimming at altitude. The same maximum were attained in heart rate and systolic blood pressure at both elevations. In both groups, hemoglobin and hematocrit ratio values increased significantly during training at altitude but returned to normal on return to sea level. In events of over two minutes duration (trial performances at 2,300 m were impaired 5-6% compared to control values obtained at sea level. On return to sea level, maximum oxygen uptakes and time trial performances of the five well-conditioned men were increased compared to preal titude control values. No significant changes were observed in the group of highly conditioned swimmers.
R 19

32,570
Cohen, P.J., Alexander, S.C., Smith, T.C., Reivich, M., et al. EFFECTS OF HYPOXIA AND NORMOCARBIA ON CEREBRAL BLOOD FLOW AND METABOLISM IN CONSCIOUS MAN. J. Appl. Physiol., Aug. 1967, 23(2), 183-189. (Anesthesia & Neurology Depts., University of Pennsylvania School of Medicine, Philadelphia, Penn.).

Cerebral blood flow (CBF) and carbohydrate metabolism were examined in nine conscious male volunteers during a steady state of hypoxia produced by the inhalation of 6.9-7.5% oxygen, while hypocarbia was prevented by the addition of CO_2 to the inspired gas. During hypoxia, Pa_{O_2} (arterial O_2 pressure) decreased from 89.4 to 34.6 torr, CBF increased from 45.0 to 77.1 ml/100 g per min., and cerebral vascular resistance decreased from 1.8 to 1.0 torr/ml per 100 g per min. The increased CBF accompanying hypoxia did not completely compensate for the reduced Pa_{O_2}, and a number of statistically significant metabolic alterations appeared. Cerebral glucose uptake increased from 4.48 to 5.73 mg/100 g per min., while cerebral lactate production increased more than fourfold. During hypoxia, the fraction of glucose consumption that could be related to oxygen uptake was lower than normal, a greater than normal proportion of glucose appeared as lactate, and cerebral oxygen consumption did not change. Arterial and cerebral venous excess lactate did not appear during hypoxia in all subjects. Electroencephalographic changes occurred in only two of seven subjects. Evaluation of the variables studied suggests that the most sensitive metabolic indices of cerebral hypoxia are changes in the rate of glucose uptake and in the relative amounts of glucose accounted for by lactate production and by oxygen consumption.
R 51

32,571
Buskirk, E.R., Kollias, J., Akers, R.F., Prokop, E.K., et al. MAXIMAL PERFORMANCE AT ALTITUDE AND ON RETURN FROM ALTITUDE IN CONDITIONED RUNNERS. J. appl. Physiol., Aug. 1967, 23 (2), 259-266. (Human Performance Research Institute for Science & Engineering Lab., Pennsylvania State University, University Park, Penn.).

Maximal aerobic capacity as measured by the maximal oxygen intake ($\dot{V}O_{2max}$), ventilation ($\dot{V}E_{max}$), heart rate (HR_{max}), bicycle-riding time, and outdoor running times, were measured in six well conditioned runners at altitudes of 300 m., 4,000 m., and after return to 300 m. The runners maintained a training regimen at all altitudes. $\dot{V}O_{2max}$ decreased 26% at 4,000 m. as compared to the values at 300 m. $\dot{V}E_{max}$ was increased at 4,000 m., and HR_{max} remained relatively unchanged. $\dot{V}O_{2max}$ was no higher following return to 300 m. than it had been before going to altitude. A synergistic effect of exercise plus hypoxia as a training stimulus was not found. Performance times were similar on return from altitude in track events to what they were before going to altitude. Pulmonary edema did not occur in any of the runners. After 4-5 weeks at altitude, the runners could compete on equal terms in soccer with native residents at 4,000 m.
R 17

32,572
Glider, Helena, Cornell, G.H. & Thorbjarnarson, B. HUMAN ENERGY EXPENDITURE IN STARVATION ESTIMATED BY EXPIRED-AIR ANALYSIS. J. appl. Physiol., Sept. 1967, 23(3), 297-303. (Surgery Dept., Cornell University Medical College, New York, N.Y.).

Energy expenditure was determined by indirect calorimetry with a unique portable expired-air analyzer which measures gas exchange intermittently. It is an integrated unit which houses two spirometers, oxygen and carbon dioxide sensors, humidity and temperature sensors, and a multipoint recorder. Its over-all accuracy in terms of the coefficient of variation for O_2 is ±2.60% and for CO_2 ±4.65%. Total caloric expenditure of six obese patients subjected to prolonged starvation was determined by multiple studies at various activity levels. Expenditure of three males ranged from 1.1 to 2.6 kcal/min and of three females from 1.2 to 1.8 kcal/min.
R 21

32,573
Stiles, R.N. & Randall, J.E. MECHANICAL FACTORS IN HUMAN TREMOR FREQUENCY. J. appl. Physiol., Sept. 1967, 23(3), 324-330. (Physiology Dept., Northwestern University Medical School, Chicago, Ill.).

Acceleration measurements of hand and finger tremor contain reproducible peaks in their power (variance) spectra. Muscle tension and moment of inertia of the hand and of the finger were systematically varied and the corresponding frequencies of the spectral peaks were observed. When average muscle tension was held constant, as monitored by a rectified electromyogram signal, adding increments of mass to the finger lowered the 25 cycle/sec. spectral peak. The 9 cycle/sec. peak did not change. Adding mass to the whole hand lowered the frequency of the 9 cycle/sec. spectral peak. The relationship between tremor frequency and added mass is consistent with that for a second-order underdamped system. A mathematical model was formulated by which the natural frequency can be computed in terms of the mass and dimensions of a cylinder similar to the finger, the mass of an added weight, and the spring constants and angle of attachment of a pair of springs. When the relationship between added mass and transformed tremor frequency was extrapolated, the predicted mass of the finger correlated well with the mass estimated by volume displacement.
R 15

32,574
Braun, W.E., Maher, J.T. & Byron, R.F. EFFECT OF EXOGENOUS d-ALDOSTERONE ON HEAT ACCLIMATIZATION IN MAN. J. appl. Physiol., Sept. 1967, 23(3), 341-346. (USA Research Institute of Environmental Medicine, Natick, Mass.).

In a crossover design, six unacclimatized men received 1.0 mg of d-aldosterone daily for three days before and the first six days of a heat exposure (120/80 F dry/wet bulb) during which they marched continuously for 90 min. With aldosterone before the heat, there was the expected urine sodium retention and potassium excretion and weight gain without blood pressure elevation. During the heat, blood pressure, body weight, electrocardiograms, and serum, urine, and sweat electrolytes were not significantly different with or without aldosterone. With aldosterone the men could march longer during the first three days ($P < .05$), had lower pulse rates during the first four days ($P < .035$), and had lower rectal temperatures during the first five days ($P < .05$). However, no shortening of total acclimatization time was seen.
R 28

32,575
Pugh, L.G.C.E. Corbett, J.L. & Johnson, R.H. RECTAL TEMPERATURES, WEIGHT LOSSES, AND SWEAT RATES IN MARATHON RUNNING. J. appl. Physiol., Sept. 1967, 23(3), 347-352. (Human Physiology Div., National Institute for Medical Research, London, England).

Body weight and rectal temperature changes were followed in athletes competing in a marathon race (42 km). Ambient temperature was 23 C (17 C wet bulb--WB) and relative humidity 58%. There were 77 competitors. Average results for those completing the race were: speed, 13 km hr^{-1}; estimated O_2 intake, 41 ml kg^{-1} min^{-1}; weight loss, 2.85 kg; rectal temperature, 39.6 C. The winner's time was 2 hr, 38 min; his average speed was 16 km hr^{-1}; estimated O_2 intake was 54 ml kg^{-1} min^{-1}; weight loss 5.23 kg; fluid loss 5.1 liters or 6.7% of body weight. Rectal temperature was 41.1 C and average sweat rate was 1.8 liters hr^{-1}. Unexplained partial collapse occurred in four runners .5-1 hr after the race. It was concluded that heat elimination limits performance for some runners even in comparatively mild conditions and that successful marathon runners have sweat rates equal to the highest values seen in heat-acclimatized nonathletes and can tolerate exceptionally high rectal temperatures.
R 23

32,576
Saltin, B. & Åstrand, P.-O. MAXIMAL OXYGEN UPTAKE IN ATHLETES. J. appl. Physiol., Sept. 1967, 23(3), 353-358. (Physiology Dept., Gymnastik-och Idrottshögskolan, Stockholm, Sweden).

During maximal running (treadmill) or bicycling the oxygen uptake was determined in 55 males and 38 female athletes belonging to Swedish National Teams. The mean maximal oxygen uptake for the 15 males with the highest values was 5.75 liters/min. with an upper extreme of 6.17 liters/min. The mean maximal pulmonary ventilation was 158.7 (140.0-203.3) liters/min. and the mean maximal heart rate 185 (169-200) beats/min. As a team the five cross-country skiers achieved the highest value 83 ml/kg x min. (5.6 liters/min.) and the highest individual value (AR, world champion in cross-country skiing) was 85.1 ml/kg x min. (5.7 liters/min.). Subject KK (3,000 m., 7:39.6) had 82 ml/kg x min. (4.9 liters/min.). The mean maximal oxygen uptake for the best 10 female athletes was 3.6 liters/min. The maximal pulmonary ventilation was 111.8 (91.6-131.0) liters/min. and maximal heart rate 195 (185-204) beats/min. A description of the system for collection of expired air is also given.
R 14

32,577
Craig, A.B., Jr. & Vare, D.E. EFFECT OF IMMERSION IN WATER ON VITAL CAPACITY AND RESIDUAL VOLUME OF THE LUNGS. J. appl. Physiol., Oct. 1967, 23(4), 423-425. (Physiology Dept., University of Rochester School of Medicine & Dentistry, Rochester, N.Y.).

The vital capacity and residual volume of 21 healthy adult males were measured with the subjects seated in air and then immersed upright to the level of the neck in water. The vital capacity was decreased from a mean value of 5.33 liters in air to 5.10 liters during immersion. The residual volume in air was 1.44 liters and in water was 1.38 liters. The change in the vital capacity was statistically significant while the change in residual volume was not. There was no difference in the results between one-half of the group studied in water 27 C and the other half in water 35.5 C.
R 10

32,578
Hansen, J.E., Vogel, J.A., Stelter, G.P. & Consolazio, C.F. OXYGEN UPTAKE IN MAN DURING EXHAUSTIVE WORK AT SEA LEVEL AND HIGH ALTITUDE. J. appl. Physiol., Oct. 1967, 23(4), 511-522. (USA Medical Research & Nutrition Lab., Fitzsimons General Hospital, Denver, Colo.).

Oxygen uptake ($\dot{V}O_2$) was measured in 15 healthy soldier volunteers at sea level and 4,300 m. (Pikes Peak) before, during, and after exercise on the bicycle ergometer. $\dot{V}O_2$'s at 4,300 m. were similar to sea-level values at rest and during mild and moderate exercise. Mean maximum $\dot{V}O_2$ at 4,300 m. was 83% of sea-level value and was unaffected by rate of ascent. Resting and exercise ventilations increased at 4,300 m., first by a rise in breathing frequencies and later by an increase in tidal volumes. During increasing exercise at 4,300 m., the alveolar-arterial difference for oxygen increased more than at sea level and the oxygen saturation of arterial blood decreased. During maximum work the oxygen saturation of mixed venous blood did not decline to sea-level values. Total work until exhaustion did not improve after two weeks at 4,300 m. despite rises in maximum exercise ventilation and oxygen content of arterial blood. Physical training at 4,300 m. was of no greater value than similar training at sea level in increasing sea-level maximum $\dot{V}O_2$.
R 46

32,579
Hansen, J.E., Stelter, G.P. & Vogel, J.A. ARTERIAL PYRUVATE, LACTATE, pH, and P_{CO_2} DURING WORK AT SEA LEVEL AND HIGH ALTITUDE. J. appl. Physiol., Oct. 1967, 23(4), 523-530. (USA Medical Research & Nutrition Lab., Fitzsimons General Hospital, Denver, Colo.).

In 15 normal subjects on ascent to 4,300 m. from sea level, resting concentrations of CO_2, actual bicarbonate, and hydrogen ion in arterial blood fell significantly while pyruvate and lactate rose equivocally. Resting pyruvate and lactate decreased significantly with acclimatization. At both altitudes, hydrogen ion, pyruvate, and lactate rose significantly with each increase in exercise while partial pressure of CO_2 and actual bicarbonate declined significantly with moderate or maximum exercise. At each level of exercise, pyruvates were significantly higher soon after arrival at 4,300 m., and then lower than sea-level values after two weeks' acclimatization. Maximum work hydrogen ion increases were less at 4,300 m. but sufficient to drop the pH below 7.30.
R 42

32,580
Vogel, J.A., Hansen, J.E. & Harris, C.W. CARDIOVASCULAR RESPONSES IN MAN DURING EXHAUSTIVE WORK AT SEA LEVEL AND HIGH ALTITUDE. J. appl. Physiol., Oct. 1967, 23(4), 531-539. (USA Medical Research & Nutrition Lab., Fitzsimons General Hospital, Denver, Colo.).

Multiple cardiovascular measurements were made at sea level and 4 300 m. (Pikes Peak, Colorado) on 16 young male volunteers during rest, mild, moderate, and maximum bicycle ergometer exercise and recovery. Subjects were divided so that effects of rate of ascent and physical conditioning could be assessed. The cardiovascular response to hypoxemia during the first four days at 4,300 m. consisted of: a) an increase over sea level in cardiac output at rest (12%), during all levels of exercise (16-18%), and after 10 min. of recovery (20%); b) a slight elevation in arterial blood pressure, and c) a fall in total peripheral resistance concomitant with the rise in cardiac output. The enhanced cardiac output was due primarily to an increased heart rate at rest and mild work but included a stroke volume response over that of sea level during moderate and maximum work. Maximum attainable heart rate was less at high altitude. All measurements returned to or near sea-level values by the third week at 4,300 m. except heart rate. Rate of ascent had a significant effect, particularly on stroke volume, while little effect was attributable to physical conditioning.
R 37

32,581
Hall, J.F. & Kitzes, F.K. THERMOREGULATORY RESPONSES IN DISPARATE THERMAL ENVIRONMENTS. J. appl. Physiol., Oct. 1967, 23(4), 540-544. (USAF Biomedical Lab., AMRL, Wright-Patterson AFB, Ohio).

Thermoregulatory responses to disparate thermal environments were investigated. Twenty-seven experiments were conducted on six subjects wearing light clothing and exposed supine, then prone, on a mat support placed so that the subject's body midline was parallel and within a horizontal plane dividing upper and lower chamber sections. Upper chamber half was maintained at 82.2 and 93.3 C while lower half was at -6.7 C. Air temperatures varied from -6.7 to 82 and 93 C, with a range of 15-30 C at the subject. Following measurements at comfort conditions, 17 skin and rectal temperature, heart rate, and evaporation were measured and recorded every 5 min. during the 30-min. supine and 50-min. prone exposure. While maximum differences between anterior-posterior mean skin temperature (T_s) of 9.1 and 9.5 C for the 82 and 93 C upper chamber temperatures, respectively, were measured, subjects reported thermal comfort. Maximum (T_s) variation at comfort was 4.1 C. Mean evaporative rates of 48.4 and 103.6 g/m^2 hr. for the 82 and 93 C exposures, respectively, indicated light sweating. Heart rate changes were insignificant.
R 8

32,582
Dill, D.B., Myhre, L.G., Brown, D.K., Burrus, Kay, et al. WORK CAPACITY IN CHRONIC EXPOSURES TO ALTITUDE. J. appl. Physiol., Oct. 1967, 23(4), 555-560. (Environmental Patho-Physiology, Desert Research Institute, Nevada Southern University, Boulder City, Nev.).

Three men aged 20, 29, and 75, and two women aged 29 were subjects in Balke tests on the von Döbeln bicycle ergometer four or five times during three weeks in desert heat, several times during three weeks at high altitudes, and during a second period in the desert. The observations paralleled those of 1965 in which the exposures to altitude were acute rather than chronic; the four men of that study included the three of this study. In chronic versus acute exposures four of the subjects could not attain as high values for $\dot{V}o_2$ (O_2 consumption), work rate, blood lactate, or heart rate at least during the first week at altitude. On the other hand, pulmonary ventilation increased more rapidly and reached higher levels. The decrement in performance during the first days at altitude may be twice as great as during the first hour. Recovery from this deterioration requires two or three weeks in the experience of the experimenters. When values for $\dot{V}o_{2max}$ and maximum work rate (WR_{max}) were referred to the amount of lean body mass, the two women and one young man were in the same category. Another man, Myhre, reached the highest values for $\dot{V}o_{2max}$ and WR_{max} referred to lean body mass, and Dill was at the other extreme. Lean body mass varies not only in quantity but also in quality.
R 10

32,583
McArdle, W.D., Foglia, G.F. & Patti, A.V. TELEMETERED CARDIAC RESPONSE TO SELECTED RUNNING EVENTS. J. appl. Physiol., Oct. 1967, 23(4), 566-570. (Health & Physical Education Dept., Queens College, Flushing, N.Y.).

By means of radio-telemetry the cardiac response prior to, during, and in recovery from selected track events was determined in 18 male varsity trackmen and 4 untrained subjects. The track events studied were the 60-yard, 220-yard, 440-yard, 880-yard, 1-mile, and 2-mile runs. It was concluded that: a) In trained runners the heart rate immediately preceding the start of the race was highest in the 60-yard dash and successively lower in events of longer distance. This anticipatory increase in heart rate represented 74% of the total heart rate adjustment to exercise in the 60-yard dash and 33% in the 2-mile run. b) The heart rate increased rapidly during the initial stages of each race with the heart rate reaching approximately 180 beats within 28 sec. during the 1-mile and 2-mile runs and within 10 sec. in the 220-yard run. Heart rate pattern during the race and in recovery was similar in the untrained group. c) Significantly higher peak heart rates were elicited in events of longer distance. There were no significant differences in maximum heart rates of trained and untrained. d) Recovery from the 60-yard dash was significantly more rapid than from any of the longer distances. No significant differences were demonstrated in recovery pattern of the 220-yard, 440-yard, 880-yard, 1-mile, and 2-mile runs.
R 24

32,584
Katch, F., Michael, E.D. & Horvath, S.M. ESTIMATION OF BODY VOLUME BY UNDERWATER WEIGHING: DESCRIPTION OF A SIMPLE METHOD. J. appl. Physiol., Nov. 1967, 23(5), 811-813. (Environmental Stress Institute, University of California, Santa Barbara, Calif.).

A description is given of a simple inexpensive device to determine body volume by the underwater weighing method. A standard swimming pool with a shallow end was used, and a wooden shell was placed in the pool to prevent water movement affecting the weighing. The method described makes it possible to study large numbers of subjects without the need for a special water tank. The prone position was used since it was found that less movement occurred when breathing in this position. Nine to ten trials of underwater weight were determined for 86 female subjects. The average of the last three trials was used as "true" underwater weight. Intraindividual variability associated with the last three trials of weighing was .0004-.0007 kg, and adjacent trial correlations of weighing were between .92 and .99. Mean body density calculated for 66 female subjects was 1.051, with an SD of 0.014.
R 8

32,585
Murray, M.P., Seireg, A. & Scholz, R.C. CENTER OF GRAVITY, CENTER OF PRESSURE, AND SUPPORTIVE FORCES DURING HUMAN ACTIVITIES. J. appl. Physiol., Dec. 1967, 23(6), 831-838. (US Veterans Administration Center, Kinesiology Research Lab., Wood, Wisc.).

The magnitude and orientation of the vertical supportive force were measured with a force platform during the following activities of a normal male: descending to and ascending from squatting and seated postures, and jumping. Simultaneous photographic records were made of the displacements of the mass centers of body segments. This combination of methods has provided a unique means to: a) compare vertical forces calculated from the photographic records with the force-platform measurements, b) differentiate between changes in the applied force and changes in the position of the center of gravity of the body, and c) differentiate between the excursions of the line of gravity and the action line of the vertical supportive force (center of pressure). The vertical force fluctuated above and below body weight during all test activities. The calculated force patterns approximated the measured patterns. Distinctly different pathways were seen for the center of pressure and the line of gravity with the former fluctuating and the latter moving smoothly. The interaction between the two suggests a fundamental servomechanism operable in the control of human posture and motion.
R 21

32,586
Hartley, L.H., Alexander, J.K., Modelski, M. & Grover, R.F. SUBNORMAL CARDIAC OUTPUT AT REST AND DURING EXERCISE IN RESIDENTS AT 3,100 m ALTITUDE. J. appl. Physiol., Dec. 1967, 23 (6), 839-848. (Medicine Dept., University of Colorado Medical Center, Denver, Colo.).

The cardiac output response to submaximal supine leg exercise was investigated in ten healthy men who had lived at 3,100 m. altitude for 4-32 years. Using the direct Fick method for oxygen, cardiac output was measured at rest and during four work loads requiring oxygen uptakes of 600-1,600 ml/min. These measurements were repeated using exactly the same work loads after the subjects had been at sea level for ten days. By normal sea-level standards, these men had subnormal cardiac outputs at high altitude, both at rest and during exercise. Cardiac output increased somewhat (8%) at low altitude. Stroke volume increased 15% after ten days at sea level, but oxygen administration at high altitude produced no increase in stroke volume. Neither pulmonary hypertension nor polycythemia was present to influence cardiac output at high altitude. Changes in pulmonary vascular resistance, acid-base balance, sympathetic activity, blood volume, or ventricular-filling pressure did not account for the observed subnormal response. The hypothesis is advanced that a depressant effect of chronic hypoxia upon the ventricular myocardium could result in reduced myocardial contractile force and stroke volume.
R 31

32,587
Alexander, J.K., Hartley, L.H., Modelski, M. & Grover, R.F. REDUCTION OF STROKE VOLUME DURING EXERCISE IN MAN FOLLOWING ASCENT TO 3,100 m ALTITUDE. J. appl. Physiol., Dec. 1967, 23 (6), 849-858. (Medicine Dept., Baylor University College of Medicine, Houston, Tex.).

The cardiac output response to submaximal supine leg exercise was determined in eight normal subjects, first at sea level and again after ten days at 3,100 m. Using the direct Fick method for oxygen, cardiac output was measured at rest and during four work loads requiring oxygen uptakes of 600-1,600 ml/min at both altitudes. At rest and at each level of exercise, cardiac output was less at 3,100 m., by as much as 2 liters/min. Reduced cardiac output was chiefly due to decrease in stroke volume. Though blood volume was less at high altitude, acute plasma volume expansion with dextran in two subjects failed to restore stroke volume to sea-level values. The reduction of stroke volume was apparently not a result of altered blood pH, pulmonary hypertension and right ventricular overload, depletion of myocardial norepinephrine stores, diminished sympathetic nervous activity, or reduction in blood volume and ventricular filling pressures. Myocardial function was probably depressed by hypoxia secondary to lowered coronary arterial oxygen tension, reduced coronary blood flow, or both.
R 19

32,588
Kawakami, Y., Natelson, B.H. & DuBois, A.B. CARDIOVASCULAR EFFECTS OF FACE IMMERSION AND FACTORS AFFECTING DIVING REFLEX IN MAN. J. appl. Physiol., Dec. 1967, 23(6), 964-970. (Physiology Dept., University of Pennsylvania, Philadelphia, Penn.).

Effects of face immersion on the cardiovascular system and the factors affecting the diving reflex were examined in 15 human subjects. During face immersion with breath holding the cardiac index decreased 22% ($P < 0.001$) and stroke index decreased about 14% ($P < 0.05$). The former decrease was accompanied by a significant decrease in heart rate. Brachial blood pressure increased more during face immersion with breath holding in cold (10-17 C) or slightly cool (30-37 C) water than it did during simple breath holding or application of an ice bag to the face. An analysis of pressure-wave contours was suggestive that peripheral vasoconstriction occurred most markedly during cold-water immersion. Heart rate was lowest during breath holding with face immersion in cold water irrespective of moderate changes in esophageal pressure and lung volume. Inhalation of asphyxic gases suggested that asphyxia is not a major factor in evoking the diving reflex. Cold receptors in the face may be the most effective trigger. Hypercapnia, however, followed by hypoxia during breath holding may contribute to the maintenance of the diving bradycardia.
R 25

32,589
Rim, Y. DECISIONS INVOLVING RISK IN DYADS. Acta Psychologica, Jan. 1967, 26(1), 1-8. (Psychology Dept., University of London, London, England).

The present study's main aim was to find whether two subjects discussing six problems involving risk would arrive at more risky decisions, as do subjects in most groups of three, four or five. It was found that only 14 out of 26 pairs of subjects arrived at more risky decisions, whereas 11 pairs arrived at more cautious decisions. It may be concluded that the more risky decisions after group discussion in groups of 3, 4, or 5, is due to an interaction between personality traits of the participants and group processes, the latter lacking or being much reduced in two-person discussions. Other findings of this investigation were: a) The more familiar or meaningful a problem is to a subject, the more inclined will he be to take a cautious decision. b) In pairs arriving at more cautious decisions after discussion, a significant difference in intelligence scores between the members was found, the initially cautious subjects being more intelligent than the initially risky ones. c) In pairs arriving at more risky decisions after discussion, a tendency was found for the initially more risky subjects to be significantly more extravert than the initially more cautious ones. d) There is a slight non-significant tendency for initially risky subjects in pairs arriving at risky decisions, and initially cautious subjects in pairs arriving at cautious decisions, to want more information before arriving at decisions.
R 16

32,590
Stanley, G. APPARENT BRIGHTNESS OF A ROTATING ARC-LINE AS A FUNCTION OF SPEED OF ROTATION. Acta Psychologica, Ja . 1967, 26(1), 17-21. (University of Western Australia, Nedlands, Australia).

Fifty-two subjects were required to adjust the brightness of a center fixation line to equal that of the apparent brightness of an arc-line viewed at a distance from the fixation point subtending an angle of 12° to the eye. Adjustments were made when the arc-line was stationary and rotating at speeds of 30, 45, 60 and 75 rpm. It was found that brightness enhancement occurred with increase in speed. This result was interpreted as supporting Ansbacher's account of distortion in the perception of moving arc-lines.
R 3

32,591
Kendon, A. SOME FUNCTIONS OF GAZE-DIRECTION IN SOCIAL INTERACTION. Acta Psychologica, Jan. 1967, 26(1), 22-63. (Experimental Psychology Institute, Oxford, England).

Analyses are reported of the social performance of individuals in dyadic sociable interaction, as recorded on film and magnetic tape, which suggest that where a person is looking during interaction may function as a signal regulating the exchange and maintenance of speaker role. Thus at points in the interaction where the speaker and auditor exchange roles, the speaker characteristically ends his utterance by looking at the auditor with a sustained gaze and the auditor characteristically looks away as he begins to speak. It is suggested that the speaker, by looking at the auditor, signals to him that he is ready for him to start speaking, as well as being able to see whether this signal has been received. In looking away, the other person signals that he has accepted the 'offer' of a change of role. During long utterances it is also found that the speaker looks at the auditor during passages of fluent speech and at the end of phrases but that he looks away during passages of unfluent speech or during hesitations. In this way the speaker can request attention signals from the auditor and, in looking away, can gain time for planning what he has to say, by forestalling any attempt to speak by the auditor. Some observations are also reported on change in gaze direction associating with attention signals, 'agreement' signals, attempted interruptions and short questions. It is suggested that any discussion of gaze direction must distinguish between monitoring functions and regulatory and expressive functions. The phenomenon of the mutual gaze is also discussed, and observations are reported which are consistent with the idea that through the amount of mutual gaze the interactants permit each other, the level of emotionality in the encounter can be regulated.
R 47

32,592
Rudochoska, Wanda. A PROOF OF THE UNLEARNING HYPOTHESIS. Acta Psychologica, Jan. 1967, 26(1), 79-88. (Center of Experimental Psychology, M. Hencki Institute of Experimental Biology, Warsaw, Poland).

One of the factors that causes forgetting consists of the activities that are interpolated in the period between the learning of some material and the measurement of the retention of that material. According to Melton, during the learning of the interpolated material unlearning of the original material occurs. The purpose of the present research was to provide evidence as to the occurrence of that phenomenon. Using the paired association method, forty subjects learned eight pairs of nonsense syllables as the original material, and eight pairs of nonsense syllables as the interpolated material. The first elements of the pairs in both sets of material were very similar to each other, while the second elements were very different from each other. Between the close of the learning of the original material and the beginning of the learning of the interpolated material, there was an interval of five minutes. There was also an interval of five minutes between the measurement of retention and the moment when the criterion was achieved for the interpolated material. To measure the degree of retention of both sets of material, the experimenter exposed to the subjects the first elements of the pairs in random order, and asked the subject to give as quickly as possible the element associated with it during learning. An analysis was made of the responses obtained during the measurement of retention. It was expected that during the measurement of retention there would be a smaller number of wrong responses R_2 to stimuli S_2 than the number of wrong responses R_1 to stimuli S_1. Analysis of the mistakes shows the result that was expected from Melton's hypothesis.
R 18

32,593
Farley, F.H. SOCIAL DESIRABILITY AND DIMENSIONALITY IN THE SENSATION-SEEKING SCALE. Acta Psychologica, Jan. 1967, 26(1), 89-96. (Psychiatry Institute, University of London, London, England).

In order to investigate the role of social desirability (SD) responding in a scale designed to measure individual differences in stimulus-seeking motivation and preference for sensory variability, the recently developed Sensation-Seeking Scale (SSS) of Zuckerman et al (J. Consult. Psychol., 1964, 28, 477-482), and the Edwards SD scale, Marlowe-Crowne SD scale, and the Lie scale of the Eysenck Personality Inventory were administered to 100 English male subjects, following which the 26 SSS items and the total scores on the other scales were intercorrelated and subjected to factor analysis. No evidence could be found that any appreciable amount of the item-variance in the SSS was accountable in terms of the SD scales employed. It was noted that, in line with previous work employing a North American sample, SD as measured did not appear as a unitary dimension. In a separate principal components analysis duplicating the original scale development procedures of Zuckerman, et al, and including only the SSS items, it was found that only sixteen of the original twenty-six items loaded .30 or greater on a general factor. It was suggested that these sixteen items be used in personality research employing the scale with English subjects.
R 13

32,594
Fransella, Fay & Bannister, D. A VALIDATION OF REPERTORY GRID TECHNIQUE AS A MEASURE OF POLITICAL CONSTRUING. Acta Psychologica, March 1967, 26(2), 97-106. (Psychiatry Institute Maudsley Hospital, London, England & Bexley Hospital, Bexley, Kent, England).

Seventy normal adults were given a form of repertory grid test in which they rank ordered personal acquaintances on evaluative, political party and political 'brand-image' constructs. They also gave their first, second and third choice vote (British General Election, 1964), their degree of voting certainty and interest in politics. It was found that: a) voting behaviour was predictable from evaluative/political party construct relationships (intercorrelations); b) anticipated relationships between evaluative and political constructs emerged and that c) the pattern of evaluative construct inter-relationships was in line with 'common sense' expectations. The concept of 'brand image' was shown to be operationally definable in terms of repertory grid measures and possible correlates of notions like 'degree of interest in politics' and 'certainty of voting intention' were indicated. In the context of political construing, repertory grid technique appears to have substantial validity.
R 10

32,595
Horn, J.L. & Cattell, R.B. AGE DIFFERENCES IN FLUID AND CRYSTALLIZED INTELLIGENCE. Acta Psychologica, March 1967, 26(2), 107-129. (University of Denver, Boulder, Colo. & University of Illinois, Urbana, Ill.).

The general purpose of this study was to describe differences in intellectual functioning associated with aging in adulthood. Estimates of broad factors identified as fluid intelligence, crystallized intelligence, general visualization, speediness, carefulness and fluency were obtained by combining scores on several tests found to define these factors in previous research. A sample of 297 subjects was divided into five age groupings: 14-17 year-olds, 18-20 year-olds, 21-28 year-olds, 29-39 year-olds and 40-61 year-olds. Analyses of variance and covariance were carried out on these factors and age groupings, using sex and education, as well as the factors themselves, as covariates. These analyses revealed that: a) The mean level of fluid intelligence was systematically higher for younger adults (relative to older adults), b) The mean level of crystallized intelligence was systematically higher for older adults (relative to younger adults); c) The mean for the general visualization function was highest for the grouping of 21-28 year-olds and the means systematically dropped off on either side of the high value, d) No systematic age trends were discernible for the general speediness, carefulness and fluency factors. These results provided support for the theory of fluid and crystallized intelligence.
R 53

32,596
Coen-Gelders, A. UNE SINGULIÈRE ILLUSION VISUELLE: L'EFFET PISTON APPARENT. Acta Psychologica, March 1967, 26(2), 130-147. (Psychology Laboratory, University of Louvain, Louvain, Belgium).

Through a narrow horizontal slit the subjects view a black rectangular figure at rest on a white background; this figure moves then from top to bottom until it disappears from sight. After a determined interval, a similar figure appears at the top of the slit and moves toward the bottom. This process is repeated several times. This produces an illusion which can be described as follows: one and the same figure disappears behind the lower edge of the slit in the downward movement and then reappears at the same place and moves from the bottom to the top of the slit (or conversely). The figure thus seems to execute a to-and-fro movement in which the reversal of the movement is hidden behind the lower edge of the slit. This illusion, which we call the 'piston effect'; is the subject of this paper.
R 10

32,597
Zapparoli, G.C. PERCEPTION OF SIMULTANEOUS STROBOSCOPIC MOVEMENTS IN DIFFERENT DIRECTIONS AND THE GESTALTTHEORY HYPOTHESIS OF PHYSIOLOGICAL SHORT CIRCUITING. Acta Psychologica, March 1967, 26(2), 189-201. (Psychology Lab., I.P.P., Milan, Italy).

The author takes into account the Higginson's point of view about the Gestaltthcory hypothesis of 'cerebral short-circuit' in order to explain the phenomena of stroboscopic movement. He describes the experience he has made about the perception of several simultaneous apparent movements in different directions and a phenomenon of a double simultaneous apparent movement in opposite directions of two stimuli along the same path. To explain this phenomenon the author formulates the hypothesis of the 'simultaneous polyfunctionalism of similar organic elements in the apparent movement's perception'.
R 15

32,598
Zapparoli, G.C. & Ferradini, F.G. ABOUT A NEW POLYVALENT APPARATUS OF STIMULATION. Acta Psychologica, March 1967, 26(2), 202-208. (Psychology Lab., I.P.P., Milan, Italy).

The authors emphasize that the psychological laboratory has only a small number of polyvalent apparatus and then present a new electronic apparatus suitable to allow the activation of peripheral stimulators of the most different kinds, acting on the various sensorial fields separately, simultaneously or successively, and characterized by the common property of not changing the impulse pattern delivered by the pilot-apparatus itself. The authors explain the characteristics and the 'logic' of functioning of their apparatus, and give some examples of programmation.

32,599
Jansen, Mathilde J. & Snoeknaars, A.J. A SHORT REPORT ON AN INTERCULTURALLY STANDARDIZED SEMANTIC DIFFERENTIAL. EUROPEAN RESULTS. Acta Psychologica, Oct. 1967, 26(3), 209-215. (Social Psychology Dept., Agricultural University, Wageningen, The Netherlands & Psychological Lab., University of Amsterdam, Amsterdam, The Netherlands).

Evidence of stability of the semantic space in the English language in the U.S. made the authors of 'The measurement of meaning' hypothesize the same structure in other languages and cultures. The results of an international project designed to demonstrate this give a large amount of support to this hypothesis. The totality of items mentioned in this article can therefore be regarded as a standard semantic differential.
R 6

32,600
Wingfield, A. PERCEPTUAL AND RESPONSE HIERARCHIES IN OBJECT IDENTIFICATION. Acta Psychologica, Oct. 1967, 26(3), 216-226. (University of Oxford, Oxford, England).

Previous work cited has shown that when subjects are presented with pictures of objects and required to give their appropriate common names, the time taken to name the objects is inversely related to the logarithm of the frequency of occurrence of the names of the objects in the language. In the present experiment, subjects were shown pictures of objects but this time required to give the names of their appropriate superordinate categories, rather than their common names. In this case the response-latencies were approximately the same for both common and rare objects, with category-naming faster than object-naming for the rare objects and the opposite trend for common objects. These findings are discussed in relation to certain notions of decision hierarchies in perceptual identification and response selection.
R 13

32,601
Ramsay, R.W., Utrecht, L.C. & Alkema, D. THE EFFECT OF MASSED VERSUS SPACED PRACTICE ON AUDITORY THRESHOLD. Acta Psychologica, Oct. 1967, 26(3), 227-232. (University of Amsterdam, Amsterdam, The Netherlands).

This experiment was designed to investigate whether an observed decrement in performance during threshold testing is due to a building up of reactive inhibition. The experiment dealt with the effects of fatigue on auditory thresholds when taking repeated measurements using the method of limits. Twenty subjects were tested under two conditions, massed and spaced practice, the one condition maximizing and the other minimizing the effect of reactive inhibition. The results confirmed the hypothesis that for spaced practice no increase in threshold would be found, whereas for massed practice there would be a gradual rise in threshold. The difference between massed and spaced practice was highly significant. The results are discussed in terms of a general fatigue factor or specific inhibition. Some implications for research into personality differences are also given.
R 12

32,602
Brosgole, L. NOTE ON PERCEIVED MOVEMENT AND APPARENT DISPLACEMENT. Acta Psychologica, Oct. 1967, 26(3), 233-235. (St. John's University, New York, N.Y.).

This article is a critique of an article by Glick, Wapner & Werner (1965) (HEIAS No. 27,855). The author maintains that the reference system for movement was not properly accounted for and the inverse relationship between motion and displacement not demonstrated.
R 1

32,603
Glick, J. & Wapner, S. THE RELATIONSHIP BETWEEN PERCEIVED MOVEMENT AND APPARENT DISPLACEMENT: A REPLY TO BROSGOLE. Acta Psychologica, Oct. 1967, 26(3), 236-240. (Psychology Dept., Yale University, New Haven, Conn. & Clark University, Worcester, Mass.).

This note is a response to Brosgole's note (MEIAC No. 32,602) in which the present authors state in conclusion "We felt at the time of writing the paper in question, and we feel even more strongly now, that premature explanation which obscures more than it reveals does service to no one. The strategy that we pursued, and continue to pursue, is to reserve speculative efforts until there is some factual basis for them."
R 2

32,604
Budohoska, Wanda. RETROACTIVE FACILITATION IN THE LEARNING OF NEW RESPONSES TO OLD STIMULI. Acta Psychologica, Oct. 1967, 26(3), 241-248. (Experimental Psychology Center, Warsaw University, Warsaw, Poland).

According to the first part of Osgood's first empirical law (1940), the learning of new responses to the stimuli of the original material during the interpolation period causes retroactive inhibition. The purpose of the present experiment was to test whether this law also holds good when the learning of the original material takes place in a different way from the learning of the interpolated material. According to the two-factor hypothesis of retroactive inhibition one of the factors causing retroactive inhibition is the unlearning of the original material during the learning of the interpolated material. The interpolated was learned in such a way as to encourage unlearning as much as possible. In following the instructions the subject when choosing a new response had to recall the responses previously learned and then to reject it as being unsuitable to the given situation. Therefore in view of the conditions in which the experiment took place it was probable that learning of the interpolated material would inhibit the recall of the original material to a greater degree than usually happens when the experiment is conducted according to the design $S_1R_1 - S_1R_2 - S_1R_1$. Instead of retroactive inhibition, retroactive facilitation took place. Contrary to the expected results, the experiment showed that an interpolated activity aided the recall of previously learned material. The data presented here are in disagreement with Osgood's first empirical law and with the two-factor hypothesis concerning retro-active inhibition. These data indicate that: a) Osgood's first empirical law does not hold good in a situation where the learning of the original material takes place in a different way from the learning of the interpolated material, b) the unlearning of the initial responses during the learning of the interpolated material may be a factor that helps retention.
R 11

32,605
Nyman, G.E. & Smith, C.J.W. ON THE DIFFICULTY OF READING ABOUT THE SERIAL COLOR-WORD TEST. Acta Psychologica, Oct. 1967, 26(3), 257-259. (University of Lund, Lund, Sweden).

This note is a response to a critique of earlier work by the present and other authors.
R 7

32,606
Stanley, G. LIGHT SUMMATION AND THE PERCEIVED LENGTH OF MOVING LINES. Acta Psychologica, Oct, 1967, 26(3), 260-264. (Indiana University, Bloomington, Ind.).

Twenty-four subjects viewed an arc-line with red and green sections rotating at 60 r.p.m. around a central point of fixation. When the leading half of the arc was red and the second half green, subjects reported seeing red followed by yellow. With order of color reversed, subjects reported seeing green followed by orange. The apparent length of the arc-line was shorter when rotating than when stationary. An explanation is proposed in terms of excitation-inhibition, funneling and light summation.
R 6

32,607
Green, R.T. & Stacey, B.G. THE DEVELOPMENT OF A QUESTIONNAIRE MEASURE OF HOSTILITY AND AGGRESSION. Acta Psychologica, Oct. 1967, 26(3), 265-285. (University College, London, England & University of Strathclyde, Glasgow, Scotland).

The need for a scale to measure hostility/aggression which is easy to administer and score, reliable and valid, is widely recognized. The first versions of the present scales were administered to a general population of 175 subjects. As a result of an item analysis, revised versions of the scales were prepared and administered to a further 117 subjects. A new format was used to reduce ambiguity of meaning. A principal components analysis of two 60 X 60 matrices strongly suggests that hostility and aggression are broader terms used to refer to a wide spectrum of attitudes and behaviour. Nevertheless, the high reliability (0.75) of the measure obtained from the two equivalent forms of the scale shows that these concepts, although hard to define, can be used meaningfully with regard to questionnaires. The principal component might best be described as a low threshold for anger, various subclusters such as 'revenge', 'contempt', 'dominance' and 'verbal aggression' being apparent. Men are found to score higher than women, and age correlates negatively with scores, both of which findings are to be expected on a priori grounds. There are some real differences between the results from studies based on the Buss-Durkee inventory and those reported in this paper.
R 13

32,608
Schalbo, K.E., Shaver, P.R. & Carrier, S.C. COLOR ASSOCIATION VALUES AND RESPONSE INTERFERENCE ON VARIANTS OF THE STROOP TEST. Acta Psychologica, Oct. 1967, 26(3), 286-295. (Wesleyan University, Middletown, Conn.).

A simple mediation model is applied to the Stroop phenomenon of response interference on color word naming tasks. A prediction is edued that as the degree of color association value for sets of words vary, the extent of response interference will vary directly. Five different lists, including three distinct levels of color associativity, were used in a repeated measurement Latin Square design. Results indicate a close correspondence between color association value and response interference. Word frequency is discussed as an important antecedent variable for response interference, whose role remains to be defined. It is suggested that a highly precise model for predicting interference times is feasible.
R 10

32,610
van der Heer, H.C. DECISION MAKING: NEED FOR ACHIEVEMENT AND PROBABILITY PREFERENCE UNDER CHANCE AND SKILL ORIENTATION. Acta Psychologica, Nov. 1967, 26(4), 353-372. (Psychological Lab., University of Utrecht, Utrecht, The Netherlands).

A critical stand was taken to Atkinson's model. A study was set-up as to the relation between need for achievement, probability preference under chance orientation (utility for risk) and probability preference under skill orientation (level of aspiration). The following relations were found: a) A significant negative rank correlation exists between need for achievement and utility for risk. Subjects with preference for low probabilities have a low need for achievement. Subjects with a low need for achievement prefer predominantly low probabilities. Subjects with a high need for achievement avoid low probabilities. b) A significant non-linear relation exists between need for achievement and level of aspiration. Subjects with low need for achievement prefer a high, in some cases an extremely high level of aspiration; subjects with a moderate need for achievement prefer a low, in some cases an extremely low level of aspiration; subjects with a high need for achievement prefer a moderate level of aspiration. A significant negative rank correlation was found between need for achievement and level of aspiration in the groups which have under chance orientation a preference for low and intermediate probabilities. For the group preferring high probabilities there was no significant correlation. c) For the groups with low and moderate need for achievement there was a significant positive correlation, for the group with high need for achievement a significant negative correlation between utility for risk and level of aspiration. Also subjects who under chance orientation prefer high and intermediate probabilities preferred under skill orientation significantly more lower probabilities; subjects who under chance orientation prefer low probabilities prefer under skill orientation significantly more higher probabilities. Under chance orientation bets with the highest expected value are preferred independent of the probability preference. Under skill orientation differences in expected value play no part. R 24

32,611
Sanders, A.F. THE EFFECT OF COMPATIBILITY ON GROUPING SUCCESSIVELY PRESENTED SIGNALS. Acta Psychologica, Nov. 1967, 26(4), 373-382. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

When subjects are instructed to group successively presented signals in that two responses must be simultaneously carried out, the total processing time is found to depend on the perceptual organisation of the stimulus display and on signal-response compatibility. Response grouping is very inefficient in the case of low stimulus response (SR) compatibility, suggesting a mutual interference process between response choices. When subjects are asked to handle the signals successively, the processes were not affected by compatibility. The instruction was difficult to obey however and delivered results that did not fit the Welford-Davis model on the psychological refractory period. The results are consistent with the conception of the reaction process as a series of successive transformations of the signal.
R 15

32,612
Eysenck, H.J. & Eysenck, Sybil B.G. ON THE UNITARY NATURE OF EXTRAVERSION. Acta Psychologica, Nov. 1967, 26(4), 383-390. (Psychiatry Institute, Maudsley Hospital, London, England).

Scores of salivary reactivity to lemon juice were intercorrelated with 57 personality questionnaire items for 45 men and 48 women, and the matrix of correlations factor analyzed. Two factors corresponding to extraversion and neuroticism were extracted; the lemon test score had a loading of -0.74 on the former, and of 0.02 on the latter, confirming theoretical predictions. It was also shown that questionnaire items having high loadings on extraversion were also highly correlated with the lemon test score, while items having low loadings had low correlations. The implications of these findings were discussed for the unidimensional nature of extraversion, and for the independence of extraversion and neuroticism.
R 12

32,613
Arent, S.S. BELONGINGNESS AND MENTAL HEALTH: SOME RESEARCH FINDINGS. Acta Psychologica, Nov. 1967, 26(4), 351-356. (Psychology Dept., University of Lethbridge, Lethbridge, Alberta, Canada).

The results of the pilot study have supported the hypothesis of inverse relationship between belongingness and anxiety, one of the indices of mental illness. In other words, the study has also supported the earlier contention of the author that there is a positive relationship between the sense of belongingness and mental health. The hypothesized positive correlation between belongingness and self-sufficiency has not been supported, probably due to the presence of a component of dependency in belongingness. In order to clarify this issue, a measure of dependency will be introduced as an additional test in future studies. It is also planned to study the relationship of belongingness with neuroticism and extraversion (using Eysenck Personality Inventory) among other factors.
R 7

32,614
Lazi, P.J. & Pinchard, A.S. AN AUTOMATED MINNESOTA MULTIPHASIC PERSONALITY INVENTORY TEST. Acta Psychologica, Nov. 1967, 26(4), 397-399. (Research Laboratoria, Janssen Pharmaceutica, Beerse, Belgium).

A method is described for automatic processing of the MMPI-test (Minnesota Multiphasic Personality Inventory), intended for smaller computer facilities. Raw and converted scores are obtained in print and summary cards serve as a permanent record of the test. The original 550 question cards can be re-used after shuffling.
R 10

32,615
Kinzly, R.E. A NEW INTERFEROMETER CAPABLE OF MEASURING SMALL OPTICAL PATH DIFFERENCES. Appl. Optics, Jan. 1967, 6(1), 137-140. (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.).

This paper reports the development of a new type of interferometer capable of measuring optical path differences of λ/1000 or less. Experiments that verify this capability were performed and are reported. The interferometer exhibits, in addition to a high sensitivity, an advantage of increased environmental stability over more conventional interferometers which depend upon optical path changes manifested as fringe shifts.
R 4

32,616
Foulsen, C.E. & Hall, D.M.B. OPTICAL EFFECTS OF THERMAL STRUCTURE IN THE LOWER ATMOSPHERE. Appl. Optics, March 1967, 6(3), 497-503. (CSIRO Physics Div., National Standards Laboratory, Sydney, Australia).

Ascending convective plumes of inhomogeneous warm air interspersed with regions of air that are remarkably free from temperature fluctuations are sometimes observed in the lower layers of the atmosphere. A close correlation is demonstrated between intervals of good optical seeing along an upward-slanting path 20 meters long and such periods of below average, air-temperature fluctuation. This correlation is sensitive to the azimuthal angle between wind direction and the vertical plane containing the optical path. The occurrence of temperature-quiescent periods at a given height is also shown to require the horizontal wind speed to be less than a critical value, and there is evidence that the thermal structure tends to be elongated in the direction of the wind. The range of amplitudes of image [illegible]ing observed in these experiments is comparable with that encountered in solar observatories. The atmospheric temperature structure coefficients calculated from these optical experiments compare favorably with independent direct measurements.
R 15

32,617
Hunt, G.R. ENHANCEMENT OF FINE DETAIL IN THE PRESENCE OF LARGE RADIANCE DIFFERENCES. Appl. Optics, March 1967, 6(3), 505-509. (USAF Space Physics Lab., AFCRL, Bedford, Mass.).

A technique is described for enhancing fine detail in the production of radiance pictures of targets in which large differences also occur, and where the dynamic range of the picture viewing system is limited. This is achieved by scanning a raster with a mirror-chopper fed detector over the target area, and referencing one sampled area on this target against the next, the radiance intensity from which is reduced by a constant factor. The detector output is then a difference curve related to a derivative trace of the radiance profile, superimposed on the true radiance profile reduced in intensity. The method is compared with a similar technique previously used by Low, and examples of the use of the present technique both in the laboratory and in observing a feature on the lunar surface are included.
R 2

32,618
Gilbert, G.D. & Pernicka, J.C. IMPROVEMENT OF UNDERWATER VISIBILITY BY REDUCTION OF BACKSCATTER WITH A CIRCULAR POLARIZATION TECHNIQUE. Appl. Optics, April 1967, 6(4), 741-746. (USN Ordnance Test Station, Bureau of Naval Weapons, China Lake, Calif.).

This report presents a brief resume of the underwater visibility problem and explains the circular polarization approach for improving contrast. Experimental apparatus was set up at the Morris Dam facility of the U.S. Naval Ordnance Test Station, Pasadena Annex, and tests were conducted both with and without polarization. Results show that use of the polarization technique increases the visibility range in turbid water by at least a factor of two.
R 4

32,615
Traub, A.C. STEREOSCOPIC DISPLAY USING RAPID VARIFOCAL MIRROR OSCILLATIONS. Appl. Optics, June 1967, 6(6), 1085-1087. (Avco Corporation, Bedford, Mass.).

A dynamic volumetric display technique is described in which a vibrating membrane mirror is used in conjunction with an appropriate two-dimensional pattern generator. The mirror can be driven electrostatically or by a loudspeaker and causes the virtual image of the pattern surface to sweep out a volume of image space. The two-dimensional pattern is a cyclically time-varying one and can be generated by stroboscopic optical projection, by a computer, or other means. The volumetric figures which were generated include a simulated air traffic control situation display and a mathematical surface.
R 2

32,620
Boynton, R.M. PROGRESS IN PHYSIOLOGICAL OPTICS. Appl. Optics, Aug. 1967, 6(8), 1283-1293. (Visual Science Center, University of Rochester, Rochester, N.Y.).

A survey is made of the current state of physiological optics, broadly defined as equated with visual science. After a survey of some historical and definitional matters, recent progress in a number of areas is critically reviewed. Finally, seven examples of important recent discoveries in physiological optics are given.
R 65

32,621
Blackwell, H.R. THE EVALUATION OF INTERIOR LIGHTING ON THE BASIS OF VISUAL CRITERIA. Appl. Optics, Sept. 1967, 6(9), 1443-1467. (Ohio State University, Columbus, Ohio).

Contrast sensitivity and visual acuity data are used to derive a unified visual performance contour which describes the generalized improvement in visual performance resulting as task background luminance is increased. Factors which influence the difficulty of visual tasks are described, and examples are given of the degree of task background luminance, and hence illuminance, required to permit criterion levels of performance for simple tasks. Physical principles and devices are described which permit measurements of: a) task object contrast, b) the integral of ocular light scatter which reduces task image contrast, and c) the joint effect of luminance differences in the environment which produce transitional adaptive effects on visual performance. These physical aspects of luminous environments are shown to influence visual performance in quantitative ways which may be assessed by reference to the standard performance contour. An over-all lighting performance index is derived which takes account of the task background luminance and these three other measures of the effects physical aspects of luminous environments have upon visual performance. Lighting performance indices are presented for five sample lighting installations, which reveal the overriding importance of other aspects of luminous environments than the level of illuminance they provide. The problem of predicting the over-all visual performance to be expected from specific luminous environments in advance of construction is discussed, and empirically derived calculational methods are described.
R 31

32,622
Mezhkov, V.V. & Feermark, M.A. LIGHTING AND QUANTITATIVE PARAMETERS OF VISUAL TASKS. Appl. Optics, Nov. 1967, 6(11), 1866-1871. (Power Institute, Moscow, Russia & General & Municipal Hygiene Institute, Academy of Medicine, Moscow, Russia).

The paper discloses the results of a series of tests carried out to evaluate the complexity of visual tasks for the purpose of specifying the fundamental principles for the standardization of lighting conditions. In addition to the parameters of the difficulty of visual tasks which are in current use in the practice of standardization, i.e., target dimensions, target contrast with the background, a certain number of additional characteristics are proposed and examined. The results of tests to evaluate the influence of these characteristics on the complexity of the visual task are reported. The relationship between the difficulties of visual tasks performed at different working levels of the visual analyzer is considered. It is shown that the degree of influence of external parameters on the complexity of a visual task depends to a great extent on the working conditions. The experimental data obtained result in certain conclusions and propositions regarding further investigations of the influence of qualitative and quantitative lighting characteristics on the visual capacity.
R 20

32,623
Turov, S.G. PHOTOPIC, MESOPIC AND SCOTOPIC VISION. Appl. Optics, Nov. 1967, 6(11), 1877-1883. (Committee for the Participation of the U.S.S.R. in International Energy Conferences, Moscow, Russia).

This paper analyzes the work relating to the visibility curve as well as to the spectral efficiency of radiation in regard to visual acuity and contrast sensitivity. Methods of calculation of the visual efficiency for various types of light sources are presented. The results of an investigation of the brightness-luminance relation are analyzed. Recommendations regarding the photometric conditions for the small luminance range are indicated. Certain physiological characteristics of the spectral-sensitivity of the eye are examined.
R 74

32,624
Anastasi, Anne. PSYCHOLOGY, PSYCHOLOGISTS, AND PSYCHOLOGICAL TESTING. Amer. Psychologists, April 1967, 22(5), 297-306. (Fordham University, New York, N.Y.).

It is the thesis of this paper that psychological testing should be brought into closer contact with other areas of psychology. Increasing specialization has led to a concentration upon the techniques of test construction without sufficient consideration of the implications of psychological research for the interpretation of test scores. Some of the relevant developments within psychology have been illustrated under the headings of behavioral change, the nature of intelligence, personality testing, and the assessment of environment. Strengthening psychological testing from within, by incorporating appropriate findings from other areas of psychology, is proposed as one way to meet the popular criticisms of the current anti-test revolt.
R 63

32,625
American Psychologist. SURGEON GENERAL'S DIRECTIVES ON HUMAN EXPERIMENTATION. Amer. Psychologist, May 1967, 22(5), 350-355.

This article contains the directives issued by the Surgeon General, Public Health Service, United States Department of Health, Education and Welfare, for safeguarding the rights and welfare of human subjects involved in research supported by the Public Health Service. (HEIAS)

32,626
Cohen, W.A. THE MILITARY NAVIGATOR IN AEROSPACE WARFARE. Air University Rev., March-April 1967, 18(3), 99-104. (USAF Institute of Technology, Wright-Patterson AFB, Ohio).

The history of the military navigator is traced from World War I to the present. Career problems are discussed. For the future, the author concludes that the navigator can either be utilized within the strict framework of navigation, chalking up his operational experience in flying organizations as background for other Air Force specialties, or he can be utilized in the operational flying field on an equal basis with the pilot. Both these concepts concerning the use of the navigator in aircraft, spacecraft, and as a commander must be closely examined and decisions made with reference to the navigator's capabilities to meet the demands levied by the weapon systems supporting the aerospace mission. Like the pilot, the navigator has won a respected niche as a military specialist. With the pilot and the missileman, he shares the crucial responsibility for the defense of the United States through the conduct of operations in the aerospace environment. He should be used to maximum advantage by the Air Force.
R 7

32,627
Scruggs, F.P., Jr. DECISION THEORY AND WEATHER FORECASTS: A UNION WITH PROMISE. Air University Rev., July-Aug. 1967, 18(5), 53-57. (USAF Air Weather Service, Scott AFB, Ill.).

This article advances ideas for getting more effective weather service from present weather forecasting skill. The proposal, which stems from elementary decision theory, is based on three interlocking procedures for weathermen to follow: express weather forecasts in probability terms; know how weather affects operations; and, through decision-making aids, use the first two steps to recommend a best choice to the decision-maker. Although each step is distinct and complex, there is no need to treat each step separately in this article. Instead, the proposal is developed through these topics: background--how weather forecasts are presently stated; decision-making under risk--what it means, two examples, and problems of application; and, finally, possible changes in weather services--implications for the Air Force.
R 5

32,628
Brown, J.R. THE EFFECT OF AUTOMATION ON ORGANIZATION. Air University Rev., July-Aug. 1967, 18(5), 64-67. (USAF Hq., Strategic Air Command, Washington, D.C.).

What changes can we expect in organizational structure as a result of advancements in automatic data processing? Will the changes evolve slowly, or can we expect abrupt shift and compliance as a result of the rapid progress of automatic data processing (ADP) technology? Will there be any dilution of middle management functions or responsibilities as a result of these advancements? These questions prompted by recent achievement in ADP technology and its effect on the development of information systems are discussed.
R 1

32,629
Wells, B. PSYCHOLOGY AND DESIGN. Design, July 1967, No. 223, 35-41.

Cooperation of the psychologist and designer as typified by the ergonomist and earlier workers is now being extended to environmental problems encountered by architects in planning for dwellings, offices, hospitals and industrial plants. Specialists in social and general industrial psychology are adding to the earlier ergonomic mix of specialists.

32,630
Tregenza, P.R. A STUDY OF THE RELATIONSHIP BETWEEN THE DESIGN LEVEL OF ILLUMINATION AND THE COST OF LIGHTING. Building Science, March 1967, 2(1), 89-96. (Architectural Science Dept., University of Sydney, Sydney, Australia).

Results are presented of the analysis of twenty alternative ways of lighting a school classroom in Sydney. Daylighting, entirely electric lighting, and P.S.A.L.I. (permanent supplementary artificial lighting) were studied and the capital and lifetime costs of each of the schemes are compared with the resulting illumination in the room.
R 6

32,631
Schulte, J.H. MEDICAL ASPECTS OF SUSTAINED UNDERWATER EXPLORATION. Arch. env. Health, Feb. 1967, 14(2), 333-336. (USN Submarine & Radiation Medicine Div., Bureau of Medicine & Surgery, Washington D.C.).

This article reviews briefly scientific and engineering underwater studies from 1961 on.
R 7

32,632
Saunders, R.A. A NEW HAZARD IN CLOSED ENVIRONMENTAL ATMOSPHERES. Arch. env. Health, March 1967, 14(3), 380-384. (USN Research Lab., ONR, Washington, D.C.).

A government contractor recently evaluated a completely integrated life support system in an experiment which involved maintaining 5 men for 30 days in a hermetically sealed environmental chamber. Undesirable contaminants developed in the chamber and persisted in spite of the contaminant control system. The atmosphere acquired an odor which became increasingly disagreeable. The crew developed anorexia, became nauseated, suffered severe vomiting, and developed headaches and odd facial sensations. These symptoms together with other difficulties prompted test termination after 4 days. Preliminary efforts to pinpoint the cause of the sickness were unsuccessful. Later analysis of the chamber atmosphere at the Naval Research Laboratory identified 23 volatile compounds. Among these were monochloroacetylene and dichloroacetylene. The latter compound is known to produce symptoms identical to those experienced by the chamber crew. Dichloroacetylene has since been found at low concentration in a submarine atmosphere also. A few chlorinated hydrocarbons customarily have been tolerated in most closed environmental atmospheres because of their general usefulness and relatively low toxicity. Such was the case in both these instances. The toxicant was produced through the action of an improperly operating element of the environmental control system on one of these compounds.
R 11

32,634
Sataloff, J., Vassallo, L. & Menduke, H. OCCUPATIONAL HEARING LOSS AND HIGH FREQUENCY THRESHOLDS. Arch. env. Health, June 1967, 14(6), 832-836. (Jefferson Medical College, Philadelphia, Penn.).

Thresholds at 10,000, 12,000, and 14,000 cps of 61 noise exposed, and 39 nonnoise exposed men were compared. The 61 noise exposed subjects were selected from 110 audiograms on the basis of having characteristic dips at 4,000 or 6,000 cps bilaterally. A two-way analysis of variance was performed for each frequency as to age effect, noise effect, and the interaction between the two. The effect of noise was roughly the same at every age group. There seems to be additivity of noise effect and age effect. At 8,000 and 10,000 cps the age effect between the second and fourth decades was not statistically significant. At 12,000 cps the age effect was significant at the 0.05 level (10 db for the decade after the 30's). At 14,000 cps the age effect was significant at the 0.01 level and the increase was roughly 5 db per decade. The difference between noise exposed and nonnoise exposed men was significant at every frequency at the 0.001 level and averaged roughly 19 db. The shapes of the high frequency curves for both groups were approximately the same with the exception that thresholds of the exposed group were significantly poorer. Noise apparently has a deleterious effect not only in the well-known areas of 4,000 and 6,000 cps but also in high frequency areas above 8,000 cps.
R 2

32,635
Switzer, Mary E. & Williams, B.A. LIFE PROBLEMS OF DEAF PEOPLE. Arch. env. Health, Aug. 1967, 15(2), 248-254. (US Vocational Rehabilitation Administration, Department of Health, Education & Welfare, Washington, D.C.).

When ears are nonfunctional, the individual's environment shrinks. He is not automatically warned of danger beyond his peripheral vision. Set in an environment which is geared to normal hearing, deaf people are faced with challenges. To many of the simpler ones they adjust rather easily through reliance upon other senses. Some more complex challenges may yield in time to simple trial and error procedures. However, certain kinds of challenges tend to cluster in problems of great complexity. These require the combined output of all of the deaf individual's personal resources over many years in a highly developed training structure. The communication problem of deaf people overrides and influences all else. It is pervasive, deep, and resistant. The deaf person's degree of adjustment and his levels of achievement in every activity relate directly to his skills in communication. Education of the deaf in the U.S. is quite advanced in terms of world performance. But, it is seriously underdeveloped in terms of the needs of deaf people and their potentialities. Isolated by his communication problem from sharing meaningfully with most of those with whom he rubs shoulders in the community, home, and job, the deaf person has created special means to compensate. The chief characteristic of these means is that the communication barrier has been eliminated since all members use the sign language. Because of their normal strength, mobility, and intelligence and a background of considerable prevocational shop training in schools for the deaf, many deaf people find employment readily. The main characteristic of public services in relation to deaf people is underservice. Again the core is communication. Unable to communicate with many deaf people, important public service programs are sharply limited in their effectiveness. A widespread, persistent, and pernicious problem is the paternalism that enmeshes deaf people. Research has been aimed at the occupational conditions, psychological aspects, and communication patterns of the deaf.

32,636
Shephard, R.J. PULSE RATE AND VENTILATION AS INDICES OF HABITUAL ACTIVITY. I. THEORETICAL ASPECTS. Arch. env. Health, Nov. 1967, 15(5), 562-567. (Physiological Hygiene Dept., University of Toronto School of Hygiene, Toronto, Ontario, Canada).

The physiological assumptions necessary to establish a linear relationship between oxygen consumption ($\dot{V}_{O_2}$) and respiratory minute volume ($\dot{V}_E$) or pulse rate (f) are reviewed. In neither case is a linear relationship possible over more than a limited range of activity. The $\dot{V}_E/\dot{V}_{O_2}$ curve is influenced primarily by the relationships of $\dot{V}_E$ and alveolar ventilation, and $\dot{V}_{O_2}$ and respiratory exertion. The $f/\dot{V}_{O_2}$ curve is influenced by changes of stroke volume and hemoglobin level during exercise. If either $\dot{V}_E$ or f is used to predict $\dot{V}_{O_2}$, the prediction should be based upon a curve rather than a linear regression. Choice of prediction procedure is influenced by the dominant individual and environmental variables, and by the convenience of the proposed techniques of measurement.
2 56

32,637
Lapp, N.L. & Rae, G.R. HUMAN ACCLIMATIZATION TO COLD WATER IMMERSION. Arch. env. Health, Nov. 1967, 15(5), 568-579. (College Center of the Finger Lakes, Corning, N.Y.).

Human acclimatization to cold water immersion was observed in the present study in terms of metabolic activities, physiologic responses, and mental ability test; all measures under the stress of cold water immersion during one-hour periods. That exposure to water immersion appears to induce higher metabolic activities, was indicated not only by thyroid uptake study, but also by oxygen consumption data. The findings showed that for a period of ten exposures of immersion, the experimental subjects were consistently higher in mental scores than the control group. This suggests that it is true that psychological adaptation to cold water conditions can be achieved over a period of time and that such adaptation is accompanied by corresponding adaptation of mental processes. Very little information about psychomotor activities during water immersion has been reported in the literature. There is need for more extensive investigation of methods by which such activities can be studied and for increased experimentation in this area.
8 11

32,638
Jaffe, L.S. PHOTOCHEMICAL AIR POLLUTANTS AND THEIR EFFECTS ON MAN AND ANIMALS. Arch. env. Health, Dec. 1967, 15(6), 782-791. (US National Center for Air Pollution Control, Department of Health, Education & Welfare, Washington, D.C.).

The physical and chemical characteristics of photochemical smog and the photochemical oxidants have been described. Aerometric data on the "total oxidant" concentrations found in the large urban communities affiliated with the Public Health Service, Continuous Air Monitoring Program (CAMP) network have been documented for 1964 and 1965. Similarly, the number of days on which the "total oxidant" concentrations equalled or exceeded 0.05, 0.1, and 0.15 ppm, respectively, have been delineated for each of the affiliated cities in this network. The 0.05 ppm and 0.1 ppm levels are routinely found and are exceeded in all of the cities affiliated with this network for highly significant percentages of days of the year, while the 0.15 ppm level is exceeded only in Los Angeles thus far for a significant percentage of the total number of days of the year. However, such higher maximum hourly and maximum five-minute levels are attained in all of the cities that were studied during the year. Specific biologically adverse effects of photochemical oxidants on man and animals at each of the above levels as well as at other concentrations will be presented in the following pages. Adverse effects on vegetation and certain materials at or below these levels have also been demonstrated.
8 89

32,639
Hermann, E.R. & Holzman, B.R. ABSOLUTE THRESHOLDS OF HUMAN HEARING. Amer. Industr. Hygiene Assoc. J., Jan.-Feb. 1967, 28(1), 13-20. (Civil Engineering Dept., Northwestern University Technological Institute, Evanston, Ill.).

Data obtained from high school students indicate that distributions of hearing thresholds determined by puretone audiometry are log-normal. A graphically simplified mathematical method for determining the loci of absolute thresholds of human hearing is presented. Sound pressure levels at which the best ear in a population first responds to stimulation are some 25 to 30 db less than median values. An elegantly simple equation is derived for determining the point of origin of a log-normal frequency distribution. The statistical method developed for this application to audiometric data is applicable to other measurements and is especially useful when the physical parameter is relative rather than absolute, as with sound measured in decibels. Implications of these findings in relation to audiometry, communications, and compensation for hearing loss are mentioned and briefly discussed.
R 8

32,640
Stopps, G.J. & McLaughlin, M. PSYCHOPHYSIOLOGICAL TESTING OF HUMAN SUBJECTS EXPOSED TO SOLVENT VAPORS. Amer. Industr. Hygiene Assoc. J., Jan.-Feb. 1967, 28(1), 43-50. (Haskell Laboratory for Toxicology & Industrial Medicine, E.I. du Pont de Nemours & Company, Wilmington, Del.).

The purpose of the experiments reported here was to assemble tests sensitive enough to measure changes in psychophysiological functions in human subjects exposed to low concentrations of solvent vapors. Four concentrations of trichloroethylene were studied, ranging from the 1965 threshold limit value of 100 ppm upward to 500 ppm. Results showed no significant effect of 100 ppm of trichloroethylene on psychomotor performance; however, there was a progressive decline in performance with increasing trichloroethylene levels at higher concentrations. Similar experiments were performed using Freon-113 (1,1,2-trichloro-1,2,2-trifluoroethane) in concentrations ranging from 1500 ppm to 4500 ppm. No significant effect of Freon-113 on psychomotor performance was seen at 1500 ppm, but slight deterioration appeared at 2500 ppm, and progressively higher concentrations resulted in an increasing decrement in performance.
R 3

32,641
Croley, J.J., Jr. SPECIALIZED PROTECTIVE CLOTHING DEVELOPED AT THE SAVANNAH RIVER PLANT. Amer. Industr. Hygiene Assoc. J. Jan.-Feb. 1967, 28(1), 51-55. (Radiological & Environmental Sciences Div., E.I. du Pont de Nemours & Company, Aiken, S.C.).

The Savannah River Laboratory has improved the design of the following articles of protective clothing: plastic suits supplied with breathing air, air-supplied welder's hoods, cloth coveralls, laboratory coats, and shoe covers, plastic suits for rescue teams, and tear-away sleeves for work with moving machinery in areas where protective garments are required.
R 4

32,642
Breslin, A.J., Ong, L., Glauberman, H., Gaerge, A.C., et al. THE ACCURACY OF DUST EXPOSURE ESTIMATES OBTAINED FROM CONVENTIONAL AIR SAMPLING. Amer. Industr. Hygiene Assoc. J., Jan.-Feb. 1967, 28(1), 55-61. (US Health & Safety Lab., AEC, New York, N.Y.).

An intensive three-day study was performed at a uranium fabrication plant to determine the accuracy of measuring average occupational exposures by conventional air sampling. Statistical evaluation of the sample data indicated that accurate measurements of average exposures were obtained by conventional sampling, that the measurement precision error of individual samples was about 20%, and that most sample groups fitted either normal or log-normal frequency distributions. The errors associated with measuring average exposures are discussed, including reference to the significance of log-normal distributions of air sample data.
R 7

32,643
Litwin, M.S., Fine, S., Klein, E., Fine, B.S., et al. HAZARDS OF LASER RADIATION: MECHANISMS, CONTROL AND MANAGEMENT. Amer. Industr. Hygiene Assoc. J., Jan.-Feb. 1967, 28(1), 68-75. (US Veterans Administration Hospital, West Roxbury, Mass.).

Analysis of biological studies indicate the factors responsible for hazards associated with laser systems: a) the laser radiation and its interaction with the biological system, b) the pumping source, c) the high voltage and current required for operation of a laser system and, d) the environment in which this system is used. Short-term and long-term hazards associated with the beam are dependent on the properties of the radiation and those of the biological system. Hazards associated with flashtubes must be considered, particularly since misfire or accidental firing can occur. Long-term effects on the eyes due to chronic single insult or to cumulative subthreshold insults are not yet known but continue to present a potential hazard. Hazards to the skin must also not be neglected in considered testing.
R 10

32,644
Tichauer, E.R. ERGONOMICS: THE STATE OF THE ART. Amer. Industr. Hygiene Assoc. J., March-April 1967, 28(2), 105-116. (Texas Technological College, Lubbock, Tex.).

The development of ergonomics is traced from its early origins in munitions manufacture during World War I until today, when applied anatomy and physiology have taken their place alongside the behavioral sciences in equipment design, in work-place layout, and in the development of manufacturing processes. The modern concepts of ergonomics, considering the man-equipment and man-environment interfaces as loci of physical stress transmittal, are discussed. Some problems of specialized working populations such as women and cardiac rehabilitees are mentioned. The minimization and prevention of work stress, through the application of ergonomics in industry, falls within the proper province of industrial hygiene, the discipline devoted by definition to the study and control of work-place-induced strain on men.
R 35

32,645
Lalonde, P., Cohen, A. & Roersma, K. A NOISE AND HEARING SURVEY OF EARTH-MOVING EQUIPMENT OPERATORS. Amer. Industr. Hygiene Assoc. J., March-April 1967, 28(2), 117-120. (US National Center for Urban & Industrial Health, Public Health Service, Cincinnati, Ohio).

Noise and hearing were surveyed at 16 construction sites involving heavy earth-moving equipment operations. Overall noise levels were 90-120 dB sound pressure level (SPL) with most energy below 600 cps. All measured noises exceeded eight-hour exposure criteria in one or more octave bands. Equipment operators showed hearing impairment which was worse at higher frequencies and which increased with years of employment even though corrected for age. Temporary hearing threshold shifts were found following single workday noise exposures. Survey findings indicated the need for noise control and audiometric monitoring.
R 13

32,646
Stern, A.C. THE CHANGING PATTERN OF AIR POLLUTION IN THE UNITED STATES. Amer. Industr. Hygiene Assoc. J., March-April 1967, 28(2), 101-105. (US Public Health Service, Department of Health, Education & Welfare, Washington, D.C.).

In the past, the principal concern of the Public Health Service has been with particulate emissions--smoke, fly ash, cinders, and dust. Nationwide, their regulatory and abatement practices reflect this early preoccupation. A growing concern are the gaseous emissions and the gaseous products resulting from atmospheric photochemical reactions. This is reflected, for example, in their present preoccupation with the automobile. Although interest in gaseous and particulate emissions will continue in the future, more attention will be paid to the particulate products resulting from atmospheric photochemical reactions. This will come from a recognition that not until the visible haze is lifted from our cities will they be truly liveable.
A 5

32,647
Lucchesi, M.H. THE OCCUPATIONAL HYGIENE SURVEY: PRINCIPLES, PRACTICE, SIGNIFICANCE. Amer. Industr. Hygiene Assoc. J., March-April 1967, 28(2), 179-183. (Environmental Toxicology & Occupational Hygiene Institute, University of Kentucky College of Pharmacy, Lexington, Ky.).

The occupational hygiene survey is a technic for the evaluation of the working environment and its effects on the health of the workers. The three basic components of the vocational complex are basic environment, machine-process requirements, and biologic factors. The many facets of the survey and evaluation of the interrelations and effects of these components are discussed in detail.
R 1

32,648
Forssman, S. OCCUPATIONAL HEALTH INSTITUTES: AN INTERNATIONAL SURVEY. Amer. Industr. Hygiene Assoc. J., May-June 1967, 28(3), 197-203. (National Institute of Occupational Health, Stockholm, Sweden).

The main functions of occupational health institutes are research, service and teaching, according to the wide definition of occupational health recognized today. Since occupational health now includes the general adaptation of work to man and of man to work, physiological and psychological aspects have been included in the field of activities. Ergonomics and human engineering are applied when production methods and working environment are adjusted to man. Industrial psychology and sociology are used in studying the mental capacity of the worker in relation to the demand of the work, the worker's attitudes towards his job, and human relations at work.
R 13

32,649
Jaffe, L.S. THE BIOLOGICAL EFFECTS OF OZONE ON MAN AND ANIMALS. Amer. Industr. Hygiene Assoc. J., May-June 1967, 28(3), 267-277. (US National Center for Air Pollution Control, Department of Health, Education & Welfare, Washington, D.C.).

Recent literature on the effects of ozone exposures on man and animals is reviewed, with emphasis on the effects of low concentrations of ozone (0.05 to 0.20 ppm). Irritation of the mucous membranes of the upper respiratory tract, a decrease in visual acuity and other changes in ocular parameters, an enhancement in mortality of respiratory infected test animals, the sphering of red blood cells, structural changes in the nuclei of myocardial tissue, and an increase in mortality of newborn animals have been reported within this range. At higher concentrations (0.6 to 0.8 ppm for 2 hours), ozone will interfere with lung function for the duration of exposure and beyond. Other effects of ozone include distinct respiratory distress, coughing, choking and severe fatigue, which occur at concentrations at or below 1.0 ppm (the maximum level of ozone ever measured in dense atmospheric photochemical air pollution).
R 75

32,650
Snook, S.H. & Irvine, C.H. MAXIMUM ACCEPTABLE WEIGHT OF LIFT. Amer. Industr. Hygiene Assoc. J., July-Aug. 1967, 28(4), 322-329. (Liberty Mutual Insurance Company, Hopkinton, Mass.).

This paper discusses the maximum amount of weight that an individual can be expected to lift comfortably and without strain. Recommendations based on empirical estimates, biomechanical techniques, and psychophysical methods are reviewed, including those of the International Labour Office, the Swiss Accident Insurance Institute, the Danish National Association for Infantile Paralysis, and the U.S. Air Force. The approach used in two Air Force experiments is identified as a variation of the psychophysical method of magnitude production. An improved experimental design is described which includes the following advantages: a) The control of additional variables not considered in previous studies. b) Experimental controls and statistical procedures found necessary for use in psychophysical experiments. c) Instructions and tasks which are more applicable to industrial situations. d) Subjects who are experienced industrial workers, older and better conditioned to the lifting task. The results collected to date are discussed and compared with those of other investigators.
R 12

32,651
Fenney, J.H., Jr. & Powell, C.H. FIELD MEASUREMENT OF ULTRAVIOLET, INFRARED, AND MICROWAVE ENERGIES. Amer. Industr. Hygiene Assoc. J., July-Aug. 1967, 28(4), 335-342.

The industrial hygienist has for some time been aware of the possible hazards which exist from the energies in the non-ionizing portion of the electromagnetic spectrum. Potential sources of these radiations and instrumentation available for field measurement are reviewed. The instruments by categorical types, their advantages, disadvantages, and specificity for various portions of the spectrum, as well as the interpretation of their responses are discussed. Field survey techniques for specific sources and/or energies are also presented. The needs are stated for continuing research on instrumentation with recommendations related to spectral response and reliability.
R 22

32,652
Rintelmann, W.F. & Gateway, D.C. A SURVEY OF HEARING CONSERVATION PROGRAMS IN REPRESENTATIVE AEROSPACE INDUSTRIES. PART I. PREVALENCE OF PROGRAMS AND MONITORING AUDIOMETRY. Amer. Industr. Hygiene Assoc. J., July-Aug. 1967, 28(4), 372-380. (Audiology & Speech Sciences Dept., Michigan State University, East Lansing, Mich. & USAF School of Aerospace Medicine, Brooks AFB, Tex.).

Questionnaires were sent to 600 assorted aerospace industrial firms. Responses were received from 336 firms. Fifty-three companies reported having fully developed hearing conservation programs. Responses were categorized and analyzed according to: a) general descriptive information: b) monitoring of hearing conservation programs; and c) types of audiometric tests, test environments, instrumentation and administration of audiometric tests.
R 16

32,653
Walworth, H.T. (Chm.). GUIDELINES FOR NOISE EXPOSURE CONTROL. Amer. Industr. Hygiene Assoc. J., Sept.-Oct. 1967, 28(5), 418-424. (American Industrial Hygiene Association, Detroit, Mich.).

Growing interest in industrial loss of hearing has emphasized the need for reliable noise criteria for use in noise control and hearing conservation programs for industrial workers. While many hearing loss studies have been reported in the scientific literature, there, heretofore, has been no single source of data relating degree of hearing loss to noise exposure levels. The Guidelines have been developed with the objective of supplying such a source, along with certain basic information for establishing hearing conservation programs.
R 1

32,654
Lawrence, Merlo, Gonzalez, C. & Hawkins, J.E., Jr. SOME PHYSIOLOGICAL FACTORS IN NOISE-INDUCED HEARING LOSS. Amer. Industr. Hygiene Assoc. J., Sept.-Oct. 1967, 28(5), 425-430. (Kresge Hearing Research Institute, University of Michigan, Ann Arbor, Mich.).

Loss of auditory sensitivity following exposure to noise is the result of metabolic and structural alteration within the sensory cells of the organ of Corti. Similar changes can be caused by other agents which do not produce a recognizable change in hearing. However, noise is always superimposed upon the physiological state of the sensory epithelium, and this may determine the final effects of the noise. The source of nutrients for the sensory cells is the arcade of vessels lying beneath the basilar membrane. Localized occlusion of these vessels eventually produces degeneration of these sensory cells. Certain conditions produce constriction of some of these vessels, resulting in diminished blood supply and reduction in the metabolic state of the sensory cells. Superimposing overstimulation on these cells at this time would most likely have a destructive effect.
R 15

32,655
Botsford, J.H. A NEW METHOD FOR RATING NOISE EXPOSURES. Amer. Industr. Hygiene Assoc. J., Sept.-Oct. 1967, 28(5), 431-446. (Bethlehem Steel Corporation, Bethlehem, Penn.).

A simple method for identifying acceptable noise exposures has been developed from the National Academy of Science-National Research Council Committee on Hearing, Bioacoustics and Biomechanics (NAS-NRC CHABA) report describing hazardous exposures to intermittent and steady-state noise. First, an exposure was imagined in which the noise dropped to harmless levels periodically, thereby creating a number of identical exposure cycles distributed uniformly throughout the day. Next, the total duration of noise allowable per day was calculated for 39 different patterns of interrupted exposure, using the CHABA charts. This total noise duration permissible daily increased rapidly with the number of interruptions, passed through a maximum value for interruptions about 5 minutes in length, and became constant for noise interrupted every 2 minutes or oftener. Nine general contours of equinoxious octave-band sound pressure levels evolved from this analysis, and the A-weighted sound level equivalent to each contour was determined for noises of manufacturing industries. It is concluded that acceptable noise exposures can be identified as accurately by using A-weighted sound levels as by using octave-band sound pressure levels.
R 3

32,656
Saith, P.E., Jr. TEMPORARY THRESHOLD SHIFT PRODUCED BY EXPOSURE TO HIGH-FREQUENCY NOISE. Amer. Industr. Hygiene Assoc. J., Sept.-Oct. 1967, 28(5), 447-451. (Haskell Laboratory for Toxicology & Industrial Medicine, E.I. du Pont de Nemours & Company, Wilmington, Del.).

The temporary threshold shift at 2 minutes (TTS_2) produced by exposure to high-frequency noise has been measured in a group having normal hearing. The noise source was filtered white noise. Peak frequencies used were at 16, 19, and 23 kilohertz (kilocycles per second). Sound pressure levels ranged from 85 to 100 dB. Eleven different combinations of spectra and sound pressure levels were tested. The results indicate that significant TTS_2 can be produced at 6000 hertz by high-frequency noise at 100-dB over-all sound pressure level if the noise source contains lower-frequency components in the 10- to 12-kilohertz range which are below 80-dB sound pressure level. Noise at this same level without the lower-frequency components appears to improve hearing temporarily. The need for more definitive studies is indicated.
R 3

32,657
Guyton, H.G., Mick, C.E., Decker, H.M. & Burgess, W.A. TECHNIQUES FOR EVALUATING BIOLOGICAL PENETRATION OF RESPIRATORY MASKS ON HUMAN SUBJECTS. Amer. Industr. Hygiene Assoc. J., Sept.-Oct. 1967, 28(5), 462-467. (USA Department of the Army, Fort Detrick, Frederick, Md.).

Wearing a protective mask does not necessarily insure the user adequate respiratory protection against toxic aerosols. There are several sources of possible mask leakage; the most common is improper donning. As respirator designs are improved in an attempt to eliminate leakage sources, evaluation techniques must be upgraded so that small amounts of leakage can not only be detected but also be quantitated. Mask evaluation procedures utilizing a large aerosol chamber, bacterial spores, and human subjects permit accurate detection of mask leakage as minute as 1 part in 50 million. This sensitivity is achieved by the use of the various samplers and sampling techniques that operate under the mask. Four types of respiratory samplers are discussed in detail in this paper, and guidance is given concerning the sampler best suited for the evaluation of a particular type of protective mask.
R 4

32,658
Dawson, F.A. ORGANIZING FOR ERGONOMICS. Amer. Industr. Hygiene Assoc. J., Nov.-Dec. 1967, 28(6), 583-587. (Kansas City Works, Western Electric Company, Lee's Summit, Mo.).

Elimination of unnecessary physical and psychical stress promotes more effective utilization of the physical and mental capabilities which the worker brings to the job. A corporate Ergonomics Committee provides an effective, systematic method to bring the knowledge of several disciplines to bear properly to "fit the job to the worker." This paper outlines the organization, function, and operation of such a committee.
R 6

32,659
Mitchell, V.F. & Porter, L.W. COMPARATIVE MANAGERIAL ROLE PERCEPTIONS IN MILITARY AND BUSINESS HIERARCHIES. J. appl. Psychol., Dec. 1967, 51(6), 449-452. (University of California, Berkeley, Calif.).

This study was concerned with comparison of the managerial and administrative role requirements perceived by military officers and civilian managers. A questionnaire provided data from 703 commissioned officers and 594 noncommissioned personnel serving in an overseas Air Force Command. The findings showed that inner-directed traits are regarded as more important for job success than other-directed, as among civilian managers. However, the pattern of the change among levels of the military hierarchy and the primary role requirements perceived differed considerably from those exhibited by civilian managers. Also, commissioned officers' perceptions of the behavior necessary for job success differed greatly from those of noncommissioned personnel. Results from the noncommissioned officers show clear dominance of other-directed behavior.
R 7

32,660
Carlson, R.E. SELECTION INTERVIEW DECISIONS: THE RELATIVE INFLUENCE OF APPEARANCE AND FACTUAL WRITTEN INFORMATION ON AN INTERVIEWER'S FINAL RATING. J. appl. Psychol., Dec. 1967, 51(6), 461-468. (Life Insurance Management Association, Hartford, Conn.).

Previous research by the author has shown that life insurance agency managers serving as interviewers report they will make employment decisions on the basis of appearance. In addition, it has also been shown that these same managers report they will make employment decisions on the basis of factual written summaries of an applicant. However, previous research has not investigated the relative effect of appearance vs. factual written data on an interviewer's final evaluation of an applicant for the job of life insurance agent. It was the purpose of this research to study these relative effects. The appearance and written information were presented to subjects in complementary and contrasting patterns. It was found that the appearance data had little impact on the final rating. It was also found that when the appearance data and written information were presented in a complementary manner there existed a component in the final rating due to information favorableness greater than that contributed by the separate ratings of the appearance and written information.
R 11

32,661
Brown, K.R. JOB ANALYSIS BY MULTIDIMENSIONAL SCALING. J. appl. Psychol., Dec. 1967, 51(6), 469-475. (University of Maryland, College Park, Md.).

Multidimensional scaling methods were used to determine the dimensions of interpersonal relations in a specific job setting. Eighteen behavior statements relating to interpersonal relations in a management-analyst position in the Federal government were developed. Job incumbents judged the similarity of the statements. Data were collected and analyzed by both the traditional multidimensional scaling method and the A-technique. Results indicated the dimensions of interpersonal relations in the job. A comparison of the two different multidimensional approaches indicated that they produced similar results. In view of certain administrative advantages of the A-technique, further use of the A-technique in analyzing job domains seems justified.
R 17

32,662
Baehr, Melany E. & Williams, G.B. UNDERLYING DIMENSIONS OF PERSONAL BACKGROUND DATA AND THEIR RELATIONSHIP TO OCCUPATIONAL CLASSIFICATION. J. appl. Psychol., Dec. 1967, 51(6), 481-490. (Industrial Relations Center, University of Chicago, Chicago, Ill.).

In order to identify underlying dimensions of personal background data, three successive factor analyses were performed on the responses of a vocationally heterogeneous sample of 690 male subjects to a wide spectrum of commonly used personal-background-data items. Using the final factoring, an analysis of variance of scores derived from fifteen interpretable first-order factors across ten occupational groups showed significant F ratios ($p<.001$) for virtually all factors. A second-order factor analysis yielded five uncorrelated factors, thought to represent broad behavior patterns associated with the needs and achievements of individuals. The study indicates relationships between the identified dimensions and occupational classification and provides a framework for future investigations of the dynamic relationships between biographical dimensions and occupational success.
R 22

32,663
Berg, D.H. AN ENQUIRY INTO THE EFFECT OF EXPOSURE TO ADVERTISEMENTS ON SUBSEQUENT PERCEPTION OF SIMILAR ADVERTISEMENTS. J. appl. Psychol., Dec. 1967, 51(6), 503-508. (University of Alberta, Edmonton, Alberta, Canada)

This study tests the hypothesis that forced exposure to advertising lowers the threshold for perceiving the advertisements. The enquiry gains its import in its relevance to the basic question: what is the effect of continued exposure? Using two groups, Control and Experimental, of late-teenage girls, a straightforward "before-after" experiment was designed wherein the experimental group was exposed to a certain form of advertising. The study consisted of three phases. The first phase involved the determination of a "perceptual sensitivity" base score. The second phase involved exposing the Experimental group to the form of advertising under study. The third phase consisted of remeasuring the perceptual sensitivity of both groups. The study demonstrated that forced exposure does increase perceptivity. The Experimental group showed significant differences in perceptual level from the Control group when remeasured in the third phase
R 3

32,664
Korman, A.K. RELEVANCE OF PERSONAL NEED SATISFACTION FOR OVERALL SATISFACTION AS A FUNCTION OF SELF-ESTEEM. J. Appl. Psychol., Dec. 1967, 51(6), 533-538. (New York University, New York, N.Y.).

The purpose of this research was to test the hypothesis that need satisfaction was related to overall satisfaction for high-self-esteem individuals, but not for low-self-esteem individuals. The hypothesis was supported in two correlational studies and one experimental study. Implications of the research for theories of satisfaction and possible interpretation in terms of childhood learning experiences were discussed.
R 12

32,665
Aerospace Technology. ELEVENTH ANNUAL WORLD AEROSPACE ENCYCLOPEDIA. Aerospace Technology, July 1967, 21(3), 21-125.

This is an expanded report on U.S. space, missile, aeronautical and oceanographic systems plus listings of foreign missile and space and ocean systems, satellites in orbit, and a chronology of the principal events of fiscal 1967.

32,666
Montgomery, Suzanne. SYMPOSIUM STRESSES NEED FOR UNSOPHISTICATED OCEAN TOOLS. Aerospace Technology, Oct. 1967, 21(9), 44-47.

Diver efficiency, both mental and physical, is impaired in water by such factors as reduced visibility, decreased communications and cold. The split nut can be easily installed under such circumstances even when heavy gloves limit tactile sense, it is believed. Since the device can be installed with one hand, the diver is able to work with a handhold. Because no tools are necessary, it can be applied in tight areas with limited clearance. Dry-environment welding using diving chambers may mean a major breakthrough for such applications as oil line repair. The first known study of diver performance using hand and power tools under controlled conditions will soon go into its second phase with open-ocean tests in 50 ft. of water off Point Mugu, Calif. The completed part of the study involved divers doing simple tasks on land and then in a fresh-water test tank with conventional and power operated hand tools. Data gathered on diver performance will help pinpoint difficulties in underwater work and indicate the direction which tool improvement efforts should take.

32,667
Chamberlin, J.A. SPACE-STATION DESIGN FOR PERMANENT RESIDENCE. Astronautics & Aeronautics, March 1967, 5(3), 46-56. (Manned Spacecraft Center, NASA, Houston, Tex.).

Although it is possible to propose space-station programs based on several attractive concepts, the view has been put forward here that it is now possible and desirable to design a large space station with accommodations and facilities for scientific experimentation equal to or better than those provided at isolated posts on Earth. The reliability of the systems required to maintain such a station for several years can best be achieved, for a reasonable expenditure of time and money, by extreme conservatism of design, made possible by the absence of the very onerous constraints of size and weight that characterize the present spacecraft hardware. A series of orbital space observatories would provide the means to assess the resources of the Earth and unfold the mysteries of the heavens in a way eminently worthwhile on its own merits. It is submitted that the potential depth, breadth, and utility of the knowledge that would become available from a series of Earth-orbital space observatories provides ample justification for designing them.
R 19

32,668
Boehm, B.W. KEEPING THE UPPER HAND IN THE MAN-COMPUTER PARTNERSHIP. Astronautics & Aeronautics, April 1967, 5(4), 22-28. (Computer Sciences Dept., Rand Corporation, Santa Monica, Calif.).

The stunning growth of computer technology provides powerful new means to focus human creativity on difficult aerospace problems, but also sets costly traps for the lazy or unwary. The author outlines trends and capabilities in computer use in prefatory remarks to a special issue on computers.
R 11

32,669
Grosch, H.R.J. THE COMPUTER DOWNSTAIRS. Astronautics & Aeronautics, April 1967, 5(4), 42-47. (General Electric Company, Santa Barbara, Calif.).

Computer facilities, already handling most of the information flows of aerospace organizations, may, when man and machine learn to converse in natural language, make pushbutton life a reality.
R 10

32,670
Chasen, S.H. & Seitz, R.N. ON-LINE SYSTEMS AND MAN-COMPUTER GRAPHICS. Astronautics & Aeronautics, April 1967, 5(4), 48-55. (Lockheed-Georgia Company, Lockheed Aircraft Corp., Marietta, Ga. & George C. Marshall Space Flight Center, NASA, Huntsville, Ala.).

Engineers have gained new tools for electronic design, structural design, and numerical-control parts programming; but integrating computer graphics and time-sharing will be no easy task.
R 39

32,671
Gazley, C., Jr., Rieber, J.E. & Stratton, R.H. COMPUTER WORKS A NEW TRICK IN SEEING: PSEUDO-COLOR PROCESSING. Astronautics & Aeronautics, April 1967, 5(4), 56. (Rand Corporation, Santa Monica, Calif.).

Modern photographic techniques, whether chemical or electronic, can separate and record many more tonal values than can the eye. The Mariner IV camera system can discriminate among 64 intensity levels, but the human eye can discriminate only about 15 shades of gray between black and white. To take advantage of the superior discrimination of a camera system, its information should be so presented that the observer can distinguish any recorded level of intensity from any other. This study attempts to do this by taking advantage of man's excellent color-discrimination and computer-processing techniques. The human eye can distinguish many thousands of colors, the exact number depending on the level of illumination. Thus, by keying measured intensity level to color, a "pseudo-color" can give an observer much more information than can a gray scale.
R 4

32,672
Carlson, L.D. HAS MAN QUALIFIED FOR LONG-DURATION SPACE FLIGHTS? Astronautics & Aeronautics, May 1967, 5(5), 40-44. (University of California School of Medicine, Davis, Calif.).

The Gemini series of orbital missions provided a significant benchmark in the incremental approach to building the capability for long-term flights in orbit or deep space. Data on in-flight and post-flight physiological performance, in particular, lend a note of optimism concerning man's ability to survive in space and the weightless condition for prolonged periods of time. This article appraises the findings concerning prolonged performances.
R 5

32,673
Wilhold, G.A. AEROSPACE NOISE. Astronautics & Aeronautics, May 1967, 5(5), 64-69. (George C. Marshall Space Flight Center, NASA, Huntsville, Ala.).

The giant boosters of modern aerospace systems have rejuvenated the scientific discipline of acoustics. The violent interaction of rocket-motor exhaust with the quiescent atmosphere generates a tremendous sound field that engulfs the space vehicle itself, adjacent facilities, and communities near the firing site. In flight, the aerodynamic flow field over the vehicle's surface creates intense fluctuating pressures that affect the structure and onboard instrumentation. Predicting the effects of the engine and in-flight noise so far has proved to be time-consuming and costly. Moreover, the existing means for analyzing and predicting noise effects do not give satisfactory results with respect to optimum system design or reducing environmental uncertainties. Yet the design and operational qualification of a vehicle necessitates noise analysis early in the design cycle. The field faces harder, not easier design problems: Launch-vehicle concepts tend toward exotic propulsion systems, unconventional vehicle configurations, and recoverable boosters. Transport aircraft concepts head toward extreme flight conditions in the supersonic and hypersonic regimes, resulting in acute design problems and intensification of community noise problems associated with airports in major cities. In brief, both contemporary and future requirements have precipitated a whole new family of problems with respect to noise-prediction techniques. These problems will continue to grow. They must be solved to preserve the integrity of vehicle operations, to save vehicle weight, to protect those who work with the vehicles, and to keep the acoustical environment within the tolerance of the community outside the operational area. Being able to make accurate, early acoustic predictions will result in saving time and hard cash. This article reviews the background of noise prediction, points out current problems, and draws attention to a research facility at NASA Marshall Space Flight Center that will permit new experimental approaches to acoustical analysis.
R 7

32,674
Feldman, S. DEVELOPING A NEW BREED OF DEEP-SUBMERGENCE VEHICLES. Astronautics & Aeronautics, July 1967, 5(7), 44-48. (USN Deep Submergence Systems Project Office, Chevy Chase, Md.).

This article describes the missions and design problems of the deep sea submergence rescue vehicle and the deep sea submergence search vehicle.

32,675
Tomsky, J.H., Pfeiffer, R. & Lefebvre, L. LARGE OBJECT SALVAGE SYSTEM DEVELOPMENT. Astronautics & Aeronautics, July 1967, 5(7), 50-55. (USN Deep Submergence Systems Project Office, Chevy Chase, Md.).

This article describes the problems in the design and operation of the Large Object Salvage System (LOSS)

32,676
Carstens, J. SENSORS, NAVIGATION, AND CONTROLS FOR UNDERSEA SYSTEMS. Astronautics & Aeronautics, July 1967, 5(7), 62-67. (USN Deep Submergence Systems Project Office, Chevy Chase, Md.).

The devices required for deep sea search, rendezvous and diver operations are discussed.

32,677
Bond, G.F. SEALAB III: NEXT STEP TOWARD THE DEPTHS. Astronautics & Aeronautics, July 1967, 5(7), 80-88. (USN Deep Submergence Systems Project Office, Chevy Chase, Md.).

Man's brief history of living and working on the ocean floor is reviewed, and plans and problems expected in Sealab III, at a depth of 430 feet, are discussed.

32,678
Horne, W.B. SKIDDING ACCIDENTS ON RUNWAYS AND HIGHWAYS CAN BE REDUCED. Astronautics & Aeronautics, Aug. 1967, 5(8), 48-55. (Langley Research Center, NASA, Langley Field, Va.).

Several tire, pavement, and vehicle-operating conditions degrade both aircraft and ground-vehicle safety greatly. The more important of these are the smooth or badly worn tire, pavement initially provided with too little texture or worn smooth from traffic, the locked-wheel skid, and driver or pilot technique. To improve safety, smooth tires and smooth-acting pavements must be identified and rejected for runway and highway usage. For example, the amount of tread on highway tires can be controlled as the State of New York and several European countries do it now. Better criteria and evaluation techniques are vitally needed to detect surfaces which are potentially slippery when wet, so that they can be renovated by pavement grooving, surface additives, or resurfacing before skidding accidents start to occur. Efforts should be intensified to reduce the catastrophic accidents from tire cornering and braking ability losses that occur during locked-wheel skids. Education of vehicle operators will help in this regard, but the need for effective anti-skid devices is clear.
R 7

32,679
Miller, R. DOUGLAS PLANS ALL-WEATHER LANDING TESTS. Aviation Week & Space Tech., Jan. 1967, 86(2), 51-59. (Douglas Aircraft Company, Inc., Long Beach, Calif.).

Douglas Aircraft Co. is taking major strides toward outfitting its commercial jet transports with the necessary capability for making approaches under ever-lowering conditions of ceiling and visibility. The company is nearing the end of a lengthy series of flight tests required by the Federal Aviation Agency for engineering certification of Category 2 configurations for the DC-8 Series 50 and 60 transports and the DC-9 Series 10 and 30 transports. Ultimately, under Category 2 conditions, airline users with properly trained crews will be able to permit their transports to land from a pilot decision altitude of 100 ft. and a runway visual range of 1,200 ft., provided the airports in turn are equipped with FAA-approved ILS (instrument landing system) and runway lighting systems. Looking beyond this immediate goal toward the ultimate all-weather landing capability, Douglas is conducting extensive simulator research and equipment evaluation for the still-undefined Category 3 conditions. It will begin flight tests in February with a Series 30 DC-9 aircraft to evaluate performance and determine specifications for Category 3 (all-weather) production equipment. In the course of its studies, the airframe manufacturer will evaluate transport head-up displays, although it is not convinced that a head-up all-weather landing is the desirable method.

32,680
O'Lone, J.G. CATHODE RAY DISPLAY SPEEDS SRAM DATA. Aviation Week & Space Tech., March 1967, 86(11), 74-79. (Boeing Airplane Company, Seattle, Wash.).

Rigid cost, schedule and reporting requirements of the USAF short-range attack missile (SRAM) program have led the Boeing Co. to utilize a cathode ray tube display system that speeds retrieval of critical data from existing management control systems and gives quick answers on the effect of program changes. The system, called Coach/Impact, also will be utilized by SRAM's ACM-69A (SRAM) System Program Office, which Boeing says represents the first time that the customer will have immediate access to the same information as the contractor. Coach/Impact an acronym for computer-aided chart room/instantaneous method of predicting, appraising, communications and tracking, is being considered for inclusion in Boeing's proposals for the Voyager Mars spacecraft and USAF's airborne warning and control system programs, and also may be employed in the company's supersonic transport effort. Utilization of the system in the SRAM program grew out of Boeing's awareness that this effort would require an unusually high degree of control. The customer had specified strict cost and schedule planning requirements and wanted the contractor to employ a control system that supplied him with program data in as near to real time as possible. Retrieval of the data, from demand to scope display, takes five seconds. In another five seconds, the display can be presented on the screen.
R 1

32,681
Thomas, B.K., Jr. NASA TO COORDINATE PILOT-AIRCRAFT STUDIES. Aviation Week & Space Tech., March 1967, 86(12), 103-104. (National Aeronautics & Space Administration, Washington, D.C.).

The National Aeronautics and Space Administration's Office of Advanced Research and Technology will coordinate government efforts in nine pilot-aircraft response studies as part of a five-year federal plan to combat the threat of clear air turbulence to future air travel. Results of the coordinated program will influence significantly development of supersonic transport designs. The plan is based on the study completed last December by the National Committee for Clear Air Turbulence. Recent endorsement by the Federal Committee for Meteorological Services and Supporting Research, whose chairman is Dr. J. Herbert Hollomon, assistant secretary of commerce for science and technology, moved the proposed coordinated attack on clear air turbulence one step closer to execution. Hollomon requested all federal agencies slated to play key roles to have agency implementation plans ready by next July. In addition to NASA, these agencies include the Defense Dept., the Federal Aviation Agency and the Commerce Dept. NASA's approach to coordinating the pilot/aircraft response effort will be to monitor the results from each of the studies to determine a better "quantitative feel" for the actual loads experienced by crews and aircraft structures. Results of the pilot/aircraft response studies are expected in four major areas: Better understanding of the response relationships of pilot and aircraft in turbulence; New pilot techniques; Improved aircraft design; Improved flight instruments. In stressing the need for a better understanding of the response relationships of pilots and aircraft in turbulence, the national committee's study cited the limited exposure of the average turbojet pilot to severe turbulence and the aeroelastic affects inherent in swept-wing jet transport designs. The ever ga turbojet pilot does not experience severe turbulence more than once in about 500 flight hours. It is obvious that he cannot be trained while actually in severe turbulence, the committee said, or flight-tested to prove competency.

32,682
Hunter, G.S. PILOT ROLE GROWS IN VTOL CONTROL CONCEPT. Aviation Week & Space Tech., April 1967, 86(15), 92-102. (Lear Siegler, Inc., Santa Monica, Calif.).

Advanced concepts in flight control are being evaluated by Lear Siegler Astronics Division as part of an Air Force program to develop a tactical VTOL (vertical takeoff and landing) weapon system with all-weather capability. Operation of these flight controls is a combination of automatic and manual modes, with the pilot in control beyond the current practice. At no time during the critical VTOL takeoff and landing sequences is he relegated to mere monitoring of automatic phases. His decision processes and control actions are brought to the required performance objectives without compromising flight safety. New techniques are incorporated in the aircraft logic, information displays and flight-control assists. Resultant technology, because of its precision and operational flexibility, also is expected to have a significant impact on conventional helicopters and subsonic and supersonic aircraft in both commercial and military applications. This may lead eventually to standardization of equipment--computers, stability-augmentation devices and displays.

32,683
Stein, K.J. TRAFFIC CONTROL OF ADVANCED SST STUDIED. Aviation Week & Space Tech., May 1967, 86(21), 79-82. (Electronics Research Center, National Aeronautics & Space Administration, Cambridge, Mass.).

"Most needed" avionic developments to afford safe, economical integration of advanced supersonic aircraft into the traffic environment of the late 1970s are emerging from definition studies at the National Aeronautics and Space Administrations's Electronics Research Center. Although the center does not expect to seek any specific subsystem development proposals in the current fiscal year, it will issue RFPs (request for proposals) in Fiscal 1968. The center's major aeronautics-oriented effort is directed toward what it calls the advanced supersonic transport--an aircraft that it assumes will offer "modest" improvements of about 10% over initial supersonic transports in terms of cruise Mach number, altitude and range, L/D, specific fuel consumption, payload and gross weight. To afford safe, economical, convenient operation of such aircraft, it is also assumed that major advances in avionic subsystems, subsystem integration and the air traffic control system will be required. These subsystem areas are of major concern: Communications; Guidance and navigation, Flight instrumentation; Data management; Flight control and displays; Integrated avionics system. The pilot would move into a supervisory relationship to the integrated system, receiving reports of exceptions to normal operational parameters and monitoring indications of normal functioning. Some sort of overall moving map display of aircraft progress is a likelihood, as well as some form of "canned" or pre-coded communications for traffic control and perhaps company communications.

32,684
Aviation Week & Space Technology. SUPERIMPOSITION VIEWER DEVELOPED FOR NAVY. Aviation Week & Space Tech., July 1967, 87(1), p.63.

Superisposition viewer developed for the Bureau of Naval Weapons uses avionics techniques to display simultaneously three sensor records derived from infrared, radar or photographic sources, superimposed on a single video monitor which provides 1,000-line resolution. Developed by CBS Laboratories Div. of Columbia Broadcasting System, Stamford, Conn., the viewer is designed to provide three major image interpretation capabilities in a single unit, including screening, superisposition and change detection. Each of the three images can be reduced or enlarged electronically and optically to a common scale within a range of 0.3X to 30X magnification, and each may be rectified for oblique or panoramic photography so that images coincide precisely. The three images may be displayed singly, alternately at a selected flicker rate, or in combination. Thus, photos may be superimposed on earlier pictures of the same location to aid in the detection of changes, or maps may be overlaid on aerial photos or radar images. Three input stations are provided, two for 70-mm. and 5in. film and the third for 70-mm., 5 in. and 9 1/2 in. film. Transparencies, which may be either negative or positive, are screened by three vidicons, each mounted within its own variable opto-mechanical system to maintain focus over the entire range.

32,685
Stein, K.J. ARMY WILL TEST MULTIPLE APPROACH SYSTEM. Aviation Week & Space Tech., Aug. 1967, 87(6), 72-76. (Airborne Instruments Laboratory, Cutler-Hammer, Inc., Melville, N.Y.).

An experimental microwave tactical landing system designed to provide multiple azimuth paths and pilot-selected approach angles for a broad range of aircraft from helicopters and V/STOLs to transports is being developed for the Avionics Laboratory of Army Electronics Command by Airborne Instruments Laboratory. The contracted equipment will be an experimental test and engineering model for test, intended to confirm system requirements and evaluate the suitability of AIL's technique for tactical use. The new system, called A-Scan is a time-sharing system in which the selected channel is occupied by elevation, azimuth and distance-measuring functions in rapid succession. New measurements of each function are made in the airborne equipment four times per second. Glide-slope guidance is provided by linearly proportional signals from zero to 40 degrees, with optional provision of angles to −5 degrees from horizontal throughout an adjustable azimuth sector of ±60 degrees. Horizontal guidance is provided by linearly proportional signals within an adjustable azimuth sector of ±20 to ±60 degrees throughout the elevation sector described above. Range measurements are in terms of distance-to-go with a precision no worse than ±50 feet or 2% of actual range, whichever is greater. Range rate will also be provided and displayed. Altitude computed from distance and elevation angle, measured relative to the landing area, will be provided and displayed. Simultaneous approach guidance may be provided to an unlimited number of aircraft within the useful system coverage, defined by the previously given azimuth and elevation angles and about 10 nautical mile slant range, whether the aircraft are in formation or occupying separate approach lines, according to A.I.L. Data on distance-to-go, altitude and range-rate is furnished to 30 aircraft with excellent quality and to a larger number with progressively degraded quality. Angular guidance is not saturated or degraded by simultaneous use by any number of aircraft, and the distance-measuring function is not saturated or seriously degraded by simultaneous use of the system by 30 aircraft.

32,686
Klass, P.J. NEW RANDOM-ACCESS MEMORY UTILIZES LASERS AND HOLOGRAMS. Aviation Week & Space Tech., Aug. 1967, 87(6), 81-86. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

A new type high-speed random-access optical memory, which shows promise of storing more than 100 million bits of information on a single photographic film and providing access times of a few microseconds, has been developed by Bell Telephone Laboratories. The memory uses an array of holograms, illuminated by a laser beam, but the three-dimensional stereoscopic effect for which holograms are best known is not used. The memory is termed "semi-permanent" because it is more permanent than magnetic tape or disks but can be changed more easily than a wired core memory. An experimental model has demonstrated a storage capacity of 1.5 million bits with access time of about 20 microseconds.

32,687
Klass, P.J. ATLANTA TESTS SUPPORT ATC AUTOMATION PLANS. Aviation Week & Space Tech., Sept. 1967, 87(10), 51-63. (US Federal Aviation Agency, Washington, D.C.).

The Federal Aviation Administration hopes to ease terminal area traffic control problems by 1972 through the introduction of automation at approximately sixty-four of the nation's largest airports, and a more modest level of automation at smaller airports equipped with radar. Subject to the availability of funds for such a program, now estimated to cost $50-100 million, this could give the nation an automated traffic control network both for enroute and terminal operations by late 1972. The FAA has $8.5 million in Fiscal 1968 funds with which to start the terminal area program and procure prototype hardware for evaluation. FAA proposes to handle the terminal area program as a packaged procurement to speed implementation. The contractor selected will be responsible not only for supplying all required hardware but also for installing it. The agency's terminal area program has been reoriented during the past year, partly as a result of experience gained with an operational testbed facility installed in the Atlanta terminal area and partly because of growing problems in the terminal area. Previously, the agency had planned to install a high level of automation first at only a few of the largest terminals, slowly extending automation on a more evolutionary basis to lower-density terminals. Now, the FAA seeks to obtain more immediate and widespread relief by installing a more modest level of automation at many more airports.

32,688
Aviation Week & Space Technology. JET SHOES STUDIED AS ASTRONAUT EVA AID. Aviation Week & Space Tech., Sept. 1967, 87(11), 81-83. (National Aeronautics & Space Administration, Washington, D.C.).

Studies of jet shoes to be used as extra-vehicular aids to astronauts in future U.S. space programs are demonstrating man's inherent ability to control a thrust vector acting against the soles of his feet. National Aeronautics and Space Administration's Langley Research Center in a recent technical note described the shoes as easily adaptable. The subject in the tests could control both attitude and motion with a reasonable degree of precision, the study concluded. The average person could maneuver the jet platform in translation by utilizing only his natural capabilities to maintain his balance.

32,689
Brown, B.A. PERSONNEL ABILITY LIMITS TECHNOLOGY GAIN. Aviation Week & Space Tech., Oct. 1967, 87(14), 44-52. (US Federal Aviation Agency, Washington, D.C.).

Federal Aviation Administration's air traffic control service (ATC), currently installing a modern semi-automated, computer-assisted control network to cope with predicted traffic volume, may lose many of the benefits of technology because of problems with the human segment of the system. Management problems, including indecisiveness, political considerations, and poor forecasting and planning, have lowered the morale, if not the efficiency, of the air traffic control service to a near all-time low. At the same time, the understrength organization is being called upon to provide more and more services to more and more users without any significant increase in either its manpower or its budget. Internally, the ATC is beset by employee dissatisfaction that is promoting a strong increase in militant unionism, and, even more of a problem, a increasing number of resignations. Although the overall employee turnover rate in the ATC has remained remarkably low, the service appears to be entering the first stages of a vicious circle which will cause trained people to leave because of the increasing workload and the workload to increase because of people leaving. Further, the FAA is caught without a pipeline of traffic controllers in training, and no real increase in the number of useful employees can be expected before about 1976. But a major segment of the problems presently besetting the air traffic control service comes from outside the FAA and can only be solved or alleviated through direct, forceful, high-level administrative actions. Even if such actions were taken immediately, it is likely that the hardware portion of the air traffic control system will continue to outstrip the human side for several years to come.

32,690
Stein, R.J. NEW [illegible] DATA BASES. Aviation Week & Space Tech., Oct. 1967, 87(14), 79-83. (Co Electron-Missouri, Conductron Corporation, St. Charles, Mo.).

New flight simulators under development at Conductron-Missouri for the emerging generation of large jet transports promise broadened capabilities for reproducing avionic system outputs and mechanical motion cues. Two major projects, one civil and one military, exemplify some of the expanding system capabilities: Boeing 747 simulator, being built for Boeing Co., will incorporate a new six-degree-of-freedom motion system, providing for large excursions in roll, pitch, yaw, vertical (heave), lateral (slip) and longitudinal motion. The 747 system will also provide simulation of weather radar returns, using weather and terrain transparencies in a flying spot scanner. USAF/Lockheed C-5A simulator, being developed by Conductron under a contract for four units with Lockheed-Georgia Co., will provide complete simulation of the huge transport's multimode X and K_u band radars. The Conductron system also will provide simulation of Lockheed's comprehensive radar malfunction detection, analysis and recording subsystem, designed for inflight troubleshooting and diagnosis of aircraft subsystems. Although they require added computer capacity, these large-scale projects adhere to the basic Conductron-Missouri philosophy of utilizing a general-purpose digital computer in conjunction with specialized input/output devices located onboard the simulator. Data into and out of the training station is multiplexed, eliminating cabling between "a few hundred" to several thousand wires that would otherwise have to be fed across the cockpit motion system, according to W.W. Foote, director commercial simulators at Conductron Missouri.

32,691
Elson, B.M. RADAR SIMULATOR USES DIGITAL COMPUTER. Aviation Week & Space Tech., Oct. 1967, 87(15), 97-101. (Pennsylvania Research Associates, Inc., Philadelphia, Penn.).

A versatile technique for simulating airborne radar terrain displays has been demonstrated by Pennsylvania Research Associates, Inc. A small general-purpose digital computer is used instead of terrain models or photo-transparencies. The company's work was sponsored by the Navy Training Device Center, Orlando, Fla., to develop an improved radar landmass simulator/trainer. The Navy plans to evaluate the new concept in an operational hybrid simulator using a Sigma 7 digital computer. The new technique is expected to provide better resolution, greater realism and more versatility than the purely analog techniques used to date. However, it is expected that the initial cost will be twice as high as that for the favored transparency method, a purely analog system of simulation currently used by the Navy.

32,692
Wetmore, W.C. ATMOSPHERE EFFECT ON SONIC BOOM PROBED. Aviation Week & Space Tech., Nov. 1967, 87(22), 72-76.

Varying effects of winds, turbulence, temperatures and pressures on sonic boom signatures are so complex that a statistical approach is needed to predict peak boom overpressures, according to a National Aeronautics and Space Administration survey. The effects of the atmosphere, like the prediction of the weather itself, remain probabilistic or statistical in nature. The general theory indicates that variations in the local speed of sound and in the local convection velocity of the sound field are responsible for the modulating effects of turbulence and temperature fluctuations on the distortion of the pressure signatures of aircraft. Calculation of the modulating effects of wind turbulence and temperature spottiness is most difficult. These calculations are highly complex, in themselves, and the basic data required are extremely difficult to determine or assess. Though some encouraging analytical efforts have been made, statistical prediction of sonic booms presently depends primarily on measurements from aircraft flights.

32,693
Stein, K.J. USAF TESTS DIGITAL FLIGHT INSTRUMENTS. Aviation Week & Space Tech., Dec. 1967, 87(24), 89-99.

A new generation of flight instruments designed to bring digital microcircuit reliability and weight saving to the familiar vertical scale displays on USAF aircraft is being developed for Aeronautical Systems Div. Installed on an aircraft panel, the new instruments appear nearly identical to current airspeed/Mach/safe speed and altitude/vertical speed indicator groupings. Behind the panel, however, they substitute a new indicating tape that is digitally encoded on the reverse side for use directly in a computer feedback loop in place of the synchros, potentiometers and electromechanical gearing of earlier units. The new instruments are being developed for Aeronautical Systems Div. by the Navigation & Control Div. of Bendix Corp., Teterboro, N.J. In the Bendix digital instrument, the tape serves as both an indicator and a feedback medium by means of printing on the front and encoding on the reverse side. Numerical values to be read by the human pilot are printed on the front of the tape by a precision silk-screen process. Metallic tracks are deposited on the reverse side of the tape by means of a photo resist-etching process. These tracks use a grey code to provide numerical values and a sign bit, read by capacitive heads in the tape drive unit. These numerical values are fed to the digital processor where they are converted to a binary format in the arithmetic section and compared with central air data computer signals. Any difference in numerical values generates an error signal that drives the tape to the correct value. At the same time, of course, the appropriate numbers on the face of the tape are visible to the pilot as instrument readings.

32,694
Klass, P.J. INFRARED UNDER STUDY FOR PILOT WARNING. Aviation Week & Space Tech., Dec. 1967, 87(23), 56-57. (National Aeronautics & Space Administration, Washington, D.C.).

Hopes for developing a low-cost pilot warning indicator (PWI) to alert pilots to nearby aircraft are once again focusing on infrared techniques, nearly a decade after they were first investigated and found inadequate with the then available technology. The Federal Aviation Administration and airspace users broadly outlined their PWI desires recently to avionic industry representatives at a one-day symposium intended to spark industry thinking on the problem. General aviation representatives called for a simple, low-cost system which would be self-contained (non-cooperative) and which might find use by larger civil and military aircraft. If any companies in attendance had new concepts in mind for PWI, they kept them under wraps, with one possible exception. Principal interest in a PWI came from general aviation, with support by the airlines and varying degrees of interest expressed by military representatives.

32,695
Dolbear, F.T., Jr. & Lave, L.B. INCONSISTENT BEHAVIOR IN LOTTERY CHOICE EXPERIMENTS. Behav. Sci., Jan. 1967, 12(1), 14-23. (Industrial Administration Graduate School, Carnegie Institute of Technology, Pittsburgh, Penn.).

College students made choices in binary lottery situations involving small amounts of money--payoffs ranged from $2.50 to -$1.00. Each of 52 subjects made 150 choices. Any of a number of choice models might be used to describe the outcome of such an experiment. However, no simple model (based on expected utility maximization) is capable of explaining all choices (of a particular subject)--there always some inconsistent choices. The experiment was designed to isolate factors affecting inconsistency. Such research is aimed at improving the predictive ability of choice models by reducing the stochastic error. A choice model based on expected utility maximization was developed. The model was designed to maximize the internal consistency of each subject's choices. In all cases, some choices were found to be inconsistent with the model. Grouping the data in various ways, four factors hypothesized to affect inconsistency were tested: difference in dispersion of the payoffs, signs of the payoffs, order of the choice situation, and small changes in wealth. Applying classical statistical techniques, inconsistency was found to be related to the first three of these factors. Some implications of these results for expected utility models of choice are presented.
R 11

32,696
Messick, D.M. INTERDEPENDENT DECISION STRATEGIES IN ZERO-SUM GAMES: A COMPUTER-CONTROLLED STUDY. Behav. Sci., Jan. 1967, 12(1), 33-48. (Psychology Dept., University of California, Santa Barbara, Calif.).

A small digital computer was programmed to play zero-sum games against human subjects. The machine was programmed to play the game according to three different strategies. The first of these was the minimax strategy. The second program employed a strategy which kept a record of the number of times the subject chose each response and used this information to compute, on each trial, an estimate of the expected loss associated with each of its choices. On each trial, the program chose the response having the least expected loss. The third program generated its choices in the same manner as the previous one, except that it only "remembers" the five most recent choices of the subject to use as estimates of choice probabilities in computing the expected losses. This program thus had a limited memory. Fourteen human subjects played a zero-sum game against each of these programs for a total of 150 trials. The sequence of choices for each subject was analyzed in an effort to determine how the different strategies used by the machine affected the strategies used by the subjects. The analyses indicated that the decision strategies adopted by the subjects depended critically on the strategy used by the computer. The subjects' strategies were effective, although not strictly optimal, against those of the machine. The results reveal a level of complexity not previously observed in the study of interdependent decision processes and some implications of these results for theory construction are discussed.
R 16

32,697
Frijda, N.H. PROBLEMS OF COMPUTER SIMULATION. Behav. Sci., Jan. 1967, 12(1), 59-67. (Psychology Dept., University of Amsterdam, Amsterdam, The Netherlands).

Computer simulation of psychological processes presents a number of problems, which are too infrequently discussed explicitly. The most important of those are the relation between a program and the theory it embodies--it is often difficult to distinguish between the theoretically relevant aspects and those of a merely technical nature--and validation of program output. Some illustrations of the activity of detailed process simulation and some suggestions concerning validation are presented.
R 20

32,698
Rapoport, A. VARIABLES AFFECTING DECISIONS IN A MULTISTAGE INVENTORY TASK. Behav. Sci., May 1967, 12(3), 194-204. (Psychology Dept., Hebrew University, Jerusalem, Israel).

This study is concerned with the experimental investigation of human dynamic decisions in multistage inventory problems. Its purpose is to detect discrepancies between observed decisions and optimal decisions which could reveal the existence of constraints on human ability to process information and make dynamic decisions. Thirty-four subjects were run individually in six different computer-controlled multistage inventory tasks. They were required to maximize the gain of an operation involving the producing, storing, and selling of a stock of goods. Two models are tested--a single-stage inventory model and a multistage inventory model. Both are normative models prescribing constant-level optimal ordering policies. Both are rejected as descriptive models. The subjects' level of stock is not constant but slightly decreasing and strongly related to the previously observed demand.
R 11

32,699
Horlock, H. THE EFFECT OF OUTCOME DESIRABILITY ON INFORMATION REQUIRED FOR DECISIONS. Behav. Sci., July 1967, 12(4), 296-300. (University of Pennsylvania, Philadelphia, Penn.).

On each of 50 trials 20 men and 18 women sampled a pack of marked and blank cards until they decided whether marked or blank cards were predominant in the whole pack. The desirability of a predominance of marked or blank cards, the proportions of marked and blank cards in the packs, and an incentive for correctness of decision were varied in a 5 x 5 x 2 factorial design. In general, the number of cards sampled was inversely related to the desirability of the pack except for packs with proportions close to .5. This relation appears to be a complex function of the difficulty of the decision and the sex of the subject, but not the level of the incentive for correctness.
R 8

32,700
Sermat, V. THE EFFECT OF AN INITIAL COOPERATIVE OR COMPETITIVE TREATMENT UPON A SUBJECT'S RESPONSE TO CONDITIONAL COOPERATION. Behav. Sci., July 1967, 12(4), 301-313. (University of Oregon, Eugene, Ore.).

Subjects, 112 male and 112 female college students, participated in four experiments with mixed-motive games, using a Prisoner's Dilemma and a Chicken matrix. A prearranged program simulating the "other player" made 30 consecutive cooperative or competitive choices during a "pretreatment" and then, for 200 trials, reciprocated the subject's choices with a one-trial lag (the tit-for-tat treatment). A highly significant increase in cooperative behavior was observed in all four experiments. The data suggest that either type of pretreatment may facilitate the development of a cooperative strategy. If followed by a tit-for-tat treatment, while in the absence of pretreatment, no increase in cooperative behavior was found. The sex of subject and the effect of the first move of tit-for-tat treatment interacted with other experimental conditions. Cooperative pretreatment, followed by a cooperative first move, produced one of the highest levels of cooperation observed in these experiments.
R 12

32,701
Swensson, R.G. COOPERATION IN THE PRISONER'S DILEMMA GAME I: THE EFFECTS OF ASYMMETRIC PAY-OFF INFORMATION AND EXPLICIT COMMUNICATION. Behav. Sci., July 1967, 12(4), 314-322. (Science & Technology Institute, University of Michigan, Ann Arbor, Mich.).

The explicit communication structure between pair members was manipulated for six groups of subjects in a two-person, iterated Prisoner's Dilemma game. In addition, subjects in each of the 29 pairs were given differential amounts of information upon which to base their choice strategies. One subject was informed only about her own payoffs for each possible combination of choices, while the other pair member was given both sets of payoffs and was aware of having more information. Although cooperation declined over repetitions of the game, group communication structure and amount of payoff information appeared to influence both overall cooperation and the rate at which cooperation declined. Increases in the availability of explicit communication tended to increase both individual and joint cooperation.
R 12

32,702
Morrison, D.G. ON THE CONSISTENCY OF PREFERENCES IN ALLAIS' PARADOX. Behav. Sci., Sept. 1967, 12(5), 373-383. (Graduate Business School, Columbia University, New York, N.Y.).

The problem studied in this paper is the consistency of a subject's choice when making a decision in two different situations. If he is placed in one set of circumstances, he must choose between two highly desirable lotteries. If the other situation prevails, he must make a similar type of decision between two much less desirable lotteries. Conditions for consistency in the two preferences are developed. It is then shown that the typical subject violates at least one of these conditions. The problem is then examined from a somewhat different point of view, and this new formulation shows that the typical response that subjects make can indeed be "consistent." The "solution" to the paradox is based on the consideration of the subject's initial asset position.
R 7

32,703
Back, K.W. & Bogdonoff, M.D. BUFFER CONDITIONS IN EXPERIMENTAL STRESS. Behav. Sci., Sept. 1967, 12(5) 384-390. (Duke University, Durham, N.C.).

Reactions of subjects to the experimental situation were investigated by means of plasma-free fatty acid (FFA) level. Arousal (elevated FFA level) was shown at entry into the experiment, at the giving of instructions, and at upsetting experiences during the experiment. Stress at entry can be called experimental stress, variations within the experiment, manipulated stress. A series of conditions which insulate the subject socially, psychologically, or physically from the situation diminish experimental stress and obliterate the differences in manipulated stress. They are: previous acquaintance, previous work together as a group, commitment to the experiment, and low height-weight ratio.
R 11

32,704
Quillian, M.R. WORD CONCEPTS: A THEORY AND SIMULATION OF SOME BASIC SEMANTIC CAPABILITIES. Behav. Sci., Sept. 1967, 12(5), 410-430. (Bolt, Beranek & Newman, Cambridge, Mass.).

In order to discover design principles for a large memory that can enable it to serve as the base of knowledge underlying human-like language behavior, experiments with a model memory are being performed. This model is built up within a computer by "recoding" a body of information from an ordinary dictionary into a complex network of elements and associations interconnecting them. Then, the ability of a program to use the resulting model memory effectively for simulating human performance provides a test of its design. One simulation program, now running, is given the model memory and is required to compare and contrast the meanings of arbitrary pairs of English words. For each pair, the program locates any relevant semantic information within the model memory, draws inferences on the basis of this, and thereby discovers various relationships between the meanings of the two words. Finally, it creates English text to express its conclusions. The design principles embodied in the memory model, together with some of the methods used by the program, constitute a theory of how human memory for semantic and other conceptual material may be formatted, organized, and used.
R 37

32,705
Gorn, S. COMPUTER AND INFORMATION SCIENCES AND THE COMMUNITY OF DISCIPLINES. Behav. Sci., Nov. 1967, 12(6), 433-452. (Moore Electrical Engineering School, University of Pennsylvania, Philadelphia, Penn.).

The author discusses the computer and information sciences, which he considers a new discipline. He considers how this new science has been affecting other sciences, arts, and professions. The approach is a philosophic attitude which the author calls cybernetic pragmatism, within which a model is given of the growth and interrelationship of information systems and the organizations which use them. The discussion concludes with a section on interdisciplinary politics and reevaluation of liberal arts education.
R 30

32,706
Morgan, J.N. WHO USES SEAT BELTS? Behav. Sci., Nov. 1967, 12(6), 463-365. (Survey Research Center, University of Michigan, Ann Arbor, Mich.).

Data from a national sample interviewed in early 1965 show that a third of the car owners reported seat belts in their cars, and a third of those who did have seat belts claimed that they used them all the time. The crucial factor associated with having and using seat belts is formal education, not age. Using seat belts is associated with other forms of risk-avoidance behavior, but not with verbally expressed desire for security on the job (common among the uneducated with insecure jobs). It is associated with actual use of other new products, but not with verbal attitudes toward new products.
R 1

32,707
Horton, T., Holm, C.E., Green, B. & Martin, H. THE ASSESSMENT OF HUMAN PERFORMANCE FOR THE ANALYSIS OF SPACE MISSIONS. Behav. Sci., Nov. 1967, 12(6), 490-497. (Valley Forge Technology Center, General Electric Company, King of Prussia, Penn.).

The authors consider the problem of developing a computer program to assist the aerospace psychologist in the task of assessing human performance reliability. The procedures which were developed permit an analysis of physiological and psychological variables relevant to human performance in space, the stressors that cause degradation in performance because they impair physiological and psychological functions, and the tasks that humans must perform. The degrading effect of each stressor is specified for each physiological and psychological variable, and the combined effect of all stressors on each variable is calculated. The status of all physiological and psychological variables relevant to the performance of a given task is assessed and a resultant reliability for each task is calculated. The minimum reliability within a given time period is used to produce a reliability profile. The system was used to obtain reliability ratings based on estimates of conditions for a hypothetical lunar mission.
R 2

32,708
Brainard, R.C. LOW-RESOLUTION TV: SUBJECTIVE EFFECTS OF NOISE ADDED TO A SIGNAL. Bell Sys. Tech. J., Jan. 1967, 46(1), 233-260. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

The visibility of noise in a television presentation is related to the spatial-frequency and flicker-frequency components of the noise display. The visibility of sine wave interference, which generates a sine wave grating on a TV screen, demonstrates remarkable linearity by giving a good approximation to the visibility function measured with narrow bands of noise. A difference in visibility between moving and stationary gratings produces a difference between noise visibility in TV and photographs. This fact is important in evaluating the computer simulation of a system by calculations for a single TV frame. The variation of visibility with motion predicts increased visibility for additive noise in a television frame repeating system. Applications to predistortion and reconstruction filters for transmission of analog and digital TV signals are discussed.
R 29

32,709
Brainard, R.C., Mounts, F.W. & Prasada, D. LOW-RESOLUTION TV: SUBJECTIVE EFFECTS OF FRAME REPETITION AND PICTURE REPLENISHMENT. Bell Sys. Tech. J., Jan. 1967, 46(1), 261-271. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

Using the experimental television facility described in a companion paper, frame repeating and point-by-point selective replenishment of picture elements have been accomplished in real time. On the basis of initial experiments, using the head-and-shoulder view of a person as the picture source, such as is likely to be encountered in a visual communication system, the following tentative conclusions have been reached: a) The motion rendition with a fifteen new pictures/second frame repeating system, while not flawless, is reasonably good. b) Selectively replenishing one-quarter of the picture points per frame gives a better continuity of motion but results in objectionable patterns; c) Picture quality greatly depends on the pattern of picture replenishment. Of the five replenishment patterns tested, two result in pictures which are significantly better than the other three. d) In informal viewings, opinion has been so divided that no preference has been established between simple fifteen new pictures/second frame repeating and the more satisfying schemes for picture replenishment. e) The frame repeating and replenishment systems produce gross impairment during zooming and panning; consequently, these systems in their present form are unlikely to be useful for broadcast television. The impairments observed in these systems are subjective and not yet predictable. This emphasizes the importance of subjective testing of systems in real time.
R 2

32,710
Klemmer, E.T. SUBJECTIVE EVALUATION OF TRANSMISSION DELAY IN TELEPHONE CONVERSATIONS. Bell Sys. Tech. J., July-Aug. 1967, 46(6), 1141-1147. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

An earlier experiment by Riesz and Klemmer on the effect of pure-transmission delay upon natural telephone conversations was extended in a test with more than double the time period and number of calls. The previous finding of little or no adverse reaction to round-trip pure delays of 600 and 1200 milliseconds (msec) alone was confirmed. The previous finding of a large increase in dissatisfaction with both of these delays following exposure to 2400 msec was not obtained. Exposure to delays of 2400 msec led to no dissatisfaction with later calls at 600 msec, but some rejections at 1200 msec did occur. There is no contradiction of other results on normal telephone circuits with 2-wire terminations (and related echo sources, paths, and suppressors) wherein customer dissatisfaction is greater with 600 msec delay than with the much shorter delay of a normal long-distance circuit.
R 7

32,711
Julesz, B. THE SUPPRESSION OF MONOCULARLY PERCEIVABLE SYMMETRY DURING BINOCULAR FUSION. Bell Sys. Tech. J., July-Aug. 1967, 46(6), 1203-1221. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

Symmetries that we can perceive with one eye can be made to disappear during binocular fusion--that is, a symmetrical pattern in one of a pair of stereoscopic images may not be seen when we view the pair stereoscopically. This phenomenon should not be confused with the classically-known binocular rivalry in which the left and right images cannot be fused and one of the images is alternately suppressed. The type of suppression phenomenon reported here is obtained for computer-generated random-dot patterns in which locally each picture element can be fused in a static way. The binocularly suppressed symmetry can be one-, two-, and four-fold, and the experiments give some insight into the processes underlying the perception of symmetry. In addition to symmetries, it becomes possible to scramble text by exhibiting it stereoscopically.
R B

32,712
Adams, J.G. GETTING READY FOR THE 747. Astronautics & Aeronautics, Sept. 1967, 5(9), 32-34. (Civil Aeronautics Board, Washington, D.C.).

Modernization of air-traffic control, governmental procedures, airports, and support facilities must be completed by the time the 747 arrives on the scene, or chaos will follow.

32,713
Sutter, J.F. THE BOEING 747: TAKING AIM ON TOMORROW'S MARKET. Astronautics & Aeronautics, Sept. 1967, 5(9), 36-41. (Boeing Airplane Company, Seattle, Wash.).

Technological advances have made possible the design of an aircraft carrying well over twice the load of present transports while lowering operating costs and increasing passenger comfort.

32,714
Bakke, O. SST AND SOCIETY IN THE NORTHEAST. Astronautics & Aeronautics, Sept. 1967, 5(9), 42-45. (US Federal Executive Board, FAA, New York, N.Y.).

The conditions of community acceptance and terminal-area capacity make it very clear that additional jet airport facilities must be provided to accommodate this revolutionary air transport.

32,715
Bright, C.B. FLOATING AIRPORT KEY TO INTER-CITY TRAFFIC. Astronautics & Aeronautics, Sept. 1967, 5(9), 46-51. (Eagleton Political Institute, Rutgers University, Newark, N.J.).

Circular "aquadromes," accessible by V/STOL aircraft and all forms of ground transportation, could move large masses of people in and out of the city center quickly and efficiently.

32,717
Dowd, P.J. & Cramer, R.L. HABITUATION TRANSFERENCE IN CORIOLIS ACCELERATION. Aerospace Med., Nov. 1967, 38(11), 1103-1107. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

Coriolis accelerations in flight adversely affect a pilot's efficiency and physical fitness by two vestibular reactions. One is illusions; the other is vestibulo-autonomic reactions. In this study, both these vestibular reactions were modified by the subject's being repeatedly exposed to rotary stimulation while being passively tilted in different planes of rotation or while actively tilting his head into a rotary plane. Three conditions were used during rotation: chair tilts in the lateral plane, active head movements in the lateral plane, and active head movements in the sagittal plane. Results indicate habituation (a decrement in nystagmus, in subjective sensations, and in somatic responses) after repeated exposure to each condition. Transference of this habituation to one head movement or position change appears to have some effect on the duration of nystagmus and sensations to exposure to another head movement or position change. The dynamic characteristics of nystagmic responses and the autonomic reactions, however, do not show any significant transference of habituation. Thus, transfer of habituation cannot be obtained for different conditions. Each condition must be practiced separately despite their similarity in sensations and nystagmic responses.
R B

32,718
Dvorak, J., Cerny, V. & Flisakova, B. ILLUSIONS BEFORE THE ONSET OF UNCONSCIOUSNESS IN SIMULATED FLIGHT. Aerospace Med., Nov. 1967, 38(11), 1108-1109. (Institute of Aviation Medicine, Prague, Czechoslovakia).

In 9 untrained subjects illusions before the onset of unconsciousness in nitrogen hypoxia during horizontal level flight in a ground simulator were analysed. Before a complete loss of consciousness in 60 per cent illusions of falling down and/or to one side were recorded, resulting in an uncorrect manoeuvre, leading to a nose up and tilt position of the cabin. In natural flight without doubt the only result could be an abrupt pullup of the plane, followed by a stall. The illusions were never observed in fixed cabin.
R 4

32,719
Lee, J.D., Jr. APPLICATION OF GAS CHROMATOGRAPHY IN MANNED SPACE FLIGHT. Aerospace Med., Nov. 1967, 38(11), 1110-1117. (Manned Spacecraft Center, NASA, Houston, Tex.).

A trace contaminant detection system using gas chromatographic techniques has been developed to provide real-time analysis of the space cabin atmosphere and suit gas during space flight. Information concerning the presence and buildup of any toxic contaminants during flight was considered essential in preparation for missions of long duration. Gas chromatography, with its inherent simplicity and amenability to miniaturization, has proven to be a valuable tool in the detection system. Rigid reliability requirements are imposed on spacecraft systems and flight instruments. A maximum effort was therefore expended in this program to obtain an instrument capable of performing in a space environment without overcompromising the versatility of gas chromatography in the laboratory. The carrier gas in the detection system is helium, housed in a 5.2-inch-diameter titanium sphere. Electronics are provided for amplification of the detector signals, zero compensation, oven temperature control, amplifier attenuation, and automatic programing. The analyzer subassembly consists of three separate columns and associated cross-section ionization detectors. The system has undergone extensive testing at NASA-MSC, including both laboratory tests and chamber simulations, and will be of great assistance in answering the trace contaminant question.
R 2

32,720
Smith, H.P.R. HEART RATE OF PILOTS FLYING AIRCRAFT ON SCHEDULED AIRLINE ROUTES. Aerospace Med., Nov. 1967, 38(11), 1117-1119. (British European Airways, London, England).

The heart rate of seven experienced pilots was recorded at five-second intervals during take-off and landing and at five-minute intervals during preflight checks, taxying and the remainder of the flight. The rate of all of the pilots was raised during every take-off and landing. It was also increased to a varying extent according to the difficulties and hazards of the remainder of the flying task. The results support the view that the number of hours flown is not the only parameter needed to measure the work done by civil air transport pilots.
R 5

32,721
Vogt, F.B., Mack, Pauline B. & Johnson, P.C. EFFECT OF GARMENTS WHICH PROVIDE WORK LOADS IN PREVENTING THE CARDIOVASCULAR DECONDITIONING OF BEDREST. Aerospace Med., Nov. 1967, 38(11), 1134-1137. (Nelda Childers Stark Laboratory for Human Nutrition Research, Texas Woman's University, Denton, Tex.).

Five healthy adult male subjects participated in two successive bedrest periods of three weeks duration to evaluate the potential protective effect of exercise garments in preventing the cardiovascular deconditioning associated with prolonged bedrest. During the first period of bedrest, the subjects underwent a period of inactive bedrest during which they remained flat in bed. During the second period of bedrest, the subjects wore a specially fitted suit to provide an exercise load to the musculoskeletal system. The results of the studies indicated no statistically significant difference in the cardiovascular response after the two bedrest conditions.
R 8

32,722
Grose, V.L. DELETERIOUS EFFECT ON ASTRONAUT CAPABILITY OF VESTIBULO-OCULAR DISTURBANCE DURING SPACECRAFT ROLL ACCELERATION. Aerospace Med., Nov. 1967, 38(11), 1138-1144. (Aerospace Management Institute, University of Southern California, Los Angeles, Calif.).

This study discusses the physiological limitations of the human and his susceptibility to error when subjected to extended and accelerated spacecraft rolling. The context for discussion is provided by the Gemini VIII spaceflight emergency of uncontrolled and accelerated rolling which caused the premature abort of the mission. Data from this flight imply that astronaut performance was impaired due to vestibulo-ocular disturbance. Five deleterious effects are attributed to spacecraft roll acceleration: disorientation, dizziness, impaired vision, nausea, and panic. Recommendations for astronaut selection and conditioning as well as spacecraft design are proposed to minimize these effects of accelerated rolling.
R 18

32,723
Trites, D.K., Kurak, A. & Cobb, B.B. PERSONALITY AND ACHIEVEMENT OF AIR TRAFFIC CONTROLLERS. Aerospace Med., Nov. 1967, 38(11), 1145-1150. (US Civil Aeromedical Research Institute, FAA, Oklahoma City, Okla.).

Personality characteristics of 338 Enroute Air Traffic Control Specialists contributing to greater or less than predicted achievement in training at the FAA Academy and relationships between this over- and underachievement in training and subsequent job performance were investigated. From a regression weighted combination of aptitude test scores and biographical characteristics predicted course grade averages were computed and subtracted from actual grade average to obtain an estimate of over- or underachievement. These difference scores were correlated with the 18 scales of the California Psychological Inventory and with measures of job performance. Overachievers were found to be more intellectually efficient, more interested in achievement, responsible, dominant, tolerant, self-controlled, socially mature and aware of others, interested in giving a good impression, and had a greater personal sense of well-being than the underachievers. Relationships between the difference scores and six aspects of job performance were all significantly positive. It was concluded that: a) over- or underachievement during training reflected differences in personality structure among trainees, and b) over- or underachievement was a relatively stable characteristic of individuals manifested subsequently in their job performance.
R 13

32,724
O'Connor, P.J. DIFFERENTIAL DIAGNOSIS OF DISORIENTATION IN FLYING. Aerospace Med., Nov. 1967, 38(11), 1155-1160. (RAF Central Medical Establishment, London, England).

In the R.A.F. a panel of consultants investigates aviators who complain of unusual or persistent symptoms of disorientation in the air. The first thirty cases have now been followed for five years; case details are given. The importance of psychological factors in perpetuating disorientation symptoms is emphasized. Treatment was by explanation, supportive psychotherapy and familiarization flying; two thirds of the thirty aviators returned to flying.
R 7

32,725
Fascenalli, F.W. & Rogers, Nancy. AN AEROSPACE WORD LIST FOR SPEECH DISCRIMINATION TESTING. Aerospace Med., Nov. 1967, 38(11), 1164-1166. (Palo Alto-Stanford Hospital, Palo Alto, Calif.).

Knowledge of audiometric testing and the diagnostic significance of the results have accrued at a much faster rate than they can be applied to the care of aircrew members. Speech discrimination tests have been shown to be of great value in identifying significant disease in the inner ear, internal auditory canal and cerebellar pontine angle all of which constitute major hazards to flying safety. Forty ears were tested with pure tone audiograms, Harvard W22 phonemic balanced lists and specially constructed lists of common aerospace terms. The results showed that in a group with good pure tone hearing levels, a good score on the phonemic balance test correlated with a good score on the aerospace word list.
R 5

32,726
De Hart, R.L. WORK-REST CYCLE IN AIRCREWMEN FATIGUE. Aerospace Med., Nov. 1967, 38(11), 1174-1179. (USAF Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio).

The stresses acting upon military aircrewmen are numerous and variable. These stresses are modified by such factors as morale, motivation and mission accomplishment. The interaction of stress and the individual may produce a subjective sense of weariness, with a concomitant objective deterioration in performance--an acceptable definition of fatigue. This study was undertaken to more clearly delineate the subjective effects of fatigue in terms of the actual work-rest cycle. The subjects were highly motivated aircrewmen in an operational squadron, performing a variety of aircraft systems tests. The missions were variable, from low level ground approach tests to high level photographic evaluations, from duration times of less than one hour, to over fifteen hours, and with a world-wide geographic spread. A daily activity log, designed to cover a 24-hour period, was prepared by each subject. The log was divided into the following five major sections: Rest, Duty, Recreation, Nutrition, and Physiological Reactions. Twenty-four subjects completed the study, preparing the log for 30 consecutive days, thus providing a total of 24 man-months of subjective data for evaluation. The daily logs were analyzed to establish trends and the influence of duty time and other factors on subjectively described symptoms of fatigue. The importance of modifying influences of such factors as job satisfaction and mission accomplishment on subjective fatigue are presented.
R 15

32,727
Weil, E. A RATIONALE FOR ATTACKING INFORMATION PROBLEMS. Amer. Docum., April 1967, 18(2), 97-103. (Information Dynamics Corporation, Reading, Mass.).

The "systems" approach to information system problems is suggested, wherein problems arising from information origination, processing, and utilization--and alternative solutions to the problems--can be viewed as an entirety rather than piecemeal. Information utilization problems involve sociopolitical considerations (e.g., "wants" vs. "needs" of users), economic values of information, and the more objective considerations of timeliness, quality, and format requirements placed upon information services or products. Quality is encompassed by the factors of specificity, completeness, and relevance. Information processing is shown to consist of seven distinct "unit processes," which may be combined in only nine different ways, thus defining nine possible types of information systems. The "unit processes" employed interact strongly with each other and with user requirements. Information origination--specifically the increasing ratio of "dross" to "ore"--is stated to be the single major information problem for which rational means of attack are not apparent at present.
R 2

32,728
Rothery, B. THE LIMITS OF SYSTEMS ANALYSES. Data Processing. Jan. 1967, 9(1), 38-39.

Because systems analysis is so all-pervading within the organization, defining the duties and limits of the systems analyst has always presented a problem. An understanding of the areas of concern to the systems analyst will help in formulating his job definition.

32,729
Grant, C.B.S. EDUCATION AND DATA PROCESSING: TELEPHONES AND SCREENS REPLACE CHALK AND BLACKBOARD. Data Processing, April 1967, 9(4), 38-39.

This article describes a new development in education technology--electronic blackboards. This system utilizes telephone lines to link a transmitter to a receiver in such a way that a lecturer can give an illustrated talk to one or more remotely located audiences. (HEIAS)

32,730
Weisberg, D.E. ADAMS ASSOCIATES ON APPLICATIONS: MAN-MACHINE COMMUNICATION AND PROCESS CONTROL. Data Processing, Sept. 1967, 9(9), 18-24. (Adams Associates Incorporated).

There is a trend today toward the use of general-purpose computers in process control systems. This article examines the ways in which new techniques and equipment are being used to monitor and control processes.

32,731
Simon, H.A. AN INFORMATION-PROCESSING EXPLANATION OF SOME PERCEPTUAL PHENOMENA. Brit. J. Psychol., May 1967, 58(Parts 1 & 2), 1-12. (Carnegie Institute of Technology, Pittsburgh, Penn.).

An information-processing system that scans stimuli serially, part-by-part, and attempts "simple" interpretations of the parts would experience a number of the well-known perceptual illusions that human subjects report. The hypothesized system has the same basic characteristics as systems which have been used to explain a wide range of cognitive phenomena. The description of the system is proposed as an explanation of some of the mechanisms for human perceptual processing.
R 21

32,732
Weiner, B. & Feldman, P. INFORMATION PROCESSING RELATED TO STIMULUS NOVELTY AND COMPLEXITY IN A SIGNAL DETECTION PARADIGM. Brit. J. Psychol., May 1967, 58(Parts 1 & 2), 69-75. (University of California, Los Angeles, Calif.).

Three experiments are reported which investigated the informational properties of novel and complex stimuli. Irrelevant visual stimuli varying in novelty and complexity were employed as noise in an auditory signal detection task. Signal detection increased over the time of exposure of the visual stimuli, suggesting that the amount of information being processed from a stimulus is a function of its novelty. The judged complexity of the stimulus did not systematically influence signal detection. The investigations employed both within- and between-subjects experimental designs.
R 7

32,733
Corteen, R.S. BASAL CONDUCTANCE LEVEL AND MOTOR PERFORMANCE. Brit. J. Psychol., May 1967, 58(Parts 1 & 2), 93-100. (Psychology Dept., Edinburgh University, Edinburgh, Scotland).

The relations between log. basal conductance and performance on three tasks were investigated. Significant relations were found with end spurt and reminiscence on the pursuit rotor, with overall performance on a dotting task, and with abnormally slow responses and optimum response speed in reaction time. These results are consistent with a view of basal conductance as a measure of "tonic" activation or the ergotropic-trophotropic dimension of Hess.
R 14

32,734
Frith, C.D. THE INTERACTION OF NOISE AND PERSONALITY WITH CRITICAL FLICKER FUSION PERFORMANCE. Brit. J. Psychol., May 1967, 58(Parts 1 & 2), 127-131. (Psychiatry Institute, University of London, London, England).

A theory of the interaction of arousal, performance and personality is outlined. On the basis of this theory it is predicted that an increase in noise will improve the performance of extraverts in a critical flicker frequency task more than that of introverts. An experiment confirming this prediction is described.
R 16

32,735
Haslam, Diana R. INDIVIDUAL DIFFERENCES IN PAIN THRESHOLD AND LEVEL OF AROUSAL. Brit. J. Psychol., May 1967, 58(Parts 1 & 2), 139-142. (Psychology Dept., University of Bristol, Bristol, England).

The pain thresholds of a group of introverts and extraverts were assessed. It was found that the mean pain threshold of the introverts was significantly lower than that of the extraverts. In a further experiment it was found that caffeine, a stimulant drug, lowered the mean pain threshold significantly. The relation between the perception of pain and level of arousal is discussed, and it is argued that the difference in mean pain threshold values as between introverts and extraverts is attributable to a difference in level of arousal.
R 19

32,736
Levelt, W.J.M. NOTE ON THE DISTRIBUTION OF DOMINANCE TIMES IN BINOCULAR RIVALRY. Brit. J. Psychol., May 1967, 58(Parts 1 & 2), 143-145. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

The dominance periods of a stimulus in binocular rivalry show a characteristic time distribution that gives important clues as to the underlying mechanism in alternation. It is shown that the distribution can be approximated by a Γ-function, which turns out to have a positive integral exponent. With an integral exponent the function describes a Poisson distribution. This suggests the existence of an underlying dominance generating process that is discrete in nature. The parameters of this process are determined by properties of the recessive stimulus in the other eye. The discrete events may be "flicks" of eye movement.
R 1

32,737
Brown, J.H.U. NEW HORIZONS IN BIOMEDICAL ENGINEERING. BioScience. June 1967, 17(6), 391-393. (National Institute of General Medical Sciences, Bethesda, Md.).

Recent developments in the field of biomedical engineering indicate that the field is developing rapidly to an interface between the biological sciences and engineering. The field may consist of a wide variety of research efforts ranging from the simple design of apparatus to complex mathematical study of biological systems. The interrelations which occur may take place in a variety of organizations ranging from a department through a separate institute or to individual collaboration between members of various departments.

32,738
Shepard, P. WHATEVER HAPPENED TO HUMAN ECOLOGY? BioScience. Dec. 1967, 17(12), 891-894, 911. (Smith College, Northampton, Mass.).

One might conclude that the destiny of human ecology is to accept its own eclectic nature. It would be impertinent to attempt to define it now so as to exclude its historical forms or its descendent and peripheral disciplines. There are at least three general approaches: a kind of extended individual physiology of the sort stimulated by space flight research and stress syndromes; the implications for man from general landscape and ecosystem ecology; and, finally, the exploration of nature and the human mind as a feedback system. The ecology of man has no sacred core to guard from Philistines. It will be healthiest perhaps when running out in all directions. Its practical significance may be the preservation of the earth and all its inhabitants.
R 57

32,739
Mitchell, D.E., Freeman, R.D. & Westheimer, G. EFFECT OF ORIENTATION ON THE MODULATION SENSITIVITY FOR INTERFERENCE FRINGES ON THE RETINA. J. opt. Soc. Amer., Feb. 1967, 57(2), 246-249. (Neurosensory Lab., University of California School of Optometry, Berkeley, Calif.).

It is now well established that, for many test targets, vertical and horizontal orientations yield higher visual acuities than oblique orientations. In order to assess the role of the optics of the eye in this effect, focusing errors of the eye were bypassed by using as the measure of resolving capacity the modulation sensitivity for sinusoidal interference fringes formed on the retina. The modulation sensitivity for vertical and horizontal orientations of the fringes was greater than for oblique orientations for a wide range of spatial frequencies. A similar orientation preference was found for the cut-off spatial frequencies. Measurements of the modulation sensitivity at 15° orientation intervals indicated that maxima in sensitivity were spaced at 90° intervals. Since the effects of the optics of the eye have been eliminated, the origin of meridional variations in acuity must lie in the retina and/or higher visual pathways.
R 15

32,740
Harvey, L.O., Jr. & Leibowitz, H.W. EFFECTS OF EXPOSURE DURATION, CUE REDUCTION, AND TEMPORARY MONOCULARITY ON SIZE MATCHING AT SHORT DISTANCES. J. Opt. Soc. Amer., Feb. 1967, 57(2), 249-253. (Pennsylvania State University, University Park, Penn.).

The effects of exposure duration, accommodation and convergence, and temporary monocularity on size matching at short distances and the interaction among these variables were studied. Test objects, subtending a constant visual angle, were presented at six distances ranging from 30 to 270 centimeters. Four groups, of thirty subjects each, made size matches with unrestricted vision and through a reduction screen, under continuous and short-duration (10 msec) illumination, binocularly and monocularly. The results implied that accommodation and convergence begin to make a significant contribution to matched size only at distances less than about one meter. When vision of the entire visual field was unrestricted, short-duration exposure had no effect on size matches. When a reduction screen was used, short-duration exposure had no effect on size matching from 120 to 270 centimeters, but increased matched size at closer distances. In all conditions of the experiment, matches made with binocular vision were identical with those made with monocular vision. Size matching for unfamiliar objects is seen to be mediated primarily by monocular cues between one and three meters, and by either monocular cues or oculomotor adjustments at distances of one meter and less.
R 15

32,741
Wyszecki, G. CORRELATE FOR LIGHTNESS IN TERMS OF CIE CHROMATICITY COORDINATES AND LUMINOUS REFLECTANCE. J. Opt. Soc. Amer., Feb. 1967, 57(2), 254-257. (Applied Physics Div., National Research Council, Ottawa, Ontario, Canada).

This is a report on a side-line experiment of the Optical Society of America Committee on Uniform Color Scales. It gives new data on L/Y ratios in terms of CIE chromaticity coordinates, based on observations made by seventy-six observers on forty-three colored ceramic tiles. The mean results are given in tabular and graphical form and compared with similar results obtained previously by other investigators.
R 13

32,742
Bailey, Judith W. & Sternheim, C.E. PSYCHOPHYSICAL RESPONSES TO MONOCHROMATIC STIMULI OF EQUAL BRIGHTNESS BUT UNEQUAL LUMINANCE. J. Opt. Soc. Amer., Feb. 1967, 57(2), 258-267. (Visual Science Center, University of Rochester, Rochester, N.Y.).

For a series of four monochromatic stimuli (468, 554, 640, and 668 nm) of differing preadapting luminances (−1.50 to 2.50 log mL), determinations have been made of the luminances required for conditioning stimuli of the same wavelength to be equivalent in brightness. Differential preadaptation is provided by haploscopic stimulation. Three hundred msec after the cessation of preadapting stimuli, variable conditioning stimuli of 300-msec duration are presented to the eye which is light adapted, and matches are made to a series of standard stimuli presented to the contralateral eye, which is adapted to a dim reference level. The psychophysical equivalence of these equally bright conditioning stimuli has been evaluated by an increment threshold technique; for conditioning stimuli and test flashes centrally fixated and of 5° subtense, luminance-discrimination functions indicate rod-cone breaks which are correlated with brightness equivalence. "On-response" functions, tracing temporal changes in the threshold of a superimposed test flash, have been determined and analyzed in terms of the correlations between brightness, luminance and extent of visual masking.
R 15

32,743
Lurie, S.M. EFFECT OF WIDTH OF MOVEMENT OF A MASKING STIMULUS AT CONSTANT TARGET SEPARATION. J. Opt. Soc. Amer., Feb. 1967, 57(2), 273-275. (USN Submarine Medical Center, New London Submarine Base, Groton, Conn.).

In the first part of this study, the effects of three widths of movement of the masking stimulus on the threshold of the test stimulus were measured. The mask was a vertical line of light 4.29° high and 0.36° wide. Its luminance was about 0.5 ft-L. It moved from left to right, at a speed of 17°/sec, toward both the test stimulus and the fovea, through a traverse of 0.36°, 1.15°, or 3.43° visual angle; the durations of these three movements were about 20, 67, and 200 msec. The movement terminated at one of four separations from the test stimulus, 0°, 0.3°, 0.6°, or 0.9° visual angle. The mask never moved past the test stimulus. The latter was a strip of light 1.15° high and 0.58° wide situated 4.3° to the left of a fixation point; its duration was 50 msec; its presentation was so timed that it and the mask disappeared simultaneously. The results are given as ratios of the threshold of the test stimulus in the presence of the mask to its threshold by itself. As expected, the ratios increased as the separation between the stimuli decreased. But more important, for any given separation, the average threshold ratios were lower in the presence of the greatest movement than in the presence of the middle movement in every case except one. For the two smaller separations, the ratios in the presence of the greatest movement were smaller than in the presence of the smallest movement as well. Because it is possible that eye movements away from the stimuli occurred; a second experiment was done using a higher speed of the masking line, 85°/sec. The results are quite similar to those in the first experiment. It is clear that with both speeds of the moving line the thresholds of the test stimulus do not simply increase with increasing movements. On the contrary, at the smaller separations of the two stimuli, there is a sharp decrease of the amount of masking as the size of the mask is reduced.
R 3

32,744
Payne, W.H. & White, C.T. EXTRAFOVEAL VISIBILITY AT A BORDER. J. Opt. Soc. Amer., Feb. 1967, 57(2), 276-277. (USN Electronics Lab., Bureau of Ships, San Diego, Calif.).

The purpose here was to investigate extrafoveal visibility of a test stimulus relative to a black and white background. Averaged evoked cortical potentials were used as measures of stimulus visibility. The stimulus was held at the same place on the retina while the black and white background was moved. Five subjects were used. A small red fixation light was mounted at 10° visual angle above the stimulus light. An electrode was placed 25 millimeters above and to the right of the subject's inion. The subject was seated 125 centimeters from the black and white plate and was instructed to fixate binocularly on the fixation light. The evoked response was recorded for 500 milliseconds beginning with the light flash. It was observed that the evoked potentials for all subjects were very similar. The first trough occurred approximately 175 milliseconds after the flash and the next peak at approximately 215 milliseconds for all subjects. The closer the stimulus light is to the border on the white side the longer the latency of the first trough and the smaller the amplitude. The latency and amplitude are to a slight degree functionally related. It is concluded that the average was correlated with subjective brightness. The failure to find a significant increase in amplitude or decrease in trough latency on the black side of the border may be attributed to the insensitivity of the evoked potentials as compared to thresholds.
R 2

32,745
Evans, R.M. LUMINANCE AND INDUCED COLORS FROM ADAPTATION TO 100-MILLILAMBERT MONOCHROMATIC LIGHT. J. Opt. Soc. Amer., Feb. 1967, 57(2), 279-281. (Photographic Technology Div., Eastman Kodak Company, Rochester, N.Y.).

Some exploratory spectrophotometric findings are reported with a new instrument. It is, in effect, a visual transmission densitometer reading in the density, log (1/T), range from 0-4. The visual field is circular, subtending an angle of 10° with a central circular spot of 1°. The instrument is built so that interference filters may be placed in the path of the light for either the surround or the main beam or both and both intensities are controlled by their own circular density wedges, calibrated from 0 to 4.4. The instrument was designed by O.E. Miller and built by members of his staff.

32,747
Judd, D.B. INTERVAL SCALES, RATIO SCALES, AND ADDITIVE SCALES FOR THE SIZES OF DIFFERENCES PERCEIVED BETWEEN MEMBERS OF A GEODESIC SERIES OF COLORS. J. Opt. Soc. Amer., March 1967, 57(3), 380-386. (US National Bureau of Standards, Washington, D.C.).

From larger-smaller judgments of color differences, compared visually two at a time, the perceived sizes may be evaluated on an interval scale. Given numbers B so evaluated, and such that B is linearly connected to some power p, of the physical measure D (such as distance on any chromaticity diagram) of the differences, the additive constant K_{br} such that the numbers $B + K_{br}$ are expressed on a ratio scale may be found from judgments of the ratio of sizes of pairs of differences. To evaluate p, it is sufficient to observe the three differences 12, 23, and 13 between the pairs of three colors, 1, 2, 3, forming a geodesic series, and chosen so that B_{12} is not much different from B_{23}. The scale formed by the numbers $(B + K_{br})^{1/p}$ is additive if the D scale is additive. If the largest of the color differences judged exceeds the smallest by a factor not greater than 3, a close approximation to the $(B + K_{br})^{1/p}$ scale may be found without evaluating K_{br} by ratio judgments. This approximation is based on the empirical discovery that scales based on the additivity condition: $(B_{12} + K_{bd})^{1/p} + (B_{13} + K_{bd})^{1/p} = (B_{13} + K_{bd})^{1/p}$, though it implies that K_{bd} depends strongly on p, are essentially identical regardless of the choice of p between 1 and 1/3. It is sufficient therefore, to derive the additive scale by setting p=1, and computing K_{bd} as $B_{13} - B_{12} - B_{23}$.
R 6

32,748
Wheeler, L. & LaForce, R.C. SUSTAINED BIDWELL AFTERIMAGES: EFFECTS OF DISC ROTATION SPEED, COLOR-PULSE CHROMATICITY, AND COLOR-PULSE LUMINANCE. J. Opt. Soc. Amer., March 1967, 57(3), 386-393. (California State College, Hayward, Calif.).

A sustained complementary hue may be obtained with a rotating black-white disc and pulses of chromatic light. Effects of disc rotation speed and of the chromaticity and luminance of the color pulse are described. The disc, observed at 11 speeds from 10 through 110 cycles per-second had a black and white sector. At the sector boundary there was an aperture through which red, yellow, green, blue, or purple light (filters equated for luminous transmittance) was pulsed for 3% of each cycle, followed by the white half cycle. Eleven observers made Munsell matches (total: 1995) to these lights, which were presented at three luminances. Complementary matches occurred 48% of the time, matches similar to the hues of the projected lights--33%, neutral matches--19%. There were systematic hue shifts around two pairs of stable points in the hue circle, as functions of disc rotation speed. The predominance of complementary matches over similar-hue matches varied with color-pulse chromaticity and luminance, and with disc speed.
R 9

32,749
Wheeless, L.L., Jr., Cohen, G.H. & Boynton, R.M. LUMINANCE AS A PARAMETER OF THE EYE-MOVEMENT CONTROL SYSTEM. J. Opt. Soc. Amer., March 1967, 57(3), 394-400. (Bausch & Lomb Inc., Rochester, N.Y.).

A study of the eye-movement control system shows the dependence of many of the system parameters on target luminance and contrast. Saccadic reaction time was found to decrease from a high value toward a fixed minimum as target luminance was increased, whether with a zero background (high contrast) or a fixed low contrast with respect to the background. The magnitude of the visual dead zone created when target luminance went below foveal threshold was also measured as a function of target luminance. The closed-loop gain of the eye-movement control system for ± 2° sinusoidal target motion was measured as a function of luminance for high- and low-contrast targets. The results showed two changes of system gain as target luminance was decreased: a) There was a decrease of the high-frequency response associated with target energies (luminance-by-time products) falling below a critical value required to produce visual sensation, resulting in a cutoff frequency; b) for high-contrast targets only, there was an over-all decrease of system gain as target luminance was decreased, for luminances well above foveal threshold and for frequencies well below cutoff. This latter, unexplained effect cannot be interpreted as resulting from an increase of retinal latency, the effect of a visual dead zone, or the lack of sufficient target energy for visibility. A similar tracking experiment was performed for "unpredictable" target motion. Several changes were observed in the responses of the eye-movement control system, and these were related to the effects of luminance upon system parameters and target predictability.
R 6

32,750
van Nes, F.L. & Bouman, M.A. SPATIAL MODULATION TRANSFER IN THE HUMAN EYE. J. Opt. Soc. Amer., March 1967, 57(3), 401-406. (Medical & Physiological Physics Dept., University of Utrecht, Utrecht, The Netherlands).

The contrast sensitivity of the human eye for sinusoidal illuminance changes was measured as a function of spatial frequency, for monochromatic light with wavelengths of 490, 525, and 650 nm. At each wavelength, data were obtained for a number of illuminance levels. All observations were taken at equal accommodation, and corrected for chromatic aberration. If the wavelength-dependent effects of diffraction on the modulation transfer are taken into account, no difference is found between the photopic contrast-sensitivity functions for red, green, or blue. For mean retinal illuminances B_0 smaller than 300 td, threshold modulation m at a given frequency is found to increase in proportion to $B_0^{-\frac{1}{2}}$ (de Vries-Rose law). For B_0 greater than 300 td m remains a constant fraction of it (Weber-Fechner law). After separation of the optical modulation transfer of the eye media from the measured psychophysical data, the remaining function can be considered as composed of a neural and a light-diffusion transfer function. The latter can be compared with the analytic transfer function of photographic film.
R 16

32,751
Gubisch R.W. OPTICAL PERFORMANCE OF THE HUMAN EYE. J. Opt. Soc. Amer., March 1967, 57(3), 407-415. (Physiological Lab., University of Cambridge, Cambridge, England).

The disagreement between physical and psychophysical estimates of human optical performance is discussed. Recent measurements of the eye's modulation transfer functions in white light for several pupil sizes are used to compare the eye with an ideal optical system in terms of normalized modulation transfer functions, point image profiles, and Strehl ratios. Several simple foveal-image profiles are derived from the measured modulation transfer functions, and the importance of these profiles to psychophysical measurements is discussed. Glare is considered as the extension of point spread functions to large angles; experimental measurements are compared with theories for the special case of an annular target.
R 44

32,752
Burkhardt, D.A. & Whittle, P. SPECTRAL-SENSITIVITY FUNCTIONS FOR HOMOCHROMATIC-CONTRAST DETECTION. J. Opt. Soc. Amer., March 1967, 57(3), 416-420. (Hunter Psychology Lab., Brown University, Providence, R.I.).

Two methods of measuring foveal spectral sensitivity were compared: a) the absolute-threshold method and b) a homochromatic-contrast method. In the second method, the subject saw a fixed-contrast homochromatic stimulus consisting of a steady background field and a superimposed 32% increment flash. The overall radiance level of the stimulus was varied systematically to determine the minimum radiance required to detect the flash. The spectral-sensitivity curve obtained by this method was somewhat narrower than the curve obtained by the absolute-threshold method. The homochromatic-contrast method was also used for a retinal region 8° above the fovea. A curve resembling the common photopic curve was obtained. It is concluded that the homochromatic-contrast method may serve as a useful addition to the standard methods of spectral-sensitivity measurement.
R 18

32,753
Nachmias, J. EFFECT OF EXPOSURE DURATION ON VISUAL CONTRAST SENSITIVITY WITH SQUARE-WAVE GRATINGS. J. Opt. Soc. Amer., March 1967, 57(3), 421-427. (Psychology Dept., University of Pennsylvania, Philadelphia, Penn.).

Contrast sensitivity for square-wave gratings of spatial frequencies between 0.45 and 33.2 cycles/deg was determined for exposure durations between 11 and 500 milliseconds. The space-average luminance of the targets was kept constant at 10 millilambert, regardless of contrast, and equal to that of the pre- and post-exposure fields, which contained a cross-hair reticle to help maintain accommodation and fixation. At the longest exposure duration (500 msec) the contrast sensitivity function exhibited both the high- and the low-frequency declines described by previous investigators. At the briefest exposure duration tested (11 msec), the low-frequency decline of contrast sensitivity was virtually absent. Log contrast sensitivity improves with increasing exposure duration, but more for high-frequency than for low-frequency gratings. These results are compatible with the assumption that there is a time delay in the occurrence of inhibitory interactions in the retina.
R 21

32,754
Weitzman, D.O. & Kinney, J. Ann S. APPEARANCE OF COLOR FOR SMALL, BRIEF, SPECTRAL STIMULI IN THE CENTRAL FOVEA. J. Opt. Soc. Amer., May 1967, 57(5), 665-670. (USN Submarine Medical Center, New London Submarine Base, Groton, Conn.).

While color-vision characteristics of tritanopia (blue-yellow deficiency) are well known to occur with small fields in the central fovea, the possibility of similar confusions as a function of brief duration has previously only been suggested. The problem has been investigated in this study by determining the color names given by nine color-normal and two deuteranopic observers to spectral stimuli from 555 to 590 millimicrons (mμ) and to a white light. The test stimuli, all presented foveally, subtended diameters of 54, 21, and 11 min at durations of 200 and 20 milliseconds (msec). For stimuli presented at small subtends and short duration, green was sometimes seen as blue or blue-green. A neutral band was found in the yellow-green (570-580 mμ), and no confusion was found between reds and greens. The degree of tritanopic-like color confusions in the fovea is related to both the exposure time and the size of the test area. The results are discussed in relation to the foveal vs small-field characteristics of apparent tritanopia.
R 24

32,755
Kinney, Jo Ann S., Luria, S.M. & Weitzman, D.O. VISIBILITY OF COLORS UNDERWATER. J. Opt. Soc. Amer., June 1967, 57(6), 802-809. (USN Submarine Medical Center, New London Submarine Base, Groton, Conn.).

The underwater visibility of various colors, both fluorescent and nonfluorescent was measured in four different bodies of water. The waters were selected to sample the continuum from very murky to clear. SCUBA divers observed with a horizontal path and other subjects on the surface looked down vertically. Fluorescent colors were always more visible than nonfluorescent, but the specific colors that were easiest and most difficult to see depended upon the body of water.
R 7

32,756
Kletzman, N.L. TWO-PULSE MEASURES OF TEMPORAL RESOLUTION AS A FUNCTION OF STIMULUS ENERGY. J. Opt. Soc. Amer., June 1967, 57(6), 809-813. (Biometrics Research, New York State Department of Mental Hygiene, New York, N.Y.).

Kahneka previously reported that increasing the duration of light pulses reduced the two-flash threshold. This reduction is attributed to the increased "quantity of light" provided by the longer light pulses. Two experiments were conducted to test the hypothesis that increased stimulus energy in the photopic range lowers two-pulse measures of temporal resolution. In Experiment I, two-flash thresholds were obtained by increasing either stimulus intensity or stimulus duration over an energy range of 1.4 log units. Comparison of the results obtained from these two manipulations showed that increasing duration reduced two-flash thresholds by 42 milliseconds (msec) and 52 msec for two subjects while increasing intensity reduced their thresholds by only 8 and 15 msec. In Experiment II, a change of the stimulus intensity over an even greater range, i.e., 2.4 log units, and use of a more sensitive psychophysical method failed to produce any systematic shift of the two-pulse threshold. It was concluded that for the energy range tested, an increased quantity of light does not modify two-pulse measures of temporal resolution.
R 15

32,757
Lewis, M.) TWO-FLASH THRESHOLDS AS A FUNCTION OF LUMINANCE IN THE DARK-ADAPTED EYE. J. Opt. Soc. Amer., June 1967, 57(6), 814-815. (US Civil Aeromedical Institute, FAA, Oklahoma City, Okla.).

Two-flash thresholds were obtained from two dark-adapted subjects using a forced-choice technique. As luminance increased, two-flash thresholds decreased in a negatively accelerated fashion.
R 14

32,758
Fender, D. & Julesz, B. EXTENSION OF PANUM'S FUSIONAL AREA IN BINOCULARLY STABILIZED VISION. J. Opt. Soc. Amer., June 1967, 57(6), 819-830. (California Institute of Technology, Pasadena, Calif. & Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

A novel phenomenon in stereopsis can be observed when viewing binocularly stabilized retinal images. This phenomenon is particularly impressive for random-dot stereoscopic images in foveal vision. If initially the left and right images are brought within Panum's fusional area (6-min arc alignment), fusion and stereopsis are perceived; the images can then be pulled apart symmetrically by about 2 deg in the horizontal direction without loss of stereopsis or fusion. The images are actually pulled apart on the retinae, since the binocular retinal stabilization compensates for the convergence-divergence motions of the eyes; hence a supra-retinal function must be responsible for this type of fusion. If the pulling proceeds too fast, or exceeds the 2-deg limit, or if the stimulus is occluded briefly, the fusional mechanism fails and the fused image abruptly breaks apart into two separate images which have to be brought within Panum's area again to re-establish fusion. For line stimuli, the maximum disparity without loss of fusion is much less than for random-dot patterns; it is always largest for disparity in the horizontal direction and is less in the vertical direction. These findings indicate that stereopsis and the classically conceived corresponding points greatly depend both on the class of stimulus used and on the recent history of the stimulation.
R 10

32,759
Green, D.G. & Maaseidvaag, F. CLOSED-CIRCUIT TELEVISION PUPILLOMETER. J. Opt. Soc. Amer., June 1967, 57(6), 830-833. (Ophthalmology Dept., University of Michigan, Ann Arbor, Mich.).

This paper describes a new digital pupillometer based on an infrared closed-circuit television system. The instrument displays the instantaneous pupil diameter in digital and/or analog mode. The sensitivity is better than 0.02 millimeter of full scale and linearity is better than 1%. Its frequency response is flat to 15 cycles per second with a rise time less than 25 milliseconds.
R 9

32,760
Armington, J.C. PUPIL ENTRY AND THE HUMAN ELECTRORETINOGRAM. J. Opt. Soc. Amer., June 1967, 57(6), 838-839. (Northeastern University, Boston, Mass.).

The purpose of this note is to show that the sensitivity of the human electroretinogram does depend upon the point of pupil entry, a result which is presumably another manifestation of the Stiles-Crawford effect. Electroretinograms were elicited by a contrast-pulse technique similar to that developed by Riggs, Johnson, and Schick. The stimulus appeared to the observer as a black and white grid which jumped back and forth within a 12° stationary field. An optical device of conventional design was used to present the stimuli in stereoscopic view. The electroretinogram was obtained from a contact-lens electrode, with a reference to the cheek. Both electrical and psychophysical data were obtained on five subjects. The electroretinal measures were compared with psychophysical ones obtained by the method of adjustment. The magnitude of the Stiles-Crawford effect determined by this matching procedure is nearly the same as those reported in the literature, even though the present stimulus situation was relatively complicated. Comparing all of the curves, the electroretinal data seem to show a somewhat stronger dependence upon the point of light entry than do the psychophysical data. This can probably be attributed to experimental error, since multiple sessions spread over a month were required for the electroretinal data, while the psychophysical data were collected in a single day.
R 7

32,761
Bartleson, C.J. & Breneman, E.J. BRIGHTNESS PERCEPTION IN COMPLEX FIELDS. J. Opt. Soc. Amer., July 1967, 57(7), 953-957. (Research Labs., Eastman Kodak Company, Rochester, N.Y.).

Results of brightness-scaling experiments with complex stimulus fields are reported. A family of brightness functions has been computed from the data for complex stimuli such as photographic reproductions viewed with both illuminated and dark surrounds. The resulting brightness vs luminance functions are not simple power functions. They exhibit exponential decay from the power form as a function of both screen luminance and surround luminance, i.e., they are nonlinear in log-log coordinates.
R 11

32,762
Easton, R.A., Markin, J. & Sobel, A. SUBJECTIVE BRIGHTNESS OF A VERY-SHORT-PERSISTENCE TELEVISION DISPLAY COMPARED TO ONE WITH STANDARD PERSISTENCE. J. Opt. Soc. Amer., July 1967, 57(7), 957-958. (Zenith Radio Corporation, Chicago, Ill.).

In a zero-persistence television display, such as one employing a deflected laser beam or injection luminescent diodes, the "dwell" time per picture element is determined solely by the system's finite resolution and is about 120 nsec (nanosecond) under current standards, as compared to 60-μsec (microsecond) persistence to 10% of initial luminance for a conventional cathode-ray-tube television display. Therefore, at a given luminance level, much higher peak luminances are encountered in the zero-persistence display. An experiment was performed to see if reasonable approximations to these two types of displays had equal averaged photometric luminances when adjusted for equal subjective brightnesses--i.e., does the Bunsen-Roscoe luminance-time reciprocity law hold under these conditions? One half of a television picture was displayed on a cathode-ray tube with 120-nsec decay to 37% of initial luminance; the other half was displayed on a television phosphor whose decay under these conditions was 40 times as long, or about 5 μsec. The viewer was asked to match the two halves for brightness and this match was checked with a photometer. The display covered a 12x16 degree rectangular field of view under simulated home-viewing conditions. Tests were run at approximately 110 and 340 candelas per m^2 (32 and 100 ft-Lamberts) highlight luminances, with both a standard blank television raster and an Indian-head test pattern. No significant departure from reciprocity was noted under these conditions. A 95% confidence interval of 6% on the raster tests and 13% on the Indian-head-pattern tests was attained.
R 11

32,763
Matthews, M.L. MACH-BAND INCREMENT THRESHOLDS AND THE MECHANISMS OF COLOR VISION. J. Opt. Soc. Amer., Aug. 1967, 57(8), 1033-1036. (Psychology Dept., University of Nottingham, Nottingham, England).

Evidence is presented which suggests that the mechanism determining Mach bands is not achromatic, as has been supposed, but may have different spatial-response characteristics according to the particular color mechanism that is being stimulated. Both an increment-threshold technique across a luminance gradient and subjective estimates of the bright Mach band indicate that the spatial response of the blue mechanism differs significantly from those of both the red and the green mechanisms in the fovea. These spatial-response data compare closely with previous findings on visual acuity and the resolution of the blue mechanism, indicating that the mechanism has relatively poor spatial integration in the fovea.
R 10

32,764
Wheeler, L. TWO-COMPONENT IMAGE SYNTHESIS: EFFECTS OF SURROUND VARIABLES. J. Opt. Soc. Amer., Aug. 1967, 57(8), 1036-1047. (California State College, Hayward, Calif.).

Munsell matches were made to stimuli composed of a small focal area (subtense, 17') and a larger surround (subtense 3°). A fixed set of thirty-six proportions of two components (red light and incandescent-lamp light) in the focal area was matched in surround conditions that included five different proportions of the same two components and three large differences of luminance. In one surround condition only, the incandescent-lamp light was paired with green, blue, and purple components. A surround proportion of 98% red-50% incandescent gave the largest hue range in the matching samples for a fixed surround luminance. When surround luminance was increased beyond the maximum focal-area luminance, the hue range of the Munsell matches increased even further. Of the pairs of components, the incandescent-blue combination yielded the largest hue range, but of low saturation, while the incandescent-green mixture gave the smallest range. Value and chroma differences among the Munsell matches are discussed.
R 29

32,765
Richards, W. DIFFERENCES AMONG COLOR NORMALS: CLASSES I AND II. J. Opt. Soc. Amer., Aug. 1967, 57(8), 1047-1055. (Psychology Dept., Massachusetts Institute of Technology, Cambridge, Mass.).

Color-normals may be divided into two distinct groups by studying: a) the spectral location of unique green, b) the additivity of spectral lights, c) the rate of recovery of sensitivity, and d) the colorimetric coordinates for "white." The results of any one of these tests may be used to predict an individual's performance on the remaining tests. Taken together, the results suggest that, for some individuals, 540-nm (nanometer) cone activity innervates the same channel activated by the 440-nm cones. This desaturation effect of the 540-nm cones cannot be entirely neural, however, because of certain differences in color matches.
R 28

32,766
Ogle, K.N. SOME ASPECTS OF STEREOSCOPIC DEPTH PERCEPTION. J. Opt. Soc. Amer., Sept. 1967, 57(9), 1073-1081. (Biophysics Sec., Mayo Clinic & Mayo Foundation, Rochester, Minn.).

Some of the fundamental facts of stereoscopic depth perception are described briefly. Emphasis is placed on experiments that provide evidence for a physiologic basis for the phenomenon: existence of limiting disparities, relationship to double images, role of simultaneous stimuli, the limiting delay between stimuli to the two eyes, role of vertical disparities, effect of unequal luminances, the role of training and of strabismus surgery, etc. A general though brief discussion of the theories of stereoscopic depth perception deals with psychologic cues, fixation eye movements, fusional eye movements, Hering theory of local signs, gestalt point of view, and suppression theories. A few current problems are then considered: duration of stimuli, role of eye movements, effect of binocular rivalry, relationship of perceived depth to angular disparity, adaptation to conflicting empiric cues and stereoscopic depth, and the induced effect.
R 28

32,767
van Nes, F.L., Koenderink, J.J., Nas, H. & Bouman, M.A. SPATIOTEMPORAL MODULATION TRANSFER IN THE HUMAN EYE. J. Opt. Soc. Amer., Sept. 1967, 57(9), 1082-1088. (Medical & Physiological Physics Dept., University of Utrecht, Utrecht, The Netherlands).

The contrast sensitivity of the human eye for sinusoidal illuminance changes in space and time, obtained by means of traveling-wave stimuli, was measured as a function of spatial and temporal frequency for white light. The average retinal illuminance was varied between 0.85 and 850 trolands. The threshold modulation for perception of a moving grating is generally higher than that for detection of brightness changes, in space and/or time, that give rise to flicker phenomena. Flicker-fusion characteristics, as determined from the thresholds for the flicker phenomenon, are found to lose their band-pass-filter resemblance for spatial frequencies of more than five cycles per degree of visual angle. The thresholds at flicker fusion for spatial- and temporal-frequency combinations in which not both frequencies are very low, appear to be proportional to the inverse of the square root of mean retinal illuminance, in the investigated range. This suggests a photon-noise-dependent threshold mechanism which is operative in a wider illuminance range than that found with contrast-sensitivity measurements for periodic illuminance variations only in space or only in time.
R 19

32,768
Chiang, C. STEREOSCOPIC MOIRÉ PATTERNS. J. Opt. Soc. Amer., Sept. 1967, 57(9), 1088-1090. (Chemistry Dept., Polytechnic Institute of Brooklyn, Brooklyn, N.Y.).

The moiré pattern produced by two separated grids is extremely sensitive to the viewing angle. Two eyes see two different moiré patterns, which fuse together to form a single stereoscopic moire pattern. Some examples are given in detail. For complicated figures, it is not possible to perceive a single moiré pattern and a fuzzy feeling is produced. Some of the impact of "Op art" may very well result from such effects.
R 4

32,769
Kinney, Jo Ann S. INDUCED COLORS SEEN BY A DEUTERANOPE. J. Opt. Soc. Amer., Sept. 1967, 57(9), 1149-1154. (USN Submarine Medical Center, New London Submarine Base, Groton, Conn.).

The amount of color induced into test fields of illuminant A or illuminant C by surrounding annuli of colored light was measured for a deuteranopic observer. The method of measurement utilized a comparison of the appearance of the test field presented to one eye with an actual field of colored light presented to the other eye. Nine different inducing colors were used with each test field. Of these nine, only two blue inducing colors produced a change of the color appearance of illuminant C: blue, green, and purple inducing colors were effective with illuminant A. The results are discussed in relation to comparable data for subjects with normal color vision and to theories of color deficiency.
R 23

32,770
van der Horst, G.J.C., de Weert, C.M.M. & Bouman, M.A. TRANSFER OF SPATIAL CHROMATICITY-CONTRAST AT THRESHOLD IN THE HUMAN EYE. J. Opt. Soc. Amer., Oct. 1967, 57(10), 1260-1266. (Med'cal & Physiological Physics Dept., University of Utrecht, Utrecht, The Netherlands).

Color-discrimination data are compared with the predictions of a generalized fluctuation theory for visual threshold behavior. The observations for the tritanopic component of vision at low luminances are in good agreement with the expectations from this theory. Just-noticeable differences of hue with equiluminous square-wave test objects, which were modulated only in chromaticity, were measured. A chromaticity-contrast sensitivity function was introduced for the description of these results, in analogy of the luminance-contrast sensitivity function. Observations were made for different spatial frequencies at four reference wavelengths and at several luminance levels. The results do not show an attenuation of the low frequencies such as appears in the luminance-threshold contrast modulation. It is inferred from this that spatial interactions are different in the chromaticness and brightness channels of the visual system. Furthermore a decrease of the luminance level causes an increase of the neural integrative interaction of the color signals. The measured chromaticity-contrast sensitivity function is divided into an optical and a nervous component. A calculation for the optical part is given.
R 37

32,771
Rinalducci, E.J. EARLY DARK ADAPTATION AS A FUNCTION OF WAVELENGTH AND PREADAPTING LEVEL. J. Opt. Soc. Amer., Oct. 1967, 57(10), 1270-1271. (University of Virginia, Charlottesville, Va.).

This study was concerned with the brief period of time just before, during, and after the offset of a background or adapting field, and with the effects of varying the spectral composition of the test and adapting stimuli as well as the level of preadapting retinal illumination upon this early phase of dark adaptation. A three-channel maxwellian-view optical system presented a 0.96° test stimulus to the fovea of the right eye of each subject, superimposed upon a 7.7° adapting stimulus. The test and adapting stimuli were of the same or different spectral composition. Two "colors" were used in the present study (red and blue). Three subjects with normal color vision were used in various phases of the investigation. The experimental procedure involved 5-7 min. of light-adaptation at one of the three preadapting levels used (10, 100, or 260 trolands), followed by a warning stimulus, and the two seconds of darkness (at 0.1, 1.0 or 2.6 trolands, respectively). A 2-log-unit decrement was maintained in all cases. A 2-millisecond test flash was presented at conditioning intervals ranging from -0.21 second (before adapting field offset) to 1.56 sec (after adapting-field offset). The cycle of eight seconds of light adaptation, two seconds of darkness, and presentation of warning signal and test flash was repeated every ten seconds. In general, the results indicate that not only can the off-effect be demonstrated with white stimuli as shown by Baker, but it can also be demonstrated with chromatic stimuli, whether they are homochromatic (red on red and blue on blue) or heterochromatic (red on blue and blue on red) combinations. The data relative to changes of preadapting level are generally in line with those of Baker, but there is some indication of an increased latency when a low chromatic intensity is dropped to an even lower one.
R 10

32,772
Stecher, S. DISCRIMINATION OF LUMINANCE DIFFERENCES BETWEEN TEMPORALLY SEPARATED PAIRED FLASHES. J. Opt. Soc. Amer., Oct. 1967, 57(10), 1271-1272. (Psychology Dept., Brandeis University, Waltham, Mass.).

The luminance difference threshold between two successively presented suprathreshold fields has been determined as a function of their temporal separation. Two 1° fields, differing only in luminance, were presented for 10 milliseconds each by a two-channel maxwellian viewing system, to the same foveal area of the retina of the right eye. The subject's task was to report whether the first flash was brighter, equal to, or dimmer than the second (standard) flash. The luminance-difference threshold (ΔI) was determined by the method of limits using an ascending and a descending series at each of four luminance levels of the standard having 10:1 ratios to each other and at each of nine interstimulus intervals between the flashes. All fields were superimposed on a fixed adapting luminance of 0.0076 millilambert. The adapting field subtended 9°36'. The luminance range extended from 0.7 to 700 millilamberts and the interstimulus intervals were 95, 105, 115, 120, 130, 150, 180, 450, and 500 milliseconds. The results indicate that at short interstimulus intervals, ΔI is large and as the interstimulus interval is increased, the difference threshold decreases. The smallest value of ΔI occurs for interstimulus intervals of 130-180 milliseconds; the exact position of the minimum depends on the luminance level. Thereafter, as the interstimulus interval is increased, ΔI becomes larger again. This rise stops in the neighborhood of 250 milliseconds. Beyond 250 milliseconds there may be a decrease in ΔI again, until at an interstimulus interval equal to 500 milliseconds the difference threshold, depending on the curve considered, is about as low as that found at the first minimum. It may, however, be reasonable to assume that the function is flat after 250 milliseconds. Greater experimental precision is needed to establish this.
R 1

32,773
Weld, G: BLUE-BLINDNESS IN THE NORMAL FOVEA. J. Opt. Soc. Amer., Nov. 1967, 57(11), 1289-1303. (Biological Labs., Harvard University, Cambridge, Mass.).

An area at the center of the human fovea, subtending a visual angle of only 7-8 min. and hence hardly larger than the fixation area, is blue-blind in the sense of almost or entirely lacking blue-sensitive cones. This is a matter of foveal topography, not size of field, for in fields of this size elsewhere in the fovea or in the parafovea, blue-sensitive cones are well represented. The blue-cone system falls in sensitivity from the border of the photopic zone--the functionally all-cone area--to a minimum, usually to extinction, at its center. Other features of foveal topography oppose this trend: the density of cones rises and the macular pigmentation thins out toward the center of the fovea. Also the red- and green-cone systems display the opposite gradient; their sensitivities rise regularly from the center toward the borders of the fovea and beyond. Tritanopia, though the rarest form of congenital color-blindness, is thus a regular feature of the center of the normal fovea. The existence of two neutral points in this condition, in the yellow and violet, has its basis in the observation that the luminosity curves of the red- and green-sensitive cones, drawn so as to cross in the yellow, cross again or fuse in the violet region. The blue-blindness of the fixation area, taken together with the red-green blindness of more-or-less concentric zones of the near periphery, and the total colorblindness of the far periphery, raises the possibility that various zones of the normal retina display all the major forms of colorblindness. Trichromic vision is normal only in the broad, central annulus of the retina, which alone is ordinarily tested. Some instances of defective color vision may be similarly localized. The problems of both normal and defective color vision involve not only the presence or absence of certain visual pigments and types of cone, but their spatial distributions on the retinal surface, and their neural connections.
R Many

32,774
Krantz, D.H. SMALL-STEP AND LARGE-STEP COLOR DIFFERENCES FOR MONOCHROMATIC STIMULI OF CONSTANT BRIGHTNESS. J. Opt. Soc. Amer., Nov. 1967, 57(11), 1304-1316. (Psychology Dept., University of Michigan, Ann Arbor, Mich.).

Five observers made color-difference judgments by the method of triads. A triad (S: A,B) consisted of a standard stimulus S and two comparison stimuli, A and B. The observer reported which color difference appeared smaller, that between A and S or that between B and S. Triads were composed of monochromatic stimuli, adjusted to constant brightness for each observer. They contained both small color differences and ones that are markedly suprathreshold. For any triad (S: A,B) it was assumed that the choice probability is an index of the relative sizes of the subjective differences (A,S) and (B,S). Estimated choice probabilities were converted to estimated distance measures by means of a scaling model based on assumptions about the observers' judgmental task. The obtained distance estimates were compared with standard wavelength-discrimination data, with Wright's data on slightly suprathreshold color differences, and with the large-difference predictions of the Hurvich-Jameson HBS color specification system. While the present data cannot be regarded as providing definitive color-difference measures (even for the limited range of conditions employed) they nevertheless contribute to the development of a metric space representation combining discriminability and suprathreshold similarity.
R 29

32,775
Norman, M.H. VISIBILITY OF LIGHT SOURCES AGAINST A BACKGROUND OF UNIFORM LUMINANCE. J. Opt. Soc. Amer., Dec. 1967, 57(12), 1516-1521. (Boeing Company, Seattle, Wash.).

The Blackwell data on the positive-contrast thresholds of the human eye have been cross plotted in luminance values and incorporated into a nomogram for determining whether light sources can be seen either with the unaided eye, or with a telescope. The nomogram incorporates data for the two special cases where the light source is in front of, and beyond the source of background luminance; the former is readily applicable to the general case, and the latter is applicable to the important special cases of stars, planets, and other exo-atmospheric sources. The nomogram allows the effects of aberrations, diffraction, defocusing, and transmission losses in a telescope to be taken into account. The effects of aberrations, etc., in the eye itself are discussed.
R 35

32,776
Murdock, B.B., Jr. DISTRACTOR AND PROBE TECHNIQUES IN SHORT-TERM MEMORY. Canad. J. Psychol., Feb. 1967, 21(1), 25-36. (University of Toronto, Toronto, Ontario, Canada).

Two experiments were conducted to determine if, as commonly believed, there is a marked difference in short-term memory as a function of whether the retention interval is filled with unrelated new-learning materials (distractor technique) or with categorically related learning materials (probe technique). The first experiment was a replication of a previous Brown study, and intersituational comparisons suggested the same basic retention function for distractor and probe techniques. The second experiment attempted to show that both types of retention-interval activity had comparable effects in a probe type of paired-associate task. It was suggested that rate constants might differ but the function itself would not; and the amount of material to be remembered appears more critical than the type of interpolated activity.
R 31

32,777
Bryden, M.P. A MODEL FOR THE SEQUENTIAL ORGANIZATION OF BEHAVIOUR. Canad. J. Psychol., Feb. 1967, 21(1), 37-56. (University of Waterloo, Waterloo, Ontario, Canada).

At present, there does not appear to be a satisfactory theory of the sequential organization of behaviour. A number of experiments on tachistoscopic recognition and dichotic listening, in which it is necessary to respond sequentially to simultaneously presented stimuli, are reviewed. The data from these experiments indicate that the order of responses is determined by the spatio-temporal arrangement of the stimulus elements, by the experimental set, and by learned associations between the individual elements. On the basis of these data, a model for serial order is developed and applied to other situations with some success.
R 55

32,778
Levy, L.H. THE EFFECTS OF VERBAL REINFORCEMENT AND INSTRUCTIONS ON THE ATTAINMENT OF SIZE CONSTANCY. Canad. J. Psychol., Feb. 1967, 21(1), 81-91. (Indiana University, Bloomington, Ind.).

The relative effectiveness of verbal reinforcement and instructions, alone and in combination, in changing behaviour was investigated in the context of a size judgment task in which reduced cues normally led to retinal rather than objective size judgments. A series of 60 training trials was used in which all subjects were asked to rate the degree of match in physical size between a standard and set of comparison stimuli. One group received only positive verbal reinforcement for correct ratings; one group received only instructions which emphasized the distinction between the actual and apparent physical sizes of objects; one group received both reinforcement and instructions; and one group served as a control receiving neither reinforcement nor instructions. Following training all subjects were tested for attainment of size constancy in the same viewing situation for both size and distance judgments using a method of adjustment. In both training and the subsequent tests for size constancy the group receiving both instruction and reinforcement was superior to the other groups; reinforcement alone appeared to have no effect upon judgments but instruction alone did. The results were interpreted as lending support to a cognitive view of the function of reinforcement in complex human learning and as demonstrating the need for further conceptualization and investigation of the role of instruction in the modification of behaviour.
R 12

32,779
Conderi, D.C. INFORMATION MEASUREMENT OF SINGLE MULTIDIMENSIONAL STIMULI. Canad. J. Psychol., April 1967, 21(2), 93-110. (McGill University, Montreal, Quebec, Canada).

Response learning becomes easier as the information in a single multidimensional stimulus increases relative to the information in other stimuli of the set. Increasing stimulus information also increases discrimination accuracy for identical stimulus pairs presented during a simultaneous discrimination task. Discrimination errors on pairs of different stimuli decrease as the amount of independent information in both stimuli increases. These are the results of a series of learning and discrimination experiments employing a measure for the information in a single stimulus which is derived from the characteristics of the stimulus set. The limitations of information measurement are also demonstrated and discussed.
R 11

32,780
Dunn, B.E., Thompson, D. & Thomas, S. RELATIONSHIP OF CERTAINTY TO AMOUNT OF PERCEIVED SLANT. Canad. J. Psychol., April 1967, 21(2), 132-140. (University of Calgary, Calgary, Alberta, Canada).

Subjects were presented trapezoidal stimuli varying in outline convergence and relative midpoint height. Different groups of subjects received different instructions and made different types of responses to the stimuli. Group I was instructed to indicate how much, if at all, a series of stimuli was slanted. Group II was informed that the stimuli were slanted and indicated their certainty of direction of slant. Group III was instructed similarly to Group I, but indicated their certainty of slant instead of the amount. Results showed that when direction of slant was taken into account, Groups I and III responded very similarly, but Group II gave a different response pattern. With absolute slant measured, all three groups were similar. Conclusions drawn were that under similar instructional conditions certainty of slant and perceived amount of slant measured the same thing and that knowledge of the shape of the unslanted stimulus determined whether outline convergence was a significant cue for slant perception.
R 12

32,781
Lawson, E.D. & Lawson, Irene F. GROUP PLANNING AND TASK EFFICIENCY. Canad. J. Psychol., April 1967, 21(2), 166-176. (Acadia University, Wolfville, Nova Scotia, Canada).

Sixty four-man groups using two types of net (all-channel and circle) under two conditions, Planning Period (PP) and Control, were run in a single session with 10 simple problems to determine whether a single 2-min. planning period after solution of the first problem would significantly improve group performance on subsequent problems. Results indicate All-Channel PP women were superior on speed and messages to their controls. Circle PP women used fewer messages to solve problems than their controls. All-channel PP men made fewer errors. Results indicate that the limited planning period is of significant benefit.
R 10

32,782
Scmat, V. THE POSSIBILITY OF INFLUENCING THE OTHER'S BEHAVIOUR AND CO-OPERATION: CHICKEN VERSUS PRISONER'S DILEMMA. Canad. J. Psychol., June 1967, 21(3), 204-219. (University of Oregon, Eugene, Ore.).

Two hundred and thirty-two male subjects participated in four experiments, three of which used a chicken matrix, while the fourth used a prisoner's dilemma matrix. All subjects were unknowingly playing against a pre-arranged programme, which made 50 competitive choices, followed by 20 co-operative choices. An attempt was made to vary the motives which subjects could satisfy in the game situation, by creating different conditions under which the alleged other player was operating. In the FREE condition, the subject was led to believe that the other player was free to change his strategy and informed about the outcomes. In the COMM condition, he was told that although the other was committed to a previously chosen strategy, he was informed about the outcomes. In the ABS condition, he was told that the other person had written out his strategy, was now absent, and would not be informed about the outcomes. In the MACHINE condition, the subject was told that he was playing against an impersonal machine with a fixed programme. These instructional differences produced different degrees of co-operation during the competitive treatment with the chicken matrix, but not with the prisoner's dilemma matrix. With both matrices, the FREE condition produced more co-operation than the other three conditions during the co-operative treatment which followed the competitive programme.
R 12

32,783
Foley, Joan E. & Abel, Sharon, M. A STUDY OF ALTERNATION OF NORMAL AND DISTORTED VISION. Canad. J. Psychol., June 1967, 21(2), 220-230. (University of Toronto, Toronto, Ontario, Canada).

Subjects responded in accordance with the apparent distance of a target, alternating between normal vision and minification. Changes in performance induced by changing the visual condition were as marked after repeated exposures as initially, provided that no current feedback was supplied. This was taken as lack of support for Taylor's (Taylor, J.G. THE BEHAVIORAL BASIS OF PERCEPTION. 1962, Yale University Press, New Haven, Conn.) prediction that effects and after-effects should decline with alternation of visual conditions. Contrary to the differential conditioning model of adaptation, their elimination apparently continues to depend on response-produced feedback.
R 2

32,784
Cohen, R.L. THE DIFFERENTIAL EFFECT OF STIMULUS INTENSITY ON REHEARSED AND UNREHEARSED MATERIAL IN SHORT-TERM AUDITORY MEMORY. Canad. J. Psychol., Aug. 1967, 21(4), 277-284. (University of Uppsala, Uppsala, Sweden).

The effect of varying the stimulus intensity (loudness) on the recall of 9-digit sequences, auditorily presented, was investigated using two presentation rates. At 1 digit/sec. and with instructions for 3, 3, and 3 rehearsal grouping, stimulus intensity was found to be a variable only in the case of the last 3 digits, which according to rehearsal instructions were unrehearsed. No effect was found on the first 6 (rehearsed) digits. At 4 digits/sec., a rate too fast for systematic rehearsal, the stimulus intensity affected the recall of the first 6 digits as well as of the last three. These results are discussed in relation to the question of whether or not the stimulus memory trace and rehearsal memory trace should be regarded as two separate entities. The question of presentation rate and performance is also briefly discussed.
R 11

32,785
Schutte, W. & Zubek, J.P. CHANGES IN OLFACTORY AND GUSTATORY SENSITIVITY AFTER PROLONGED VISUAL DEPRIVATION. Canad. J. Psychol., Aug. 1967, 21(4), 337-345. (University of Manitoba, Winnipeg, Manitoba, Canada).

Subjects who were placed in darkness for a week but who otherwise were exposed to a normal and varied sensory environment showed a significant increase in olfactory sensitivity (benzene). The measures of gustatory thresholds yielded a differential pattern of results. Sensitivity to NaCl (salty) and sucrose (sweet) was increased significantly with the after-effects persisting for one day after restoration of normal visual stimulation. On the other hand, sensitivity to HCl (sour) and quinine (bitter) was not affected significantly. The results were interpreted as providing experimental support for a sensoristatic model recently formulated by Schultz (Schultz, D.P. SENSORY RESTRICTION. 1965, Academic Press, New York, N.Y.).
R 14

32,786
Berlyne, D.E., McDonnell, P., Nicki, R.M. & Parham, L.C.C. EFFECTS OF AUDITORY PITCH AND COMPLEXITY ON EEG DESYNCHRONIZATION AND ON VERBALLY EXPRESSED JUDGMENTS. Canad. J. Psychol., Aug. 1967, 21(4), 346-367. (University of Toronto, Toronto, Ontario, Canada).

In five experiments, electroencephalograph (EEG) responses were recorded and verbal ratings of "complexity," "pleasingness" (or "pleasantness"), and "interestingness" were obtained from subjects exposed to auditory patterns of varying pitch and complexity. Mean duration of desynchronization was a U-shaped function of pitch, and white noise produced significantly longer desynchronization than pure tones both when equated for intensity and when equated for loudness. No significant difference was found between the mean durations for pairs of tones and single tones or for consonant pairs and dissonant pairs. Judged "complexity" did not follow objective criteria of complexity. The various ratings are discussed in relation to one another, to EEG effects, and to the results of previous experiments in which visual patterns were subjected to similar judgments.
R 30

32,787
Pitz, G.F., Downing, L. & Reinhold, Helen. SEQUENTIAL EFFECTS IN THE REVISION OF SUBJECTIVE PROBABILITIES. Canad. J. Psychol., Oct. 1967, 21(5), 381-393. (Southern Illinois University, Carbondale, Ill.).

The revision of subjective probability during sequences of varying numbers of events was examined. The alternative hypotheses consisted of two bags containing different proportions of red and blue chips, and informative events consisted of the sampling with replacement of a single chip from the chosen bag. Subjects were provided with sequences of 5, 10, or 20 events, and estimated the probabilities that each bag was being used by means of a pointer and scale marked in percentage units. Analysis of the data was carried out in terms of subjective log likelihood ratios (SLLR). Changes in SLLR were an increasing function of prior probability and were independent of the composition of the alternative hypotheses. Changes were greater during short sequences than during longer sequences and were greater following events confirming the subject's currently favoured hypothesis than following disconfirming events. All of these findings show subjects to be suboptimal relative to a normative model.
R 11

32,788
Auerbach, A.J. A PAIN-TOLERANCE DETERMINATION TECHNIQUE FOR EVALUATING ANALGESIC DRUG EFFICACY. Canad. J. Psychol., Dec. 1967, 21(6), 490-495. (University of Waterloo, Waterloo, Ontario, Canada).

This study investigated a new technique for measuring pain tolerance in humans. The standard tolerance-determination technique, in which a painful stimulus is gradually increased in intensity until the subject withdraws from it, presents a number of conceptual and practical problems. In the present research, the stimulus intensity was held constant and slightly above the tolerance level. The extent to which 24 male college students pushed their fingers against a 67.5° C. contact over a 32-sec. period was measured and was found to be significantly greater under the effect of 3/4 grain of codeine than under a placebo. Suggestions were offered for refining the supratolerance procedure and for defining the term pain tolerance.
R 12

32,789
Smith, Marilyn, C. STIMULUS-RESPONSE COMPATIBILITY AND PARALLEL RESPONSE SELECTION. Canad. J. Psychol., Dec. 1967, 21(6), 496-503. (University of Toronto, Toronto, Ontario, Canada).

There has been considerable controversy in the literature as to whether human information processing of multiple inputs occurs sequentially or in parallel. It has recently been suggested that the manner in which the processing occurs may depend upon the nature of the tasks involved. This paper attempts to discover whether the stimulus-response (S-R) compatibility of each task, as determined by the relationship between reaction time (RT) and number of bits of stimulus (or response) information, can serve as a predictor of the nature of the processing. By examining the delay in RT_2 to two stimuli presented sequentially, as well as the composite RT to two stimuli presented simultaneously, it was found that parallel processing could occur if each of the two tasks had high S-R compatibility. It is suggested that S-R compatibility may therefore serve as a predictor of whether multiple-response selections will occur sequentially or in parallel.
R 15

32,790
Ogilvie, J. & Dalcar, Eva. THE PERCEPTION OF CURVATURE. Canad. J. Psychol., Dec. 1967, 21(6), 521-525. (University of Toronto, Toronto, Ontario, Canada).

Thresholds of curvature were determined for two chord lengths at three orientations--vertical, horizontal, and oblique. The radius of curvature at threshold was smaller for the shorter lines. Performance was about the same for horizontal and vertical lines but not as good for oblique lines. The sagitta or "off-straightness" of the threshold curves varied between 2 and 4 sec. of arc at the eye. The problem of the appropriate measure of acuity is discussed.
R 6

32,791
Leib, J.W., Cusack, Julie, Hughes, Deanna, Lilette, S., et al. TEACHING MACHINES AND PROGRAMMED INSTRUCTION: AREAS OF APPLICATION. Psychol. Bull., Jan. 1968, 69(1), 12-26. (Ohio University, Athens, Ohio).

One of the principal enterprises of publishers and equipment producers is the manufacture and sale of programs and teaching machines. Applications of these educational and training techniques are prevalent in education, special education, industry, and the military. Conflicting results have been obtained both within and among these areas. It is concluded that this lack of concordance is due both to the situation in which the technique is used and various programming technicalities. More control in future research concerning criterion tests, structuring of this situation, control groups, specification of objectives, motivational factors, and theoretical variables is recommended.
R 86

32,732
Levy, P. SUBSTANTIVE SIGNIFICANCE OF SIGNIFICANT DIFFERENCES BETWEEN TWO GROUPS. Psychol. Bull., Jan. 1967, 67(1), 37-40. (University of Birmingham, Birmingham, England).

A simple extension of discriminant analysis is described which leads to an estimate of the proportion misclassified when significant differences are used for classifying individuals into two groups. The estimate is obtained by a simple operation upon the t ratio in the univariate case and upon the multiple point-biserial correlation coefficient in the multivariate case. The assumptions made are those normally employed for the initial test of significance performed on the mean differences.
R 10

32,733
Egeth, H. SELECTIVE ATTENTION. Psychol. Bull., Jan. 1967, 67(1), 41-57. (University of Michigan, Ann Arbor, Mich.).

Research on selective attention in humans is discussed critically in this paper. Emphasis is placed on an analysis of the nature of the selectivity that is demonstrated in four experimental tasks: recognition of tachistoscopically presented materials, listening to one of several simultaneous auditory messages, speeded classification of multidimensional objects, and searching through complex visual fields. The results of these studies are interpreted in terms of coding strategies that subjects use in processing sensory input.
R 42

32,734
Fellows, B.J. CHANCE STIMULUS SEQUENCES FOR DISCRIMINATION TASKS. Psychol. Bull., Feb. 1967, 67(2), 87-92. (Portsmouth College of Technology, Portsmouth, England).

Sequences of positions for the placing of the positive stimulus in a two-choice visual discrimination task as constructed by Gellermen are examined by means of a hypothesis-analysis technique and are found to be unsatisfactory on two counts: a) They fail to ensure that no position hypothesis will produce other than chance performance on the learning curve, and b) they fail to prevent the differential reinforcement of position hypotheses. A new set of sequences is proposed which satisfy these conditions. Suggestions are made as to the combination of these sequences for use in relatively long discrimination tasks.
R 22

32,735
Aaronson, Doris. TEMPORAL FACTORS IN PERCEPTION AND SHORT-TERM MEMORY. Psychol. Bull., Feb. 1967, 67(2), 130-144. (Cognitive Studies Center, Harvard University, Cambridge, Mass.).

The temporal course of perception may be an important determinant of errors that occur in immediate recall tasks. The studies reviewed suggest that the following factors play an important role in perception and short-term memory: a) the rate at which stimuli are presented, b) the duration of the stimuli, c) pre- and poststimulus events. Further, the subject's strategies may in part determine: a) the time elapsing before the various perceptual processes are performed on an item or b) the order in which items are processed.
R 80

32,736
Jones, L.V. INVARIANCE OF ZERO-POINT SCALING OVER CHANGES IN STIMULUS CONTEXT. Psychol. Bull., March 1967, 67(3), 153-164. (University of North Carolina, Chapel Hill, N.C.).

Hicks and Campbell recently reported a series of attempts to locate a rational origin on each of several psychological scales, by utilizing an additive scale model in conjunction with Thurstone's Case V paired comparisons or with a category-judgment scaling method. They concluded: a) that the additivity model applied almost equally well to judgments of birthday gifts, traffic violations, and behavior descriptions; b) that the location of a rational 0 point was strongly affected by the range or "context" of stimuli included; c) that equivalent findings resulted from paired-comparisons or category-judgment scaling methods. The present report was motivated by a critical examination of the Hicks-Campbell assumptions concerning discriminal dispersions of single and composite (double) stimuli. By replacing the Case V assumption of equal dispersion over all stimuli with a Case VI assumption that dispersion is linearly related to scale value, reanalysis of their data provides results uniformly more supportive of the additive scale model, and supportive of the invariance of the rational origin over changes in stimulus context.
R 18

32,737
Freeman, R.B., Jr. CONTRAST INTERPRETATION OF BRIGHTNESS CONSTANCY. Psychol. Bull., March 1967, 67(3), 165-187. (Pennsylvania State University, University Park, Penn.).

Several interpretations of brightness constancy in terms of simultaneous contrast and their supporting experimental evidence are reviewed. Brightness constancy is defined in terms of the luminance relationships of stimulus conditions. The various contrast theories of brightness constancy and their concomitant definitions of "contrast" offered by Hering, Helson, Jameson and Hurvich, Heinemann, Diamond, Leibowitz, and Walach are presented. The results of recent investigations of simultaneous contrast are described, and compared with the results of brightness-constancy experiments. True brightness constancy, as an ideal case, is rarely obtained experimentally, obviating the necessity for a theory for it. The induced-response theory of Jameson and Hurvich handles many data of brightness-constancy and brightness-contrast experiments with relatively simple mathematical formulation, while at the same time making possible the prediction of those deviations from brightness constancy which were first described by Hering and are still obtained experimentally.
R 46

32,798
Cohen, J. AN ALTERNATIVE TO MARASCUILO'S "LARGE-SAMPLE MULTIPLE COMPARISONS" FOR PROPORTIONS. Psychol. Bull., March 1967, 67(3), 199-201. (New York University, New York, N.Y.).

An alternative to Marascuilo's χ^2 analogue of Scheffé's theorem for performing tests on multiple linear contrasts among proportions coming from K independent populations is described. Based on the arcsin transformation of p, the proposed alternative is suitable for small samples, may be used when a sample p is 0 or 1 and is computationally simpler. Tests of complex contrasts are also exemplified.
R 3

32,799
Smith, Marilyn C. THEORIES OF THE PSYCHOLOGICAL REFRACTORY PERIOD. Psychol. Bull., March 1967, 67(3), 202-213. (Massachusetts Institute of Technology, Cambridge, Mass.).

When two stimuli are presented in rapid succession, reaction time to the second stimulus is typically delayed. Various theories of this phenomenon, commonly referred to as the psychological refractory period, have been proposed. The theories have been placed into three categories: a) central refractoriness theories, which postulate a refractoriness in the system following the first response selection; b) preparatory state theories, which explain the delay in terms of the expectancy or readiness generated by the particular interstimulus intervals employed; and c) single-channel theories, which assume a mechanism of limited capacity in the processing system. A review of the literature indicates that the latter theory best accounts for the available data. It is suggested that a limited capacity attention mechanism which is required for response selection may be the locus of the delay.
R 46

32,800
Bay, R.H. & Singer, G. SENSORY ADAPTATION AND BEHAVIORAL COMPENSATION WITH SPATIALLY TRANSFORMED VISION AND HEARING. Psychol. Bull., May 1967, 67(5), 307-322. (Monash University, Clayton, Victoria, Australia & University of Sydney, Sydney, Australia).

An analysis of spatial transformations of perceived space is made in terms of angular and parallel modifications of the median, horizontal, and frontal planes of the observer, and the perceptual and behavioral outcomes of such transformations examined. It is argued that there are two independent outcomes: behavioral compensation and sensory spatial adaptation with aftereffect. The first can be regarded as a special case of motor learning similar to that studied in early investigations with frontal plane transformation (mirror tracing), and the second is essentially similar to spatial adaptation which may occur with appropriate nontransformed stimulation. Both effects can occur simultaneously in the same direction, but the experimental data presented show that they can be studied independently. The effects observed by Ivo Kohler are treated as special instances of sensory adaptation which occur with transformations dependent upon sense-organ position and movement. The felt-position hypothesis and the reafference theory proposed by Held are shown to be reinterpretable in terms of motor learning and transfer of learning. Various methodological issues in the investigation of motor learning and sensory adaptation are examined.
R 71

32,801
Hershenson, M. DEVELOPMENT OF THE PERCEPTION OF FORM. Psychol. Bull., May 1967, 67(5). 326-336. (University of Wisconsin, Madison, Wisc.).

Four schemes representing the flow of information from stimulus through sensory and perceptual systems to response are proposed in the context of an evaluation of the perceptual potentialities and abilities of the newborn human being. The evidence suggests that the newborn is provided at least some sensory capacities with which to synthesize a perceptual world. Suggestions are offered to facilitate the study of the newborn's ability to perceive form.
R 45

32,802
Goldstein, M. A METHOD FOR CONSTRUCTING SEQUENCES IN CONTINGENT DISCRIMINATION DESIGNS. Psychol. Bull., May 1967, 67(5), 346-348. (Long Island University; Brooklyn, N.Y.).

The method described limits run lengths and systematic patterns of alternation and double alternation.
R 5

32,803
Marascuilo, L.A. & McSweeney, Maryellen. NONPARAMETRIC POST HOC COMPARISONS FOR TREND. Psychol. Bull., June 1967, 67(6), 401-412. (University of California, Berkeley, Calif.).

Post hoc procedures using orthogonal polynomials are illustrated for three nonparametric tests that are frequently employed by behavioral scientists in the analysis of empirical data. These examples involve null hypotheses which have been rejected by the Kruskal-Wallis 1-way analysis-of-variance test for rank data, by the Friedman 2-way analysis-of-variance test for rank data, and by the Cochran extension of the McNemar test of change for dichotomous data. Finally, the proposed post hoc procedures are compared to planned-comparison methods.
R 18

32,804
Peterson, C.R. & Beach, L.R. MAN AS AN INTUITIVE STATISTICIAN. Psychol. Bull., July 1967, 68(1), 29-46. (Science & Technology Institute, University of Michigan, Ann Arbor, Mich. & University of Washington, Seattle, Wash.).

This review considers experimental research that has used probability theory and statistics as a framework within which to study human statistical inference. The experiments have investigated estimates of proportions, means, variances, and correlations, both of samples and of populations. In some experiments, parameters of populations were stationary; in others, the parameters changed over time. The experiments also investigated the determination of sample size and trial-by-trial predictions of events to be sampled from a population. In general, the results indicate that probability theory and statistics can be used as the basis for psychological models that integrate and account for human performance in a wide range of inferential tasks.
R 115

32,805
Pollack, R.H. COMMENT ON "IS THE FIGURAL AFTEREFFECT AN AFTEREFFECT?" Psychol. Bull., July 1967, 68(1), 59-61. (Institute for Juvenile Research, Chicago, Ill.).

Despite the plausibility of the argument Ganz has marshaled in favor of an afterimage explanation for the figural aftereffect, he has ignored certain data which would have caused him to modify his position. Behavioral data dealing with a) contour interaction following fixation, b) temporal order of stimulus presentation, and c) ontogenetic trends are cited to demonstrate the necessity for modification of Ganz's position. First, contour repulsion is not a universal consequence of fixation. Second, analysis of Ganz's experiments shows that an apparent similarity between simultaneous and successive effects holds only because many of his situations allowed for true simultaneous presentation of all stimuli. Third, examination of ontogenetic trends occurring in simultaneous and successive displacement effects reveals the strong probability of more than one process underlying these effects.
R 19

32,806
Andrews, T.G. & Kerr, Frances E. INDEX OF LITERATURE REVIEWS AND SUMMARIES IN THE PSYCHOLOGICAL BULLETIN, 1940-1966. Psychol. Bull., Sept. 1967, 68(3), 178-212. (University of Maryland, College Park, Md.).

The Psychological Bulletin is one of the major sources of literature reviews and summaries in psychology. To make this journal even more useful for the searcher and researcher the review articles for the past 27 years have been classified and indexed. The present index covers the years 1940 through 1966. Because several kinds of articles other than literature reviews are carried by Psychological Bulletin, certain criteria of inclusion and exclusion were established for the index. All articles are included whose principal purpose was to present reviews of the literature on specialized topics. These articles usually employed twenty or more references. Also included are any notes or rejoinders associated with a critical review article. Excluded from the index are shorter articles not purporting to review or summarize a sector of the literature, convention notes and reports, book reviews, and presidential addresses--unless the address could be classed as literature review. The items in the index are limited to authors, volume numbers, and inclusive pages. Among the subject headings in the index, the letter P is used to indicate that a particular subject is only a part of the whole reference and is not the major subject being reviewed or summarized. The original articles have been carefully perused in order to classify them appropriately under the several subject headings to make the index as useful as possible for the researcher and to make his search, scanning, and retrieval easier and his browsing more productive.
R Many

32,807
Andrews, T.G. STATISTICAL METHODS AND RESEARCH DESIGN: INDEX OF REVIEWS AND NOTES IN THE PSYCHOLOGICAL BULLETIN, 1940-1966. Psychol. Bull., Sept. 1967, 68(3), 213-220. (University of Maryland, College Park, Md.).

In preparing the previous larger index of all reviews and surveys of the literature from 1940-1966 it became obvious that several important and useful notes on statistical methods and research design had to be omitted because they did not qualify as literature reviews. It was thought that it would be desirable to bring these notes together and index them for greater usefulness to the statistically-minded reader. The reviews and surveys listed in the larger index on topics of statistics and research design are also included in the present index to make it a more nearly complete single source.
R Many

32,808
Brown, D.R. & Owen, D.H. THE METRICS OF VISUAL FORM: METHODOLOGICAL DYSPEPSIA. Psychol. Bull., Oct. 1967, 68(4), 243-259. (Purdue University, Lafayette, Ind. & Ohio State University, Columbus, Ohio).

A methodological program for the development of a psychophysics of form is outlined with relevant data presented for samples of random polygons. The method emphasizes the importance of viewing form as a multivariate display and the importance of studying the statistical characteristics of the population of shapes from which samples are selected for behavioral studies. Implications for perceptual research are discussed.
R 49

32,809
Still, A.W. USE OF ORTHOGONAL POLYNOMIALS WITH NONPARAMETRIC TESTS. Psychol. Bull., Nov. 1967, 68(5), 327-329. (University of Cambridge, Cambridge, England).

Nonparametric tests usually suffer by comparison with the F test when a test of interaction is required. However, when a trend analysis is appropriate, a nonparametric test may be used in conjunction with orthogonal polynomials and such a detailed analysis effectively meets the need for a test of interaction. An example is given in which a nonparametric trend analysis is carried out on data whose underlying distributions make an F test invalid.
R 7

32,810
Wachtel, P.L. CONCEPTIONS OF BROAD AND NARROW ATTENTION. Psychol. Bull., Dec. 1967, 68(6), 417-429. (Downstate Medical Center, State University of New York, Brooklyn, N.Y.).

Some representative uses of concepts of broad and narrow attention are reviewed. Such concepts are useful in understanding and integrating a wide variety of phenomena studied by experimentalists and clinicians. Failure to distinguish carefully enough between types of broadening and narrowing, however, may lead to contradictions and obscurities. The present paper highlights some of the necessary distinctions and clarifies some of the practical and theoretical implications of the different kinds of narrow and broad attention discussed.
R 73

32,811
Cliff, N. & Hamburger, C.D. THE STUDY OF SAMPLING ERRORS IN FACTOR ANALYSIS BY MEANS OF ARTIFICIAL EXPERIMENTS. Psychol. Bull., Dec. 1967, 68(6), 430-445. (University of Southern California, Los Angeles, Calif. & California State College, Long Beach, Calif.).

Evidence concerning sampling fluctuations in factor analysis is presented, with emphasis on data gathered from Monte Carlo studies. Two points of view about factor analysis are offered: a) the statistical, in which sampling fluctuations are the result of the sampling of persons, and b) the psychometric, in which indeterminacies resulting from fluctuations in what is measured are emphasized. Several studies suggest that the standard error of a factor loading due to the sampling of persons is about $N^{-1/2}$. This is approximately true for analytically rotated factors. It is more nearly true for least-squares rotations to the population, but this generalization is limited by the lack of control of the angles of separation among the rotated factors in the sample. Evidence is given concerning the influence of type of factoring, size of loading, and method of factoring. The determination of the number of factors is discussed. Evidence from studies of "psychometric" error is also presented.
R 39

32,812
LaForge, R. CONFIDENCE INTERVALS OR TESTS OF SIGNIFICANCE IN SCIENTIFIC RESEARCH? Psychol. Bull., Dec. 1967, 68(6), 446-447. (University of Portland, Portland, Ore.).

David Bakan's generally well-taken comments are criticized on the grounds that the procedures he recommended are typically more difficult to manage than those procedures whose management by psychologists he criticized. In particular, more attention to procedures for constructing confidence intervals and computing the power of tests of hypotheses is recommended, within the Neyman-Pearson approach to statistical inference. Both neo-Bayesian procedures and inexplicit, intuitive procedures are opposed.
R 9

32,813
Schaefer, H.J. & Sullivan, J.J. RADIATION MONITORING WITH NUCLEAR EMULSIONS ON MISSION GEMINI IV AND V. Aerospace Med., Jan. 1967, 38(1), 1-5. (USN Aerospace Medical Institute, NAMC, Pensacola, Fla.).

On Gemini type missions the bulk of the radiation exposure of the astronauts is due to trapped protons picked up in the South Atlantic Anomaly. Although the exposure remained around the 50-millirad level during the four-day mission (Gemini IV) and around the 100-millirad level during the seven-day mission (Gemini V), a detailed analysis of the proton energy spectrum seems of special interest. Track and grain count evaluation of nuclear emulsion carried by the astronauts within their space suits and helmets shows that this spectrum is a continuum from zero to about 400 Mev kinetic energy with a broad maximum. Since a large part of the flux is of low penetrating power, the radiation level within the capsule sensitively depends on local shield geometry showing dose rate variations of 20 per cent at opposite corners of the same film sheet. A similarly strong variation must be assumed to exist for the depth dose within the astronauts' bodies, with dose dropping steeply to values lower than the aforementioned surface dose levels found in the emulsions.
R 10

32,814
Lynch, T.N., Jensen, R.L., Stevens, P.M., Johnson, R.L., et al. METABOLIC EFFECTS OF PROLONGED BED REST: THEIR MODIFICATION BY SIMULATED ALTITUDE. Aerospace Med., Jan. 1967, 38(1), 10-20. (USAF School of Aerospace Medicine, Brooks AFB, Tex.).

Metabolic studies were performed on 44 healthy men before and during bed rest at ground level or at simulated altitudes of 10,000 or 12,000 feet. Simple bed rest brought loss of calcium, phosphorous, nitrogen, sodium, and chloride with little change in potassium. The addition of 12,000 feet simulated altitude significantly reduced the loss of urinary calcium, phosphorous, nitrogen, sodium and chloride and total [illegible]. The 10,000 foot simulated altitude was associated with urinary calcium losses quantitatively intermediate between the ground level and 12,000 foot groups and increased total [illegible] and potassium losses. The possibility that reduced bone resorption represents one aspect of acclimatization to simulated altitude is discussed.
R 32

32,815
Vogt, F.B. & Johnson, P.C. PLASMA VOLUME AND EXTRACELLULAR FLUID VOLUME CHANGE ASSOCIATED WITH 10 DAYS BED RECUMBENCY. Aerospace Med., Jan. 1967, 38(1), 21-25. (Texas Institute for Rehabilitation & Research, Texas Medical Center, Houston, Tex. & Medicine Dept., Baylor University College of Medicine, Houston, Tex.).

Eleven healthy adult males were studied before, during, and after three periods of 10 days recumbency. Intermittently inflated cuffs were applied to the lower extremities or periodic exercises were performed by the subjects during two of the three periods of recumbency. A significant decrease in plasma volume occurred in the first several days of recumbency. Extracellular fluid volume decrease was progressive over the recumbency period. The use of intermittent cuff inflation on the lower extremities or periodic exercises did not influence the plasma volume and extracellular fluid volume change seen in association with 10 days bed recumbency.
R 32

32,816
Dougherty, J.B. CARDIOVASCULAR FINDINGS IN AIR TRAFFIC CONTROLLERS. Aerospace Med., Jan. 1967, 38(1), 26-30. (Guggenheim Center for Aerospace Health & Safety, Harvard School of Public Health, Boston, Mass.).

The impact of air traffic control work on the health of air traffic control specialists (ATCS) has long been of concern to their employers. Previous studies have shown that ATCS at certain experience and responsibility levels report significantly more symptoms than others. This study collected blood pressure readings and electrocardiograms of ATCS and non-ATCS at work. It showed that the prevalence rates of hypertension for all ATCS were significantly below those of all non-ATCS. A special study was made of journeyman radar controllers age-matched with non-controllers. The prevalence rates for hypertension showed a reversal with the journeyman controller manifesting higher rates than non-ATCS and higher rates than his fellow-ATCS. This trend was not significant. The journeyman radar controllers' electrocardiograms showed a prevalence of abnormality two times that of the age-matched non-ATCS. While the journeymen had significantly more electrocardiogram abnormality than the non-ATCS, no pre-employment electrocardiograms are available to clearly define the relationship of the abnormality to air traffic control work. Hypotheses to explain the differences and methods to test the differences are noted.
R 12

32,819
Vogt, F.B., Mack, Pauline B., Johnson, P.C. & Wade, L., Jr. TILT TABLE RESPONSE AND BLOOD VOLUME CHANGES ASSOCIATED WITH FOURTEEN DAYS OF RECUMBENCY. Aerospace Med., Jan. 1967, 38 (1), 43-48. (Helen Childers Stark Laboratory for Human Nutrition Research, Texas Woman's University, Denton, Tex.).

Four healthy adult males were studied during a 14 day bedrest experiment. Repeated tilt table tests, using an English saddle type support, were conducted before and after the period of recumbency. Particular attention was directed during the post-recumbency period to the determination of the pattern of the subjects' tilt table response in recovering from the deconditioning. Each subject was tilted five times in the three day recovery period following recumbency. Radioisotope blood volume determinations were made prior to the study, during the study, and during the recovery phase. The results indicate that definite cardiovascular deconditioning occurred after 14 days of bedrest, and that significant recovery is attained with three days of ambulation. The study demonstrated that blood volume decreased in the first several days of bedrest, without a further statistically significant change during the remainder of the 14 day period of bedrest. Also discussed are the discrepancies in determining plasma volume by counting plasma directly, and by determining plasma volume from calculations using total blood volume (obtained by counting whole blood) and its associated hematocrit reading.
R 5

32,820
Reynolds, H.H. & Kratochvil, C.H. SUGGESTIONS FOR A COMPARATIVE NEUROSCIENCES RESEARCH PROGRAM. Aerospace Med., Jan. 1967, 38(1), 49-50. (USAF Aeromedical Research Lab., Holloman AFB, N.M.).

Research in the neurosciences is currently a topic of great interest throughout the world. Many institutions are pursuing rather broad programs; however, there does not yet exist a comparative approach which fits the conceptual framework and offers the synthesis in which the authors are interested, and which would appear to be worthy of consideration. Phyletic, ontogenetic and subject matter investigative dimensions are briefly discussed. The implications of neurosciences research for military bioastronautics is alluded to as regards optimal human functioning and the role of military man in long-term international strivings.
R 10

32,821
Cameron, R.G. RATIONAL APPROACH TO COLOR VISION TESTING. Aerospace Me.., Jan. 1967, 38(1), 51-59. (Swiss Air Force Institute of Aviation Medicine, Dübendorf, Switzerland).

A rational approach to color vision testing demands the elucidation of three points: whether a color vision defect is actually present, what it is and whether the defect is compatible with the requirements of the examining service. The validity of the here suggested methods for such elucidation is illustrated by a careful analysis of detailed results from pseudoisochromatic plate, anomaloscope and signal-lantern testing of the 266 defectives discovered in serial examinations of 5141 pilot candidates. A brief review of the relevant literature is undertaken, and a comparison is made with the percentages of the six diagnostic groups of these 266 defectives. Our figure of 5.17 per cent defectives appears to indicate that about 2 1/2 per cent of defectives (particularly the dichromats) were self-eliminated, and our rejection rate of 3.9 per cent of all candidates can be regarded as an average figure. Finally a plea is made for uniformity of definition, of methodology and particularly of terminology.
R 4

32,822
Vogt, F.B. & Hellen, T.O. ELECTROCARDIOGRAM PREPROCESSING UNIT. Aerospace Med., Feb. 1967, 38(2), 123-126. (Texas Rehabilitation & Research Institute, Houston, Tex.).

This paper describes an analog preprocessing circuit for obtaining a pulsed output corresponding to each cardiac cycle using the electrocardiogram. The circuit is designed to present a fixed pulse output for each heart beat and is relatively unresponsive to false trigger signals on the electrocardiogram such as electromyogram, 60 cycle per second interference, electrode movement artifact, false triggering on a T-wave, baseline shifts, and polarity changes of the QRS complex. The circuit diagram, principle of operation, and application of the unit are presented. The unit should be useful where electrocardiograms are obtained with associated high noise components, such as during flight conditions or exercise procedures. It also should prove useful when only the time of occurrence of the electrical activity of the heart is desired to operate other apparatus, such as to obtain heart rate or blood pressure.
R 4

32,823
Strughold, H. & Rivenar, O.L. CHARACTERISTICS OF PARKING ORBITS IN CIRCUMMARTIAN SPACE. Aerospace Med., Feb. 1967, 38(2), 127-128. (USAF Aerospace Medical Div., Brooks AFB, Tex.).

The orbital periods and velocities of a vehicle moving in the Martian gravisphere, which extends to 0.5 million kilometers, are tabulated. The lower altitude limit for a parking orbit determined by the "sensible" atmosphere with a useful lifetime might be found between 100 to 200 kilometers, even if we accept a ground air pressure of 10 millibar. Since Mars has no effective magnetosphere to trap particle rays, there are no topographical restrictions for parking orbits from a van Allen-type radiation belt in contrast to the situation in near-earth space. A table in this article shows the orbital data for 16 selected altitudes from 200 to 20,000 kilometers, including that of a synchronous satellite.
R 4

32,824
Rosen, J., Perry, J.J., Carpenter, L.R. & Auml, S.A. FLIGHT RESEARCH PROGRAM: VI. HEART RATE AND LANDING ERROR IN RESTRICTED FIELD OF VIEW LANDINGS. Aerospace Med., Feb. 1967, 38 (2), 128-132. (Flight Research Center, NASA, Edwards AFB, Calif.).

Two pilots were instrumented for electrocardiogram in a T-33 jet aircraft in the course of eleven flights in which pilot horizontal field of view was varied from 360° to 5.7°. Landing error was recorded in terms of distance from the desired touchdown point. A high degree of correlation was found to exist between heart rate and landing error. There was no significant correlation between heart rate and field of view, nor was there significant correlation between field of view and landing error for the fields of view tested. At the 5.7° field of view the monocular fields of view did not overlap, so that only one eye could be used. Landing error did not increase significantly when only one eye was used. This finding has implications with respect to aeromedical standards.
R 1

32,825
Rosen, J., Older, H. & Jones, W.L., Jr. FLIGHT RESEARCH PROGRAM: VII. MEDICAL MONITORING OF NAVY CARRIER PILOTS IN COMBAT. Aerospace Med., Feb. 196?, 38(2), 133-139. (Flight Research Center, NASA, Edwards AFB, Calif.).

The feasibility of medical monitoring in combat was demonstrated by instrumenting ten dive-bombing missions from a Navy attack aircraft carrier operating in the Gulf of Tonkin. Nine missions suitable for data analysis were obtained. The results were remarkable primarily for the low heart rates seen on these opposed missions. The overall heart rate for 18 hours of data was 87.6 beats per minute. The heart rates at launch and recovery were substantially higher than the bombing heart rates, in spite of the significant normal acceleration experienced during the bomb runs. The difference between launch or recovery, and bombing was statistically highly significant. Comparisons between the first and the second combat missions of the day for the same pilots on the same day showed heart rate to be substantially lower on the second mission. The difference was statistically significant. The pilots were of an unusually high experience level, and the data presented could not be considered representative for a pilot group of average combat experience, or average carrier operations experience.
R 7

32,826
Hemenway, R.D., Bachman, C.H. & Lorenz, P.J. SOME PSYCHOMOTOR AND PHYSIOLOGICAL TESTS ON HUMANS EXPOSED TO AIR IONS. Aerospace Med., Feb. 1967, 38(2), 145-148. (US Veterans Administration Hospital, Syracuse, N.Y.).

Humans were exposed to air ions by inhalation only. The ion current to each subject was measured. Both psychomotor and physiological tests were performed with ions of both polarities. Reaction time measurements under ionization were ambiguous. In a vigilance task both negative ions and positive ions reduced the number of omissions, the positives being most effective. Neither polarity affected the heart rate. Reduction in respiration rates occurred for both polarities of ions as well as the control during the ion exposure. The reduction for positive ions was greater than for the control, the reduction for negatives was less than for the control. Measurements of direct current potential between forehead and ear showed no correlation with ion treatment.
R 10

32,827
Tepas, D.I. EVOKED BRAIN RESPONSE AS A MEASURE OF HUMAN SLEEP AND WAKEFULNESS. Aerospace Med., Feb. 1967, 38(2), 148-153. (Systems & Research Div., Honeywell, Inc., St. Paul, Minn.).

This report reviews the results of several experiments in which the evoked brain response to clicks was monitored to determine the feasibility of utilizing this measure as a sensitive and direct index of human sleep and wakefulness. The experiments conducted fall into two general categories: a) those in which the evoked brain response was used to monitor the effects of various work-rest schedules on sleep-wakefulness behavior, b) those directed towards a preliminary evaluation of man's ability to sleep while wearing a pressure suit. The results of these experiments indicate that the evoked brain response to clicks is a sensitive indicant of sleep-wakefulness behavior which can be recorded from a wide range of subjects. Thus, the evoked brain response may provide an objective central nervous system measure for monitoring and manipulating the performance of man in a complex space system environment.
R 15

32,828
Foley, Mary F., Billings, C.E. & Hulv, G.S. DEVELOPMENT OF TECHNIQUES FOR DIRECT MEASUREMENT OF METABOLISM UNDER WATER. Aerospace Med., Feb. 1967, 38(2), 153-155. (Preventive Medicine Dept., Ohio State University, Columbus, Ohio).

In previous studies of metabolism and ventilation in flight, the Müller-Franz portable breath-powered respirometer has been found to be a precise and simple tool. The concept embodied in this instrument has been adapted for use in studies of the metabolic cost of activity under water. The criteria specified for a device for these studies were: it must utilize commercially available SCUBA (self-contained underwater breathing apparatus) gear; there must be no connections to the surface and the swimmer must not be hindered in any way; it must be usable at any depth capable of attainment using SCUBA, and in any activity engaged in by divers. A device has been developed which meets these criteria. Pilot studies of metabolism in divers swimming at various rates have been conducted.
R 17

32,829
Hoffman, C.S. & Greening, C.P. EFFECT OF BLUR AND SIZE ON TARGET RECOGNITION. Aerospace Med., Feb. 1967, 38(2), 156-158. (Autonetics Div., North American Aviation, Inc., Downey, Calif.).

A study was performed to determine the effect of blur and size on target recognition. Films of six different clock orientations of Landolt C's were made. Blur and size were varied by varying the angular velocity of the camera across the target field and the distance of the camera from the targets. The subjects were required to identify an assigned target orientation on each trial. The results were: a) the effect of image smear on target recognition is dependent upon the ratio of smear in inches to the critical dimension of the target, in comparable units. If the amount of smear is less than twice the critical dimension, target recognition accuracy is unaffected. At a ratio of 2.0, performance begins to drop off rapidly until it levels off at a near chance level and b) time to recognize targets falls off rapidly when the amount of blur equals the critical dimension.
R 5

32,830
Muir, D.C.F. INFLUENCE OF GRAVITATIONAL CHANGES ON THE DEPOSITION OF AEROSOLS IN THE LUNGS OF MAN. Aerospace Med., Feb. 1967, 38(2), 159-161. (London School of Hygiene & Tropical Medicine, London, England).

The deposition of aerosols in the lungs of man depends on several factors which in turn are related to the size of the particles. Unit density spheres with diameters between 1μ and 8μ are principally deposited by sedimentation due to gravity. In the absence of gravity the concentration of these particles in the lung air probably approaches that in the ambient air. In the presence of a reduced gravitational field the overall deposition of particles in this size range is reduced but deposit on in the alveolar regions will be increased. The pattern of aerosol deposition of particle in the lungs of subjects on the surface of the Moon can be predicted from a knowledge of such deposition on Earth. The increase in the quantity of material reaching the alveolar regions demands a knowledge of the size distribution of particles in the inhaled air.
R 10

32,831
Rocco, R.M. EFFECTS OF SOLAR RADIATION ON MEAN FACIAL SKIN TEMPERATURE. Aerospace Med., Feb. 1967, 38(2), 161-163. (Space Sciences Labs., Litton Systems, Inc., Beverly Hills, Calif).

Test subjects, wearing simulated spacesuit helmets, underwent facial irradiance tests to determine the effects of absorbed solar electromagnetic radiation on facial skin temperature. Lead glass was used as visor material to protect subjects from ultraviolet radiation without significant attenuation or alteration of the visible and infrared spectra. A mercury-xenon solar simulator provided intensities from 0.4 to 0.7 solar constant at the skin surface. Skin temperatures were measured with thermocouples taped to the cheeks and forehead. Results indicate that a mean facial skin temperature not in excess of 100°F can be maintained in a 75°F spacesuit environment provided the skin does not absorb more than 0.22 solar constant (97 British thermal unit/hr ft^2) from solar irradiation, earth albedo and vehicle albedo and the visor temperature does not exceed 115°F. Since astronauts engaged in near-earth extravehicular missions may be exposed to intensities as high as two solar constants, spacesuit visors may require a heat reflecting coating to attenuate the solar and albedo facial irradiance.
R 4

32,832
Brinkmeier, Barbara L. PERFORMANCE OF CIVIL AVIATION PILOTS UNDER CONDITIONS OF SENSORY INPUT OVERLOAD. Aerospace Med., Feb. 1967, 38(2), 164-168. (University of California, Santa Barbara, Calif.).

It was the purpose of this study to determine the effect of sensory input overload on the performance of non-professional civil pilots during simulated instrument flights in a LINK AN 2550-1 trainer. Parameters included track, altitude, and airspeed deviations measured under overload conditions induced by amended clearances and extraneous kinesthetic, visual, and auditory stimuli. Data from experimental flights for each subject was compared with his performance on control flights under similar flight plans. The analysis suggests that pilot performance may be facilitated by an auditory stimulus which does not require a response. A visual stimulus, whether or not a response was required, resulted in a performance decrement. The kinesthetic stimulus, a result of rough air activators, produced significant pilot errors when introduced alone and in combination with auditory or visual stimulus. Even with no additional sensory input, a single amended clearance delivered at a critical period of the flight was sufficient to cause gross errors in simulator control.
R 10

32,833
Stoddart, J.C. REACTION TIME DURING VOLUNTARILY CONTROLLED ALVEOLAR HYPERVENTILATION. Aerospace Med., Feb. 1967. 38(2), 171-173. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

Six subjects were asked to perform a choice reaction time task while undergoing voluntarily controlled alveolar hyperventilation. The results indicate that the level of alveolar ventilation governs the time of onset of deterioration in performance. At V_A (alveolar ventilation) = 20 liters per minute, prolongation of reaction time occurred when the alveolar carbon dioxide tension was 16 mm Hg. At V_A = 18 liters per minute, deterioration occurred when the alveolar carbon dioxide tension was 19 mm Hg. It is considered that this method can be used to assess the susceptibility of aircrew to the effects of hyperventilation.
R 4

32,834
Adolfson, J. & Fluur, E. HEARING DISCRIMINATION IN HYPERBARIC AIR. Aerospace Med., Feb. 1967, 38(2), 174-175. (Psychological Lab., University of Göteborg, Göteborg, Sweden & Otolaryngology Dept., Karolinska Sjukhuset, Stockholm, Sweden).

In order to determine to what extent the hearing discrimination was influenced by hyperbaric air intoxication, 23 divers were tested by means of speech audiometry in a pressure chamber at 4 ata (atmospheres absolute), 7 ata, and 11 ata. The hearing discrimination decreased with increased pressure and the impairment was statistically significant on 7 ata and 11 ata. It was concluded that even if the sound intensity was raised far above the hearing threshold the promoted associative reactions caused by hyperbaric air intoxication led to severe difficulties for a diver to apprehend simple common words. It was also suggested that this state could be a reason for a diver not to obey orders from the surface when diving at depths greater than 60 meters. No adaptation to the hyperbaric environment was found in this investigation.
R 8

32,835
Hunt, N.C., III. IMMERSION DIURESIS. Aerospace Med., Feb. 1967, 38(2), 176-180. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

The effect of water immersion on urine composition was studied in twelve dehydrated subjects. Acting as their own controls, the subjects were submitted to three separate six-hour periods of a) routine daily activity, b) water immersion to neck level, reclining in a deck chair, and c) reclining in a deck chair, non-immersed. Reclining in a deck chair, relative to routine daily activity, was associated with a natruresis accompanied by a small volume of osmotically obligated water. Water immersion, relative to reclining in a deck chair, was associated with a marked diuresis, consisting primarily on non-solute obligated water, and secondarily of water obligated to a significantly increased sodium excretion. In six subjects, Pitressin treatment tended to supress immersion diuresis. Whereas the release of non-solute obligated water is best explained by ADH inhibition accompanying the negative pressure breathing inherent to immersion, another reason must be sought for the enhanced sodium excretion. The mechanism for natruresis was not defined by indirect measurements of glomerular and tubular activity; possible mechanisms are discussed.
R 35

32,836
Wortz, E.C., Edwards, D.K., III, Diaz, R.A., Prescott, E.J., et al. STUDY OF HEAT BALANCE IN FULL PRESSURE SUITS. Aerospace Med. Feb. 1967, 38(2), 181-188. (AiResearch Manufacturing Company, Los Angeles, Calif.).

Studies were made of eight subjects who exercised on a level treadmill at 1.4 and 2.0 mph (2.25 and 3.22 km/hr) wearing a pressurized Gemini G2-C space suit at sea level and at simulated 32,500 feet (9906 meters) altitude. The subjects' metabolic rates were measured by indirect calorimetry, and these rates were compared with heat removal rates from the suit. Avenues of heat removal other than by ventilation gas cooling were eliminated. Ventilation cooling removed only a portion of the metabolic heat generated; the remainder was expended as useful work or stored in the subjects' bodies. Because of the low efficiency of the human body in doing useful work, it appeared that the heat storage rates were fairly high. It was presumed that these rates were a result of the high heat storage that can occur in exercising muscle tissue. It was concluded that heat storages of as much as 1000 British thermal units (252 Calories) can be safely tolerated under conditions of high muscular activity.
R 14

32,837
Snyder, R.G. & Dille, J.R. POSSIBLE MEDICAL FACTORS CONTRIBUTING TO THE FATAL CRASH OF A RACE PILOT: A CASE REPORT. Aerospace Med., Feb. 1967, 38(2), 195-197. (US Civil Aeromedical Institute, FAA, Oklahoma City, Okla.).

The fatal crash of an unlimited class aircraft during high-G pylon racing at the 1965 International Air Races at Boulder City, Nevada, raised questions of possible gastrointestinal symptoms and drug use which could have lowered the pilot's G tolerance and his ability to react adequately in an emergency situation. Discussion of the possible effects of sedation, fatigue, and reduced G tolerance due to acute gastroenteritis is presented. It is suggested that this be considered as a possible contributing cause of the accident.
R 8

32,838
Akre, P.R. MULTIFOCAL PREMATURE CONTRACTIONS--AN ECG FINDING OF GRAVE SIGNIFICANCE. Aerospace Med., Feb. 1967, 38(2), 197-201. (USAF School of Aerospace Medicine, Brooks AFB, Tex.).

Evaluation of the cardiovascular system is important in determining an individual's ability to tolerate the stresses of flying. The electrocardiogram is an essential part of the cardiovascular evaluation. A case is presented of a USAF pilot of 19 years whose routine electrocardiogram demonstrated multifocal premature ventricular contractions. This man was thoroughly evaluated at the School of Aerospace Medicine and ultimately removed from flying duties. One year later, this individual expired suddenly as the result of ventricular fibrillation. Autopsy revealed diffuse severe interstitial fibrosis of the left ventricle. The demonstration of multifocal premature ventricular contractions is a grave finding. The frequency of this finding and its significance in flying personnel is discussed.
R 4

32,839
Wood, E.H. [illegible] EFFECTS OF GRAVITATIONAL AND INERTIAL FORCES ON THE CARDIOPULMONARY SYSTEM. Aerospace Med., March-1967, 38(3), 225-233. (Physiology Sec., Mayo Clinic & Mayo Foundation, Rochester, Minn.).

In recent years, there has been accumulating laboratory evidence that the pulmonary effects associated with the accelerations encountered in the launch and re-entry phases of space flight may be of practical importance in relation to manned space missions. Considerable work has been done in the last few years, and is continuing in several laboratories concerning the pulmonary effects of gravitational and accelerative forces. The final answers as to the mechanisms involved in producing these effects are still not available. Some of these effects on man and dogs are described. Large transalveolar pressure gradients in superior portions of the lungs are potentially dangerous and perhaps should be a greater source of worry in regard to astronaut safety than is that currently popular bug-a-boo, cardiovascular deconditioning due to weightlessness. It must be remembered, however, that the intrapleural pressure differences reported here were obtained in dogs. The physical dimensions and topography of the human thorax are quite different from those in the dog. Since the thorax has a greater diameter in the human than in the dog, it might be expected that the pressure differences associated with acceleration might be greater. However, the heart has better anatomic support in the human than in the dog, so no firm extrapolation can be made from the dog to the human on the basis of the data obtained up to the present. To fill this gap, studies are currently being carried out, supported by the Air Force and the National Aeronautics and Space Administration, using chimpanzees supplied from Holloman Air Force Base. The results obtained thus far indicate that the effects of acceleration on intrathoracic pressures are similar in dogs and chimpanzees, but these studies are still in too preliminary a stage to give quantitative data.
R 15 *Space TRAVEL/Physiological effects*

32,840
Abramson, N., Plemms, T.E. & Kaufman, W.C. EFFECT OF HEAT STRESS UPON HUMAN RENAL FUNCTION. Aerospace Med., March 1967, 38(3), 234-238. (USAF Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio).

Six resting subjects were exposed on separate occasions to 27°C (8-14 mm Hg P_{H_2O}), 46°C (8-13 mm. Hg P_{H_2O}) and 55°C (4-8 mm. Hg P_{H_2O}) for three hours. Measurements were made of glomerular filtration rate (GFR), renal plasma flow (RPF), free water clearance (C_{H_2O}), and electrolyte excretion. In a second study, spironolactone, an aldosterone-antagonist, was administered prior to 27°C and 46°C exposures and renal function was again measured. Acute heat stress oliguria was confirmed, GFR was unchanged while RPF was significantly reduced at both 46°C and 55°C. Osmolar clearance and sodium excretion decreased. Free water was retained but not in excess of that which occurred at room temperature under minimal dehydration. Heat-induced oliguria primarily reflects the retention of sodium. In view of an unchanged GFR, this suggests the activity of aldosterone; however, the oliguria was not completely blocked with the aldosterone-antagonist. Thus, a change in GFR undetected by present clearance methods may be important. An initiating or additional factor may be the reduction in renal blood flow. Free water retention was not of major significance. That this should be the case in view of demonstrable increases in blood ADH is unexplained.
R 21

32,841
Murray, R.H., Krog, J., Carlson, L.D. & Bowers, J.A. CUMULATIVE EFFECTS OF VENESECTION AND LOWER BODY NEGATIVE PRESSURE. Aerospace Med., March 1967, 38(3), 243-247. (Cardiopulmonary Lab., Indiana University Medical Center, Indianapolis, Ind.).

Because the physiological effects of the application of negative pressure to the lower body (LBNP) have been attributed to a diminished effective blood volume, it seemed of interest to study the cumulative effects of venesection and LBNP on the circulation. Following the placement of an indwelling venous needle, each of four, experienced subjects was exposed to negative pressure (0-40 mm. Hg) applied to the lower body in seven 10 mm. steps for intervals of five minutes each. Following this test, 500 ml of blood were withdrawn and the test repeated. Another identical series of paired LBNP exposures was carried out, but without venesection. The following measurements were made: heart rate; blood pressure; calf and forearm volume and forearm blood flow by venous occlusion plethysmography; plasma volume; hemoglobin; hematocrit and plasma proteins. During each preliminary exposure to n.p. (negative pressure) heart rate rose 14 beats/min and pulse pressure fell 7-15 mm. Hg. Forearm volume fell continuously over the course of both exposures on the test day; forearm blood flow varied directly and calf volume indirectly with chamber pressure; estimated total plasma volume (plasma water) fell approximately 10 per cent. All values returned to near control levels within thirty minutes following the completion of the exposures. During the application of LBNP following venesection, heart rate and pulse pressure changed to a greater degree than during the preliminary exposures, and each of the subjects developed distinct presyncopal symptoms at a chamber pressure of −40 mm. Hg, recovering promptly with n.p. release. These data demonstrate that this regimen of LBNP application provides a very significant circulatory stress, and support that approximately 1 liter of blood is lost from the effective circulation with the use of this n.p. technique.
R 4C

Shapiro, J., Young, D.R., Dalton, J. & Pelligra, R. DEVELOPMENT OF A STANDARD PROLONGED WORK TEST FOR THE EVALUATION OF FATIGUE AND STRESS IN MAN. Aerospace Med., March 1967, 38 (3), 268-272. (Ames Research Center, NASA, Moffett Field, Calif.).

A postabsorptive work situation that requires about one-third of their maximal work capacity can be well tolerated in human male subjects for up to 24 hours. Arrythmia is a contraindication to such a test whereas depression of the ST segment of the ECG (electrocardiogram) is not. Only after about 9 hours do blood values for glucose and free fatty acids attain equilibrium values. Thus, in order to obtain meaningful data concerning metabolic interactions, the work situation must be sufficiently prolonged as to permit establishment of a new dynamic equilibrium. The reserve of "carbohydrate" in the body appears to be greater than previously suspected. Utilization of large amounts of reserve fat, as reflected by high serum values for free fatty acids, is not detrimental. Reduction of serum glucose to very low levels by the injection of insulin did not exclude the ability to continue work.
R 9

32,843
Rohles, F.H., Jr., Nevins, R.G. & Springer, W.E. TEMPORAL CHARACTERISTICS OF BODY TEMPERATURE DURING HIGH THERMAL STRESS. Aerospace Med., March 1967, 38(3), 286-290. (Environmental Research Institute, Kansas State University, Manhattan, Kan.).

Eight subjects were exposed to 6 temperatures (95, 98, 100, 105, 110, and 120°F DB) at each of four relative humidities, 60, 70, 80, and 90 per cent. The time for the rectal temperature to increase 2°F was measured in each of the 24 conditions; the test was terminated if this did not occur in less than 4 hours. The results showed that when the Effective Temperature (ET) was below 91.3°F none of the subjects exhibited a 2°F increment in rectal temperature in less than 4 hours. Conversely, all of the subjects reached this criterion when the effective temperature was 97°F and above. Between Effective Temperatures of 92.9° and 95.5°F there was a transition zone in which some of the subjects reached the criterion and some did not. In general it was found that the higher the ET, the shorter the latency of the rectal temperature response to increase 2°F. The rank order correlation between ET and the time required for the rectal temperature to increase was -.987.
R 2

32,844
Vogt, F.B. EFFECT OF COMPLEX MEASURING INSTRUMENTATION UPON THE TILT TABLE RESPONSE. Aerospace Med., March 1967, 38(3), 290-292. (Texas Rehabilitation & Research Institute, Houston, Tex.).

Ten healthy adult male subjects were studied during four separate tilt procedures performed at weekly intervals at the same time of the day. Three of these tilt procedures were simple tilt procedures utilizing minimal instrumentation, including the attachment of electrocardiogram leads and a blood pressure cuff for obtaining indirect blood pressure. A fourth tilt procedure was performed in which extensive instrumentation was used. Data were collected on each of the subjects for a control period prior to tilting for 20 minutes after which time the subjects were returned to the horizontal position. None of the subjects experienced syncope in this particular series of tilts. An objective approach to the analysis of tilt table data was used and the results are presented in this paper. It is concluded that subjects who have had experience of previous tilt table procedures, are aware of procedures to be performed on them, and are familiar with the instrumentation associated with the measurements being made, show no statistically significant difference in tilt table procedures with minimal instrumentation as compared to tilt table procedures with complex instrumentation requiring intravenous and intra-arterial catherization.
R 5

32,845
Waggoner, J.K. HUMAN TOLERANCE TO CHANGES IN AIRCRAFT CABIN PRESSURIZATION. Aerospace Med., March 1967, 38(3), 299-301. (AiResearch Manufacturing Div., Garrett Corporation, Los Angeles, Calif.).

Recommended rates of aircraft cabin pressurization changes have been unchanged for thirty years and are generally based on a statistically inadequate number of subjects exposed to changes in a pressure chamber done in the early days of aeromedical research. The research study presented here encompasses a larger group selected to be more representative of aircraft passengers flying today. The results indicate the following: a) Presently recommended rates of cabin ascent and descent appear to be excessively stringent with regard to the reaction of the group of subjects studied; and b) adequate instruction of passengers regarding the cause for ear symptoms during pressure changes and appropriate advice regarding how to alleviate these symptoms is more important than the various rates of pressurization changes included in this study.
R 1

32,846
Meader, W.L. DECOMPRESSION SICKNESS IN HIGH-ALTITUDE FLIGHT. Aerospace Med., March 1967, 38(3), 301-303. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

Review of 5 years of a WU-2 squadron's daily records shows 16 cases of decompression sickness entirely confined to reports of bends pain among 11 crewmembers in 998 flights. Generally, 40 minutes were spent in denitrogenation in a partial pressure suit and helmet before achieving cabin altitudes of close to 29 000 feet. The majority of bends occurred within the first 3.5 hours affecting the knee joints in almost two-thirds of the cases with a tendency to recur at the same joint. Only one case required descent to lower altitude to afford relief from pain.
R 9

32,847
Lisko, E., Crowley, W.J., Jr. & Lewis, J.A. ALTITUDE DECOMPRESSION SICKNESS WITH FOCAL NEUROLOGICAL MANIFESTATIONS. Aerospace Med., March 1967, 38(3), 304-306. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

The appearance of focal neurological signs in altitude decompression sickness lengthens the list of differential diagnoses confronting the flight surgeon. From a group of 37 patients with neurological dysbarism, the 13 patients with focal neurological components were collated in a retrospective study. The authors conclude that there is no unique topological vulnerability in the brain with this disorder but the absence of cortical irritative phenomena and other considerations suggest that the white matter is probably the usual site of the lesions and could account for both the initial and late focal signs.
R 15

32,848
Randolph, C.L., Jr. VALUE OF ROUTINE X-RAY EXAMINATION OF THE ABDOMEN DURING AEROMEDICAL EVALUATION. Aerospace Med., March 1967, 38(3), 307-309. (USAF School of Aerospace Medicine, Aerospace Medical Sciences Div., Brooks AFB, Tex.).

A roentgenogram of the abdomen was obtained on each of 2,132 flying personnel undergoing aeromedical evaluation. Included were 544 men being considered for space pilot selection and other special missions. The remainder were being examined for determination of their fitness for continued flying duties. The abdominal film showed 43 men to have significant, previously undiagnosed abnormalities including one renal carcinoma and one abdominal aortic aneurysm. From considerations of the incidence of abdominal abnormalities with age, and potential radiation induced genetic changes, this study suggests that routine abdominal x-ray examination would have its greatest usefulness in the over 35 age group.
R 9

32,849
Beard, Sarah E., Allen, T.H., McIver, R.G. & Bancroft, R.W. COMPARISON OF HELIUM AND NITROGEN IN PRODUCTION OF BENDS IN SIMULATED ORBITAL FLIGHTS. Aerospace Med., April 1967, 38(4), 331-337. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

Denitrogenation for 4 hours, then decompression from 14.5 to either 7 or 5 psia with exposure of several hours to oxygen and to mixtures of oxygen and a diluent gas, and a further decompression to 3.5 psia in "pure" oxygen together with exercise permits comparison of the effect of diluent gases in evoking flyer's bends. Compared to nitrogen, helium causes symptoms to appear sooner and to affect more men even though peripheral venous blood, in equilibrium with alveolar gas, contains less helium than nitrogen. The results of 334 man-flights suggest application of diffusion theory to formation, as opposed to growth, of bubbles from these gases.
R 19

32,850
Adey, W.R., Kado, R.T. & Walter, D.O. COMPUTER ANALYSIS OF EEG DATA FROM GEMINI FLIGHT GT-7. Aerospace Med., April 1967, 38(4), 345-359. (Brain Research Institute, University of California, Los Angeles, Calif.).

A computed analysis, using digital techniques, was performed on closely spaced samples of 55 hours of EEG (electroencephalograph) data from Astronaut F. Borman, with calculation of auto-spectral and cross-spectral density distributions and coherence functions. Flight data were compared with extensive baseline collections from the same subject in laboratory task performances, in a Gemini flight simulator, and in sleep. Two channels were recorded for the first 29 hours of flight and one thereafter. A detailed analysis of the prelaunch period and first orbit indicated an anticipatory arousal before launch, with changes in power distribution and coherence during the first orbit consistent with strong orienting reactions. Careful assessment of awake flight records throughout the remainder of the 55 hours indicated increased power in the theta band (4 to 7 cycles/sec) by comparison with laboratory and flight simulator data. The genesis of this increased theta rhythm in orienting reactions associated with initial exposure to weightlessness is discussed, and the need emphasized for data gathered at later times in longer flights to elucidate persistent shifts from ground-based norms. Sleep analyses from the first two "nights" in space are presented, with clear evidence of minimal sleep on the first night, and four consecutive normal 90 minute cycles on the second night. The sensitivity of EEG records to changing states of alertness and focused attention is reviewed, and the value of the method, in conjunction with adequate computation, for pilot-astronaut monitoring is emphasized.
R 16

32,851
Graybiel, A., Miller, E.F., II, Billingham, J., Waite, R., et al. VESTIBULAR EXPERIMENTS IN GEMINI FLIGHTS V AND VII. Aerospace Med., April 1967, 38(4), 360-370. (USN Aerospace Medical Institute, NAMC, Pensacola, Fla.).

Two experimental probes were carried out involving the astronauts who were exposed to weightlessness for periods of eight days in GT V and fourteen days in GT VII. One experiment dealt with nonvisual influences which might affect egocentric visual localization of the horizontal. The astronauts' task was to set a dim line of light, in an otherwise dark field, to an external horizontal reference; in weightlessness this reference was the recollection of an element of the spacecraft horizontal with respect to their seat; preflight and postflight it was their recollection of things horizontal with reference to the Earth while they were in a device upright with respect to gravity. The outstanding inflight findings were the small intratest and intertest variances manifested by all of the astronauts and the high degree of accuracy in the settings made by three of the four astronauts. These results suggest that lifting the gravitational load from the otolith organs did not result in any disturbance of central nervous system integrative processes which might have influenced the visually perceived direction of space. Moreover, the combination of removal of otolith modulating effects on tactile and kinesthetic sensory systems and the unusual pattern of agravic pressure and kinesthetic sensory inputs, factors which might be expected to increase variances in settings, did not do so. Whether agravic sensory information of this nature can influence, in a positive manner, the setting of a dim line of light in darkness remains to be demonstrated. The second experiment consisted in the preflight and postflight measurement of ocular counterrolling which depends, for the greater part at least, on a reflex response having its genesis in the otolith apparatus. No significant differences between preflight and postflight [illegible] were demonstrated.
R 33

32,852
Walter, D.O., Kado, R.T., Rhodes, J.M. & Adey, W.R. ELECTROENCEPHALOGRAPHIC BASELINES IN ASTRONAUT CANDIDATES ESTIMATED BY COMPUTATION AND PATTERN RECOGNITION TECHNIQUES. Aerospace Med., April 1967, 38(4), 371-379. (Brain Research Institute, University of California, Los Angeles, Calif.).

Methods used in acquisition and analysis of electrophysiological data from 200 astronaut candidates are described. Data from 50 of these subjects have been intensively analyzed in establishment of baselines covering a wide range of states of wakefulness and sleep. Accurately timed physiological stimuli and perceptual and learning task were presented to all subjects, thus allowing fine comparison between subjects, and establishment of group means for records from each test situation. Spectral analyses were performed by digital methods for each of the 18 scalp EEG channels with leads located according to a modified 10-20 plan. From the primary spectral density parameters, averages and variances were calculated for each scalp location for the whole group of 50 subjects. These averages covered resting conditions, recurrent somatic, auditory and visual stimuli, vigilance tasks, and visual discriminations at different levels of difficulty. Similar analyses were performed on 30 subjects in drowsy and sleep states. In each case, despite wide individual differences between subjects, the group mean and/or pattern of variance in spectral densities for each test condition presented a characteristic pattern. These patterns were consistent with neurophysiological observations on organization of corticosubcortical interrelations and cerebral systems. Recent evidence relating the scalp EEG to intracellular wave phenomena in cortical neurons is reviewed. In continuing studies, automated pattern recognition techniques have been applied to the primary outputs of spectral analysis. Preliminary results presented here from 4 subjects indicate an accuracy exceeding 90 per cent in computed assignment of states of wakefulness, based on 10 to 20 second epochs of data from 4 EEG channels, and evaluation of 78 variables. Coherence measurements were of great importance in these studies. The value of EEG records in flight monitoring is reviewed and the feasibility of on-line computation discussed. R 30

32,853
Sanborn, W.G. & Wortz, E.C. METABOLIC RATES DURING LUNAR GRAVITY SIMULATION. Aerospace Med., April 1967, 38(4), 380-382. (AiResearch Manufacturing Company, Garrett Corporation, Los Angeles, Calif.).

Previous research by Wortz and Prescott had shown lower metabolic rates for walking in a six-degree-of-freedom (D.O.F.) gimbal simulator than in a four D.O.F. vertical suspension simulator. The experiment reported here was to evaluate the effects of walking at simulated 1/6 gravity using the "inclined-plane" technique of Hewes and Spady. The "inclined-plane" simulator is a four D.O.F. simulator. No differences in metabolism were found between the inclined-plane and the "four D.O.F. vertical suspension" simulators for walking rates of 2 mph and 4 mph.
R 6

32,854
Beare, A.C. & Kahn, A. CRITICAL RE-EVALUATION OF THE HUMAN TRANSFER FUNCTION PROBLEM. II. Aerospace Med., April 1967, 38(4), 383-389. (Human Factors Lab., Westinghouse Defense & Space Center, Baltimore, Md.).

A study of compensatory tracking was performed on an analog computer simulation to test the application of the superposition theorem to human tracking performance. Four subjects participated in a 4x4x4x3x3x2 analysis of variance design in which the input variables of frequency, amplitude, stick and scope sensitivity and noise conditions were varied systematically. The performance data of error and stick movement and the ratio of these two measures, i.e., the gain, were subjected to an analysis of variance performed on a digital computer. The results showed that the linearity assumption is not a valid assumption. The variable underlying performance is the average rate of stick motion. Using the rate variable, a transfer function was derived which provides an adequate fit between the empirically derived and the theoretically calculated data. The conclusions show that error increases and gain decreases as a direct function of average rate of stick motion and that the presence of noise has an effect similar to that of increasing the rate.
R 12

32,855
Chisum, Gloria T. & Hill, I.H. FLASHBLINDNESS: THE EFFECTS OF PREFLASH ADAPTION AND PUPIL SIZE. Aerospace Med., April 1967, 38(4), 395-399. (USN Aerospace Medical Research Lab., NADC, Johnsville, Penn.).

A question of considerable operational importance is the extent to which the blinding effect of a flash from a nuclear weapon will vary with the ambient light level. Under conditions of darkness, the size of the pupil and the sensitivity of the eye are maximized. With an increase in the ambient light level both the sensitivity of the eye and the pupil size decrease. Data are presented on the independent effects of pupil size and receptor adaptation level on the production of flashblindness by high intensity, short-duration flashes.
R 7

32,856
Karson, S. SECOND-ORDER FACTORS IN AIR TRAFFIC CONTROL SPECIALISTS. Aerospace Med., April 1967, 38(4), 412-414. (US Office of Aviation Medicine, FAA, Washington, D.C.).

The purpose of this study was to identify the second-order personality factors in a sample of 124 air traffic control specialists in the Federal Aviation Agency. The controllers were tested with the 16 Personality Factor Questionnaire which included a motivational distortion scale for "faking good." The 16 P.F. scores were then intercorrelated by means of Pearson product-moment correlation coefficients to achieve a matrix of intercorrelations. An iterative principal axis factor analysis was accomplished. Nine second-order factors were extracted which were identified as follows: a) Extraversion-versus-Introversion; b) Anxiety-versus-Dynamic Integration; c) Cool Rationality-versus-Affectivity; d) Independence-versus-Subduedness; e) was not identified; f) High-versus-Low Group Conformity; g) Cultured Tact-versus-Spontaneity; h) Frustration-versus-Unbroken Success; i) Obsessive-Compulsiveness. It is believed that these factors will prove useful in studying the personality structure of controllers.
R 10

32,857
Clark, B. THRESHOLDS FOR THE PERCEPTION OF ANGULAR ACCELERATION IN MAN. Aerospace Med., May 1967, 38(5), 443-450. (Ames Research Center, NASA, Moffett Field, Calif.).

This paper reviews 25 studies which report stimulus thresholds for the perception of angular acceleration in man. These reports constitute a miscellany of definitions of threshold, rotation devices, and psychophysical methods. The thresholds reported varied between 0.035° and 8.2°/sec^2 with a median of about 1°/sec^2. The results of the effects of several experimental variables on thresholds are reviewed. The data support the notion that man is extremely sensitive to angular acceleration, particularly under optimum conditions. However, two critical limitations of these studies (i.e., the small number of observers tudied and the lack of direct measures of angular acceleration) and the variation in methodology between studies limit the generalizations from the data.
R 63

32,858
Cramer, R.L. SUBJECTIVE RESPONSES TO OSCILLATION IN YAW. Aerospace Med., May 1967, 38(5), 457-458. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

The sensations of turning elicited by oscillation on the yaw axis are subject to a phase distortion which is dependent upon the frequency of oscillation. Proper training should reduce this source of pilot error.
R 3

32,859
Walker, Jacqueline L.C. PLASMA 17 HYDROXYCORTICOSTEROIDS IN HEALTHY SUBJECTS AFTER WATER IMMERSION OF TWELVE HOURS' DURATION. Aerospace Med., May 1967, 38(5), p.459. (Texas Rehabilitation & Research Institute, Houston, Tex.).

The Plasma 17 hydroxycorticosteroids were measured by the Nelson and Samuels method in six healthy subjects before and after water immersion at 93°F, of twelve hours' duration. The test was repeated several days after the first immersion. There was no significant difference in the concentration of 17 hydroxycorticosteroids in the plasma withdrawn before or after water immersion.
R R

32,860
Vogt, F.B. PLASMA VOLUME AND TILT TABLE RESPONSE TO WATER IMMERSION DECONDITIONING EXPERIMENTS USING EXTREMITY CUFFS. Aerospace Med., May 1967, 38(5), 460-464. (Texas Rehabilitation & Research Institute, Houston, Tex.).

The plasma volume and tilt table response of six healthy adult male subjects was evaluated before and after six periods of water immersion deconditioning. The immersion periods were of 12 hours duration. A Latin Square experimental design was utilized employing six different treatments: a) water immersion, no cuffs, b) water immersion, no cuffs, c) water immersion with arm cuffs, 1-minute-on, 1-minute-off, d) water immersion with arm cuffs, 2-minutes-on, 4-minutes-off, e) water immersion with arm cuffs, 5-minutes-on, 10-minutes-off, and f) water immersion with leg cuffs, 5-minutes-on, 10-minutes-off. The cuffs were inflated to an effective pressure of 60 to 70 mm. Hg. The subjects were immersed in a sitting position, head out, with the water temperature maintained at 93° F. The results of the study indicate that cardiovascular deconditioning occurred during immersion as is evidenced by a decline in plasma volume and in tilt table manifestations of orthostatic intolerance. There was no statistically significant difference in the tilt table response or plasma volume changes for any of the experimental treatment conditions. The results thus indicate that in this group of subjects, under well controlled experimental conditions, a protective effect was not noted with the use of extremity cuffs. The mechanism for the apparent protection afforded by cuffs in other experiments, and not in this study, is not evident.
R 8

32,861
Clark, J.G., Willis , J.D., Hood, W.B., Jr. & Murray, R.H. INITIAL CARDIOVASCULAR RESPONSE TO LOW FREQUENCY WHOLE BODY VIBRATION IN HUMANS AND ANIMALS. Aerospace Med., May 1967, 38 (5), 464-467. (USAF Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio).

Measurements of cardiovascular function were made during the onset of whole body, X-axis sinusoidal vibration in anesthetized conditioned dogs and awake untreated human volunteers. The anesthetized animals showed a drop in mean arterial pressure averaging 27 mm. Hg. An increase in heart rate occurred during the blood pressure drop. Awake humans revealed no drop in mean arterial pressure during this time interval. In addition, four dogs had electromagnetic flow probes placed around the ascending aorta and subjected to whole body, X-axis, sinusoidal vibration. A drop in mean arterial pressure occurred during the onset of vibration but flow was maintained by the increased heart rate suggesting a fall in peripheral vascular resistance. Mechanisms are postulated to explain these findings.
R 16

32,862
Offerhaus, L. & Dejongh, J.C. HOMEOSTATIC REGULATION OF THE CIRCULATION DURING PROLONGED GRAVITATIONAL STRESS (+Gz). Aerospace Med., May 1967, 38(5), 468-475. (National Aeromedical Centre, Soesterberg, The Netherlands).

During quiet standing, upright tilting and prolonged low-level gravitational stress (4Gz) in the human centrifuge, two types of circulatory readjustment may be observed, both of which are probably triggered by insufficient filling of the arterial system. Direct and indirect evidence was obtained that these three forms of gravitational stress are accompanied by increased secretion or release of catecholamines. Total blood volume is readjusted by renal retention of water and sodium. The characteristic pattern of delayed antidiurosis which usually accompanies quiet standing was also observed after the centrifuge experiments. Some of the homeostatic mechanisms which may cause such a pattern are discussed. Both increased secretion of aldosterone and of antidiuretic hormone are probably contributing factors, but neither can explain the complete pattern of antidiuresis. Differences between + 1 Gz (quiet standing and upright tilting) and + 3 Gz were of a quantitative nature only.
R 62

32,863
Jones, W.L., Allen, W.H. & Parker, J.F., Jr. ADVANCED VISION RESEARCH FOR EXTENDED SPACEFLIGHT. Aerospace Med., May 1967, 38(5), 475-478. (Office of Advanced Research & Technology, National Aeronautics & Space Administration, Washington, D.C.).

Extended spaceflight will require that man operate in truly unique visual environments. Visual efficiency in these environments is not completely known. Yet many of the requirements of missions such as Apollo are absolutely dependent on the vision of the astronauts. For this reason, NASA has embarked on a program to provide answers concerning the visual requirements of space missions and the effectiveness with which man will be able to meet these requirements. An initial part of this program involves cataloging data concerning those parameters of the space environment which directly affect vision. Concurrent research projects, at NASA centers and at contractor facilities, are studying the visual tasks to be accomplished during space exploration. This paper describes the NASA research program and presents some recent findings.
R 9

32,864
Conkle, J.P., Mabson, W.E., Adams, J.D., Zeft, H.J., et al. DETAILED STUDY OF CONTAMINANT PRODUCTION IN A SPACE CABIN SIMULATOR AT 760 MM of MERCURY. Aerospace Med., May 1967, 38 (5), 491-499. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

A 27-day experiment designed to determine man's contribution to trace contaminants in a sealed environment was conducted jointly by the United States Air Force and the National Aeronautics and Space Administration. A total of 97 compounds were identified and quantified during the 27 days. Twenty-one compounds were noted only during the manned portion of the study. Direct analysis of the sealed environment was not adequate for this type of comprehensive survey. The use of cryogenic fractionation and concentration, however, did provide samples with sufficient concentration of contaminants for analysis by means of gas chromatography, infrared spectroscopy, and mass spectroscopy. Carbon monoxide was the only compound which was produced by men at such a rate that clearly would require removal in long-term sealed atmospheric system habitation.
R 18

32,865
Burger, E.J., Jr. PULMONARY MECHANICS ASSOCIATED WITH OXYGEN TOXICITY AND A SUGGESTED PHYSIOLOGICAL TEST FOR SUSCEPTIBILITY TO THE EFFECTS OF OXYGEN. Aerospace Med., May 1967, 38(5), 507-513. (Physiology Dept., Harvard School of Public Health, Boston, Mass.).

Five healthy male subjects were exposed to pure oxygen at 0.39, 0.5, 1.0, and 2.0 atmospheres absolute for a three-hour period each. The subjects were admonished not to take deep breaths during the period of exposure. Transpulmonary pressures were measured at known absolute lung volumes following exposure and were compared with air control curves. The results of these measurements and of their relationship to symptoms indicated that absorption atelectasis had occurred in 14 out of 24 trials. Further evidence for this phenomenon was obtained by comparing the results of these experiments with others in which atelectasis had purposely been provoked. A method for the identification and selection of susceptible individuals was suggested. These results were contrasted with apparent direct toxicity of oxygen during an additional, prolonged exposure to oxygen at 2.0 atmospheres.
R 26

32,866
Adams, C.R. & Bulk, G.K. ZERO BUOYANCY:SIMULATION OF WEIGHTLESSNESS TO EVALUATE PSYCHO-PHYSIOLOGICAL AND ANTHROPOMORPHIC PARAMETERS THAT AFFECT SPACE STATION DESIGN. Aerospace Med., May 1967, 38(5), 518-520. (Advance Biotechnology Dept., Douglas Aircraft Company, Inc., Santa Monica, Calif.).

This paper summarizes progress in the use of neutral-buoyancy (water immersion) technique for simulated space crewman performance. A description of some of the psychophysiological, man-machine, and anthropomorphic parameters, as they affect space station design, is presented together with a number of general conclusions about six-degrees-of-freedom motion simulation. The conclusions are based on studies of techniques for locomotion, body orientation, restraint, rescue operations, extra-vehicular activities (EVA), assembly and repair operations, exercise, and so forth. The studies indicate that locomotion can be satisfactorily effected by one- or two-handed translational movements or by one- or two-handed compression-pulsation, but that only very slow translational movements are possible when Velcro tape is used for frictional effect. Various reactive motions which result from applied forces are either greatly reduced or virtually eliminated with the use of simple restraining devices. The studies also show that the orientation of sleeping position (relative to the deck) is unimportant if some form of light, comfortable restraint is used.
R 6

32,867
Howard, P., Ernsting, J., Denison, D.M., Fryer, D.I., et al. EFFECTS OF SIMULATED WEIGHTLESSNESS UPON THE CARDIOVASCULAR SYSTEM. Aerospace Med., June 1967, 38(6), 551-563. (RAF Institute of Aviation Medicine, Farnborough, Hants., England).

The effect upon the cardiovascular system of weightlessness simulated by immersion in brine for six hours were studied in five subjects. Measurements of the blood pressure, heart rate, plasma volume, urine excretion and metabolic gas exchange failed to reveal any abnormality resulting from the immersion. The response to passive tilting to an angle of 70° from the horizontal for twelve minutes was recorded before and after the exposure. No syncopal reactions occurred, and the slight changes in the reactions after immersion could be attributed to other factors. It is postulated that the failure to demonstrate cardiovascular deconditioning was related to the absence of a diuretic response, and that both were the result of essentially normal thoracic pressures. The selection of a reference level for the respiratory system is discussed in relation to the effects of weightlessness upon the peripheral circulation. It is concluded that no entirely satisfactory reference can be defined.
R 16

32,868
Vogt, F.B. TILT TABLE AND PLASMA VOLUME CHANGES WITH SHORT TERM DECONDITIONING EXPERIMENTS. Aerospace Med., June 1967, 38(6), 564-568. (Texas Rehabilitation & Research Institute, Houston, Tex.).

The tilt table response of nine experimental subjects was evaluated before and after short-term periods of deconditioning, including chair rest, bedrest, water immersion, and water immersion with cuffs. Twelve hour deconditioning experiments were conducted utilizing the following eight experimental conditions: a) water immersion, b) water immersion, arm cuffs only, c) water immersion, leg cuffs only, d) water immersion, arm and leg cuffs, e) bedrest, f) chair rest, g) water immersion with leg cuffs the last 4 hours, and h) water immersion with leg cuffs 15 minutes per hour. In water immersion experiments, the subjects were immersed in a sitting position, head out, with a water temperature of 94° F. Cuffs were inflated in cycles, with inflation to 70 mm Hg for 2 of every 6 minutes. The results indicate that definite cardiovascular deconditioning occurred with water immersion, as evidenced in the plasma volume decline and the tilt table response. There was a significant decline in plasma volume during all experimental conditions except chair rest. The results of this study do not indicate a definite protective effect from the use of intermittently inflated extremity cuffs.
R 10

32,869
Calentano, J.T., Barker, P.B., Walton, D.M. & Wright, L.N. FLIGHT RESEARCH PROGRAM: VIII. STUDY OF VIBROPHONOCARDIOGRAPHIC (VPC) TECHNIQUES FOR MONITORING CARDIAC DYNAMICS IN THE FLIGHT ENVIRONMENT. Aerospace Med., June 1967, 38(6), 569-576. (Space & Information Systems Div., North American Aviation, Inc., Downey, Calif.).

This paper reports a series of studies accomplished as part of a program to develop a flight-rated vibrophonocardiograph (VPC). The research began with the implantation of myocardiograph (MCG) strain-gauge sensors on the ventricles of animals to provide an indicator of cardiac mechanical activity that could be used for evaluating vibrophonocardiograph data. The development of a VPC sensor system included correlation studies of simultaneously obtained MCG, VPC, electrocardiogram, and left-ventricular pressure data from animals, plus a comparative evaluation of several VPC systems. Subsequently, data from human subjects were collected with several VPC sensors, using various attachment techniques under a variety of experimental conditions. Electronic filtering of VPC data was employed to determine minimum pass bands permitting identification of isovolumetric contraction and ejection activity. A substudy was also undertaken to define the magnitude of apical beat shift caused by orienting human subjects in various pitch and roll attitudes.
R 53

32,870
McKenzie, J.M. & Florica, V. STRESS RESPONSES OF PILOTS TO SEVERE WEATHER FLYING. Aerospace Med., June 1967, 38(6), 576-580. (US Civil Aeromedical Research Institute, FAA, Oklahoma City, Okla.).

Selected measurements of stress-related and other physiological variables were made on jet aircraft pilots participating in USWB-NSSL turbulent weather programs. Data were gathered from two categories of flying conditions: a) storm penetration flights (Sclwiter type aircraft) and b) storm perimeter flights (Canberra type aircraft). Measurements made before and after each flight included urinary catecholamine levels, urinary electrolyte concentrations, urinary hemoglobin levels and body weight. Results indicate a direct relationship between catecholamine output during the penetration flights and the pilots' evaluation of the turbulence encountered. Increased output of catecholamines also corresponded to unusual in-flight experiences during storm penetrations. No relationship between catecholamine output and instrumentally measured turbulence was detected in the Canberra aircraft. Our data indicate that turbulence effects on sympathoadrenal responses are dependent upon the pilot's evaluation of the turbulence. Stress responses to severe weather flying may be related to the pilot's previous experience and other factors which affect his assessment of the storm.
R 9

32,871
Lewis, C.E., Jr., Jones, W.L., Jr., Austin, F. & Roman, J. FLIGHT RESEARCH PROGRAM: IX. MEDICAL MONITORING OF CARRIER PILOTS IN COMBAT--II. Aerospace Med., June 1967, 38(6), 581-592. (Flight Research Center, NASA, Edwards AFB, Calif.).

Cardiorespiratory functioning in flight was monitored on Naval aviators flying bombing missions against heavily defended targets in North Viet Nam. Thirty-one missions suitable for data analysis were obtained. Continuous records of electrocardiogram, respiratory rate, acceleration and voice were recorded in flight. Both day and night missions were monitored. The pilots studied were of an unusually high experience level, averaging 1,952 total flying hours and 104 combat missions per man. The overall combat heart rate was 94.9 beats per minute. Overall bombing heart rate was 112.3 beats per minute, including day and night bombing, frequently in bad weather. Overall respiratory rate was 22.9 breaths per minute. In a comparison study on Marine reserve pilots, gravitational stress was determined to be of importance in elevating the bombing heart rate observed in this combat study. The stresses of combat flying, particularly the element of risk, is clearly shown to be ineffectual in evoking cardiovascular response in the group studied.
R 10

32,872
Austin, F.H., Jr., Gallagher, T.J., Bricteon, C.A., Polls, B.D., et al. AEROMEDICAL MONITORING OF NAVAL AVIATORS DURING AIRCRAFT CARRIER COMBAT OPERATION. Aerospace Med., June 1967, 38(6), 593-596. (USN Bureau of Medicine & Surgery, Department of the Navy, Washington, D.C.).

A team of Navy and NASA personnel monitored Navy carrier pilots flying high-risk attack combat missions in North Viet Nam during a 22-day line period near the end of a seven-month deployment. During the first 10 days, electrocardiogram, respiration and acceleration were recorded in flight on 32 pilots. Samples of pre- and post-flight blood and urine were collected for biochemical analysis for stress hormones and other fractions. Landing performance was recorded from radar tracking of carrier approaches. Results of the cardiorespiratory response is reported in a separate paper. The phosphatidyl glycerol fraction of the plasma phospholipids became elevated during the combat period, as did the phosphatidic acid, while the cardiolipin level remained relatively constant. These changes plotted against time in combat indicated a characteristic biochemical response pattern for combat flying stress. Statistical analysis of the designated phospholipid components showed significant concentration changes in the combat pilots in contrast to that previously found in other stress states and in normal controls. Analysis of the landing data of the monitored pilots showed a mean performance for the group which compared closely to the performance of pilots flying similar aircraft (A4E).
R 15

32,873
Marshall, J.E. & Brown, J.H. VISUAL-AROUSAL INTERACTION AND SPECIFICITY OF NYSTAGMIC HABITUATION. Aerospace Med., June 1967, 38(6), 597-599. (USA Medical Research Lab., Fort Knox, Ky.).

Forty male subjects with no previous exposure to precise constant angular acceleration received 13 positive accelerations of 24°/sec². Vision was permitted for all subjects on pre- and post-test criterion trials. Twenty subjects received concomitant visual stimulation with an illuminated visual field during ten habituating trials. The remainder were habituated in complete darkness. Habituation acquired in darkness did not transfer to criterion trials with vision. Darkness habituated subjects showed a significant slow-phase increment when tested with vision following task-controlled arousal level increase. Subjects habituated with vision showed a continued output decline when tested under similar conditions.
R 15

32,875
Robertson, W.G. Quigley, D.G. & McRae, G.L. EFFECT OF EXERCISE ON OXYGEN CONSUMPTION AT DECREASED PRESSURE. Aerospace Med., June 1967, 38(6), 617-619. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

Seven healthy young men were exercised on a treadmill at 3.4 mph, 0 per cent incline; and at 3.4 mph, 10 per cent incline at sea level (approximately 747 mm Hg) and 27,000 feet (258 mm Hg). Oxygen consumption, carbon dioxide output, and heart rate were measured. Studies were made with air, 31 per cent oxygen in nitrogen, pure oxygen at ground level, and pure oxygen at altitude. The 31 per cent oxygen-69 per cent nitrogen mixture at ground level and pure oxygen at altitude yielded the same alveolar oxygen tension (171 mm Hg). This allowed the study of the effect of a pressure change at the same alveolar oxygen tension. Oxygen consumption and heart rate were found to be constant after 3 minutes of exercise. Oxygen consumption values are reported for the average of 2 minutes for the fourth to sixth minute of exercise. No significant differences were noted in oxygen consumption, carbon dioxide output, or heart rate within any workload with gas mixtures or altitude. It is concluded that altitude has no effect on oxygen consumption with work and that ground-level studies can be used to determine logistic requirements at reduced pressure.
R 13

32,876
Tucker, G.J. PSYCHOMOTOR ADAPTION TO FLIGHT. Aerospace Med., June 1967, 38(6), 620-623. (Psychiatry Dept., Yale University School of Medicine, New Haven, Conn.).

In this report the attempt has been made to outline the problems of psychomotor adaption to the aerospace and the anxiety associated with it. Aviators with these problems manifest the following symptoms: a) a feeling of discomfort when in control of the aircraft, b) a lack of "feel" for the airplane and being constantly "behind" it, c) little satisfaction from the flying experience, d) difficulty in maintaining geographic and spatial orientation and e) good flight performance with increasing anxiety in learning new tasks in flying. These findings are validated both clinically and in a large number of patients who drop from flight training at their own request. The delineation of these symptoms allows for more exact evaluation of flying personnel, particularly those in training.
A 5

32,877
Enders, L.J. AORTIC INSUFFICIENCY IN FLYING PERSONNEL. Aerospace Med., June 1967, 38(6), 623-628. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

Forty-eight cases of aortic insufficiency in experienced pilots have been evaluated by the Aeromedical Consultation Service within the past ten years. More recently, the use of the centrifuge and aircraft to evaluate the hemodynamic significance of this disease has enabled crew members to return to duty in spite of their diagnosis. Minimal aortic insufficiency without evidence of progression, followed over a period of time can be compatible with sustained excellent health for a period of many years. Indeed, individuals with known aortic insufficiency can and have been athletic champions, indicating the presence of valvular disease does not always significantly impair the functional capacity of the cardiovascular system. In-flight studies indicate that minimal aortic regurgitation may have no significant influence on the blood pressure response and tolerance to acceleration and therefore should not preclude selected patients from being returned to unrestricted flying duties.
R 11

32,878
Melton, C.E., Higgins, E.A., Saldivar, J.T. & Wicks, S.Marlene. EXPOSURE OF MEN TO INTERMITTENT PHOTIC STIMULATION UNDER SIMULATED IFR CONDITIONS. Aerospace Med., June 1967, 38(6), 631-634 (US Civil Aeromedical Institute, FAA, Oklahoma City, Okla.).

Ten men were subjected to intermittent photic stimulation in an airplane cockpit in an environmental chamber. By a) a Grimes red rotating beacon (1.5 flashes per second), b) an Air Guard strobe light (1.0 flashes per second) and c) propeller flicker (10 flashes per second). IFR conditions were simulated by passing steam into the cooled chamber. Electroencephalograms and electro-oculograms were recorded for the 10 minute period prior to photic stimulation, during 10 minutes of photic stimulation, and for 10 minutes after stimulation. None of the lights provoked seizure, syncope, nystagmus or photic driving. The strobe light evoked complaints of irritation from 7 of the subjects and caused pacing of the alpha rhythm together with pulsating pupils. Three subjects became drowsy during the Grimes light, six became drowsy during propeller flicker, none complained of drowsiness during the strobe light. These sources of intermittent light appear to be innocuous to normal people. The commonest complaint was annoyance. Drowsiness was probably due to the environment and nature of the task.
A 22

32,879
Gibbons, L.V. BODY TEMPERATURE MONITORING IN THE EXTERNAL AUDITORY MEATUS. Aerospace Med., July 1967, 38(7), 671-675. (Aerospace Medicine Dept., McDonnell Company, St. Louis, Mo.).

The external auditory meatus was studied as a potential location for body temperature monitoring of spacecraft crews in both pre-flight and in-flight testing. A thermistor embedded in a rubber plug which was "custom" fitted to the test subjects' external meatus was evaluated as a sensor. Sublingual temperatures were simultaneously recorded as a reference. Analyses of the data showed a significant correlation between oral and aural temperatures ($r = 0.75$, $P < 0.001$), and indicated that the device and method were highly suited to the intended purpose. Throughout the study, aural temperatures were consistently lower than sublingual temperatures, and the differential appeared to be dependent upon the position of the ear thermistor relative to the tympanic membrane. Response time differential was never greater than two minutes. The device and method may have some general application outside the aerospace industry.
A 9

32,880
Kissen, A.T. & McGuire, D.W. NEW APPROACH FOR ON-LINE, CONTINUOUS DETERMINATION OF OXYGEN CONSUMPTION IN HUMAN SUBJECTS. Aerospace Med., July 1967, 38(7), 686-689. (USAF Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio).

A new approach providing electronic, on-line oxygen consumption determinations is presented. A polarographic sensor generates current directly proportional to exhaled pO_2 value. The wet gas flowmeter voltage output varies linearly with mass flow of exhaled air. Electrical signals, thus provided were amplified, multiplied and integrated electronically. The primary output is a scale factor representing consumed oxygen. Expired air samples, simultaneously collected in a gasometer, were analyzed by gas chromatography. Oxygen consumption values (200-2400 cc O_2/min) obtained from 31 subjects (132 observations) during rest and after exercise produced a sample correlation coefficient of 0.993 (95 per cent confidence interval 0.990, 0.995). Subjects enjoy virtually unrestrained mobility in that attachment to monitoring equipment is limited to electrical leads. Personnel support requirements and errors, associated with conventional procedures, are significantly reduced. The compact nature of the device permits application in almost any experiment design situation including pressurized suits and underwater studies.
R 7

32,881
Wynston, L.K., Perkins, D.L., Strelnar, I. & Johnson, S.P. APPLICABILITY OF CERTAIN BIOCHEMICAL TECHNIQUES TO CALCIUM MANAGEMENT IN SPACE SYSTEMS: AN EXPERIMENTAL STUDY OF BLOOD SERUM CALCIUM. Aerospace Med., July 1967, 38(7), 690-694. (Life Sciences Dept., North American Aviation, Inc., Downey, Calif.).

A search for an agent which could lower serum calcium levels, reduce calcium excretion and possibly prevent decalcification of bones has been initiated. A protein preparation obtained from bovine parotid glands, parotin, has been extensively investigated, and it is concluded that this substance has little or no significant action in bringing about a decrease in calcium levels in several species of experimental animals. The claimed biological activities for parotin have not been substantiated as a hormonal effect, but may be explained on the basis of stress reactions in the test animal. Parotin obtained from pooled human saliva was also shown to be ineffective in lowering serum calcium levels. A rabbit serum calcium lowering factor from the pituitary, obtained as a side fraction in corticotropin preparation, apparently is inactive in other species and would appear to be of little value in preventing disuse osteoporosis in humans.
R 13

32,882
Vogt, F.B. & Johnson, P.C. EFFECTIVENESS OF EXTREMITY CUFFS OR LEOTARDS IN PREVENTING OR CONTROLLING THE CARDIOVASCULAR DECONDITIONING OF BEDREST. Aerospace Med., July 1967, 38(7), 702-707. (Texas Rehabilitation & Research Institute, Houston, Tex. & Texas Medical Center, Houston, Tex.).

Six young healthy adult male subjects were studied during three 14-day periods of bedrest with the experimental conditions of bedrest, bedrest with armcuffs, and bedrest with arm cuffs and leg cuffs. The inflation-deflation cycle for the extremity cuffs was 2-minutes-on, 4-minutes-off, with an inflation pressure of 70 mm. Hg. Tilt table and plasma volume studies were performed on the subjects before and after each 14-day period of deconditioning. The tilt procedure consisted of two consecutive tilts performed on each subject before and after bedrest, with the subject wearing leotards for the first tilt followed by a tilt without the use of leotards. The use of extremity cuffs was confined to the period of deconditioning only. The studies indicate that after deconditioning has occurred, the use of leotards on the subjects provides a protective effect against the tilt table manifestations of cardiovascular deconditioning. A significant protection was not observed with the use of intermittently inflated extremity cuffs during bedrest.
R 11

32,883
Wynveen, R.A. & Montgomery, K.M. AN EXPERIMENTAL OXYGEN CONCENTRATING SYSTEM. Aerospace Med., July 1967, 38(7), 712-718. (USAF Flight Dynamics Lab., Wright-Patterson AFB, Ohio).

Breathing O_2 for aviators is provided by supplying sufficient O_2 for each flight prior to take-off. Simplification of these logistics seems possible using an O_2 concentrating technique that extracts oxygen directly from ambient air at the time and place it is needed. An experimental model of the device and test rig to characterize its performance over a range of conditions was designed, tested and delivered to the Air Force. The model consisted of 26 electrochemical cells electrically connected in series. Each cell was composed of two porous metal electrodes separated by an aqueous KOH electrolyte held in a porous matrix. The test rig included the system accessories and instrumentation. The accessories were those components necessary to allow for continuous concentrator operation. The instrumentation included those devices to monitor and regulate the operating parameters and to measure the performance of the concentrator as a function of changes made in the operating parameters. The unit was operated at an average output of 0.22 lb./hr., with a 0.6 lb./hr. over capacity capability. Operation was demonstrated over a range of ambient air pressures, including pressures to 6.5 psia. The percentage of O_2 removed from the air passing through the device ranged from 20 to 80 per cent. The O_2 purity was shown to exceed 99.5 per cent. The results demonstrated the concept has the features necessary for on-board generation of aviator's breathing O_2.
R 1

32,884
French, B.O. APPRAISAL OF APOLLO LAUNCH NOISE. Aerospace Med., July 1967, 38(7), 719-722. (Manned Spacecraft Center, NASA, Houston, Tex.).

This study describes a noise program completed at the National Aeronautics and Space Administration Manned Spacecraft Center to assure that the Apollo mission launch noise would not be detrimental to the crew. A preliminary appraisal of the predicted noise environment indicated that the physiological effects of low-frequency noise had to be investigated and that the noise environment the crew would experience had to be carefully defined. Studies were initiated to define the external and internal environment during development missions; to define the noise reduction of the spacecraft, helmet, and space suit; and to investigate the physiological effects and performance impairment when human subjects were exposed to low-frequency (below 100 cycles per second) acoustic environments. The results of the study indicate that the noise generated during launch will not adversely affect the Apollo crew.
A 14

32,885
Hunt, N.C., III. POSITIVE PRESSURE BREATHING DURING WATER IMMERSION. Aerospace Med., July 1967, 38(7), 731-735. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

Continuous positive pressure breathing was applied to twelve healthy USAF volunteers during water immersion, in an attempt to overcome the diuresis and tilt table intolerance associated with immersion. During the six-hour treatment period the subjects reclined in a deck chair, immersed to neck level in water, and breathed a continuous 20 cm. H_2O positive pressure. The resultant urine composition and tilt table tolerance were compared to that associated with six hours: a) immersed, and b) non-immersed in the same position and without positive pressure. The use of positive pressure respiration inhibited the diuresis associated with water immersion; this inhibition applied to both non-solute obligated water and excretion of sodium slats. Tilt table tolerance following positive pressure surpassed that seen in the non-immersed control. It was concluded that the diuresis was inhibited by the action of positive pressure respiration on volume receptor sites. - Possible mechanisms for tilt table protection are discussed.
A 26

32,886
Lane, J.C. FREQUENCY OF EXAMINATIONS FOR AIRLINE PILOTS. Aerospace Med., July 1967, 38(7), 736-739. (Department of Civil Aviation, Melbourne, Australia).

The conventional six-month interval between medical examinations for airline pilots is unusually short for such recurrent examinations. The effect on safety of increasing the interval to twelve months is investigated by reviewing cases of medical disqualification and sudden death of Australian airline pilots for the period September 1953 to June 1965. In 38 of 52 pilots, the medical condition came to notice during the currency of the license, between examinations, and in nine others the sequence of events would have been unaffected by halving the examination. In the remaining five the train of events would probably have been the same. In 12 of 13 relatively sudden deaths the condition had not been detected at medical examinations. It is concluded that, at least when the aviation authority is able to maintain long term records, safety is unlikely to be influenced by a change in examination frequency from 6-monthly to annually.
A 2

32,887
Diamond, S. MEDICAL COMPLICATIONS OF CONTACT LENSES AND THEIR AEROMEDICAL IMPLICATIONS. Aerospace Med., July 1967, 38(7), 739-741.

The aviation medical examiner should be familiar with the many diverse types of contact lens complications which may occur, and cognizant of their aeromedical implications. Continuing objective research studies concerning ways and means of minimizing or eliminating these complications should be made to keep experienced pilots flying and to promote air safety in pilot contact lens wearers.
A 5

32,888
Muena, D.R. ADAPTATION OF THE ORDINARY TAPE RECORDER FOR ROUTINE AUDITORY SCREENING OF CIVIL AVIATION PERSONNEL. Aerospace Med., July 1967, 38(7), 749-751. (School of Medicine & Dentistry, Rochester, N.Y.).

Present requirements of the FAA (Federal Aviation Agency) permit auditory testing using whispered voice at a specified distance, with an audiogram necessary only if there is evidence of substandard hearing. The author's experience is similar to the observation of others that the whispered voice test is not only inaccurate and inconsistent, but also irreproducible. The widespread use and popularity of tape recorders at the present time has made possible the mass production and the consequent low cost of these items. The most inexpensive tape recorders have a frequency response of at least 200-4000 cycles per second and are suitable for use in speech reception threshold testing utilizing stereo headphones and spondee words. For an outlay of 15 to 25 dollars, for headphones and accessories, any ordinary monophonic or stereophonic tape recorder can be converted to a self-explanatory speech reception threshold tester which may be administered by medical assistants with accuracy and reproducibility. The subject is asked to repeat spondee words, the intensity of which is modulated directly by the prerecorded tape input and consequently no adjustment at all is necessary by the person administering the test. Standardization may easily be made by a physician utilizing a subject whose hearing has been recently assessed as normal by a pure tone audiometer. The procedure has widespread application in the field of auditory screening in routine civil aviation medical examinations without large financial investment. In addition an accurate and reproducible evaluation of the subjects auditory prowess can be easily and quickly determined by medical assistants.
A 7

32,889
Catlett, C.F., Kidera, G.J. & Smith, J.E. EFFECTS OF GLUCOSE LOADING ON THE ELECTROCARDIOGRAM OF PILOT APPLICANTS. Aerospace Med., Aug. 1967, 38(8), 779-779. (Medical Dept., United Air Lines, Chicago, Ill.).

The use of a glucose challenge test to screen pilot applicants for latent diabetes is now widely practiced in commercial aviation medicine. Several reports have indicated however, that heavy carbohydrate loading can produce factitious abnormalities in the electrocardiogram of persons without heart disease while other reports have suggested that such loading demonstrate occult heart disease. To evaluate the relevance of these facts to pilot selection examinations, a series of 220 pilot applicants, all below thirty-three years of age and without demonstrable heart disease, were studied before and after the ingestion of glucose. In none of the cases studied were electrocardiographic changes produced which could be interpreted as abnormal, although a measurable variation in the voltage of the T-wave and S-T segment was noted in nearly all cases. From these results it was concluded that the ingestion of a diagnostic dose of carbohydrate for a glucose challenge test has no significant effect upon the electrocardiographic patterns of healthy young men and there is no contraindication to performing simultaneous carbohydrate tolerance studies and electrocardiographic evaluations in pilot applicant physical examinations.
R 17

32,890
Snyder, [illegible] & Snow, C.C. FATAL INJURIES RESULTING FROM EXTREME WATER IMPACT. Aerospace Med., Aug. [illegible], 38(8), 779-783. (Automotive Safety Research Office, Ford Motor Company, Dearborn, Mich. & FAA Civil Aeromedical Research Institute, FAA, Oklahoma City, Okla.).

Increased overwater flights have resulted in an increase in both military ejections and civil crash landings in water. Of 78 general aviation water accidents occurring last year. The objective of this study was to determine mechanisms of gross trauma in non-penetrating fatal water impacts. [illegible] analysis of necropsy data on 169 fatal (52 female, 117 male) jumps from a tandem drop bridge. Impact velocities ranged from 106-112 ft/sec (32.31-34.13 m/sec) and body orientation was mainly transverse (± Gx) or lateral (± Gy). The most common mechanism of injury was crushing of the thoracic cage with resultant bilateral rib fractures and penetration of the vital organs (85.2 per cent). Lung lacerations, ruptured [illegible], brain injury, and drowning were most frequent. In 17 cases, no skeletal fractures were found. Eight individuals apparently relatively uninjured by the impact (± Gx) subsequently drowned. These data reinforce previous work indicating human tolerance in water impact close to the [illegible] m/sec velocity, and that body orientation is critical. Additional protection in the transverse or lateral impact must be considered for increased survivability.
R 14

32,[illegible]
Sion[illegible] A.J., Jr., Hearld, A.B., London, S.A., et al. POTABLE WATER STANDARDS FOR [illegible] 67. Aerospace Med., Aug. 1967, 38(8), 789-799. (USAF Aerospace Medical Div., Aerospace Medical Div., Wright-Patterson AFB, Ohio).

Many different types of engineering devices to produce water from human waste, chamber atmosphere and [illegible] hydrogen fuel cells have been developed over the past decade. Such diversified techniques have resulted in water varying greatly in quality from one technique to another, between units of the same process, and within the same unit from day to day. Thus, potable water standards were developed for guidance to a) qualify all water producing techniques prior to evaluation for aerospace systems and b) ascertain the safety of the water for human consumption. Development of these engineering guidelines has been based on several criteria, including the results of over 300 laboratory analyses of aerospace water systems. The recommended standards are divided into two parts. The first deals with qualification of the technique and is subdivided into general requirements (performance goals) and specific requirements (limits of acceptability). The second part consists of procedures for monitoring the water from qualified units for potability.
R 34

32,892
Hartman, B.O. & Cantrell, G.K. SUSTAINED PILOT PERFORMANCE REQUIRES MORE THAN SKILL. Aerospace Med., Aug. 1967, 38(8), 801-803. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

The impact of factors such as management, job satisfaction and workload was clearly demonstrated in retrospect during World War II. A study of crew workload in the C-141 provided data which could be used to study living and working schedules during extended missions. A model mission was empirically derived and demonstrated major disruptions in the daily patterns of eating, sleeping and working. Situational factors associated with flying through several time zones appeared to have a primary effect. Actual reports from the field supported these findings. While it is reasonable to hypothesize that these and similar factors should reduce the aircrewman's physical and psychological fitness for sustained flying proficiency during demanding missions, the crucial studies remain to be done.
R 1

32,893
Streimer, I., Turner, D.P.W. & Volkmer, K. EXPERIMENTAL STUDY OF PERFORMANCE CHARACTERISTICS IN A ZERO POTENTIAL ENERGY MANUAL TASK. Aerospace Med., Aug. 1967, 38(8), 804-807. (Space & Information Systems Div., North American Aviation, Inc., Los Angeles, Calif.).

The findings and implications of experimental data obtained during the investigation of a flexion-extension (sawing) type task are discussed. Experimental equipment was designed with extremely low friction so as to capitalize upon the absence of potential energy similar to that of zero gravity where a fixed-rear loose-object relationship could be duplicated. The comparative differences of work output characteristics of efficiency, rate, and total capacity attributable to the absence or presence of potential energy are discussed. The implications defining the maximum capabilities and minimum requirements of an operator performing this specific task are presented.
R 47

32,894
Lastnik, A.L. CRASH AND BALLISTIC PROTECTIVE FLIGHT HELMET. Aerospace Med., Aug. 1967, 38(8), 808-811. (USA Natick Labs., Natick, Mass.).

The U.S. Army Natick Laboratories has developed a helmet to upgrade head protection for Army aviators. This helmet exhibits greater impact energy-dissipating characteristics than other military helmets and also provides resistance to penetration by ballistic fragments. While the Army's new helmet has the same configuration as the Navy's APH-6 and Air Force HGU-2A/P helmets, increased protection is achieved by making its shell of laminated nylon fabric instead of laminated glass cloth. Impact energy attenuation is further increased by lining the shell with 1/2-inch thick, four-pound density, expanded polystyrene plastic. Subjected to two successive impacts of 169 foot-pounds in the same area, there was no evidence of bottoming, nor were accelerative forces in excess of 300 G's measured on an instrumented headform. Duration of impacts was not less than 6.0 milliseconds. The glass cloth helmet impacted with only 100 foot-pounds imparted 300 and 600 G's, with duration of impacts not exceeding 4.0 milliseconds.
R 8

32,895
Hills, B.A. DECOMPRESSION SICKNESS: A STUDY OF CAVITATION AT THE LIQUID-LIQUID INTERFACE. Aerospace Med., Aug. 1967, 38(8), 814-817. (Chemical Engineering Dept., University of Adelaide, Adelaide, Australia).

Cavitation by decompression has been studied at various interfaces between hydrophobic liquids and aqueous fluids. The parameters investigated include temperature, extent of decompression, gas solubility, dispersion of the liquids and the thermodynamic properties of the relevant phase boundaries. Results indicate random nucleation and no significant metastable limit to the supersaturation of the interfaces by gas. The preferential separation of the gas phase at such sites is discussed in relation to decompression sickness and the optimal deployment of decompression time according to an equilibrium criterion.
R 12

32,896
Teng, P.C. & Rosenstein, R. INFLUENCE OF ALCOHOL AND DRAMAMINE, ALONE AND IN COMBINATION, ON PSYCHOMOTOR PERFORMANCE. Aerospace Med., Aug. 1967, 38(8), 818-821. (USN Aerospace Medical Institute, NAMC, Pensacola, Fla.).

The effect of alcohol and Dramamine, alone and in combination, on the performance of four young adult subjects on the Scow Complex Coordinator was studied in a series of eight experiments. Alcohol alone produced a 12.5% decrease in performance when the blood alcohol level was between 44 mg% and 50 mg%. When the blood alcohol decreased to the 35 mg% level, the performance decrement became insignificant. Dramamine alone in dosage of 100 mg per person produced relatively insignificant performance decreases (max. 6%). The combination of alcohol with Dramamine produced much larger performance decrements. During the first three hours following ingestion of Dramamine and alcohol, the performance decrements were 8%, 25%, and 9%, respectively, when the blood alcohol levels were 50 mg%, 44 mg%, and 34 mg%. Reasons for not recommending a maximum permissible alcohol level for airmen are discussed.
R 6

32,897
Mader, P.P. & Hills, E.S. CONTAMINANT CONTROL IN SPACE CABINS: APPROACH AND RESULTS. Aerospace Med., Aug. 1967, 38(8), 822-825. (Advance Biotechnology Dept., Douglas Aircraft Company, Santa Monica, Calif.).

A procedure for the systematic screening of materials and supplies intended for use inside space cabins is described in this paper. All outgassing experiments were conducted at 120°F., and the significance of the test temperature is discussed. Some of the data obtained in this survey with paints, insulation materials, and so forth, are reported. During the manned operation of the Douglas space cabin simulator, the atmosphere was tested in regular intervals for the accumulation of toxic compounds. Gas chromatographic, infrared, and wet chemical analyses were performed. It was frequently possible to observe the appearance of new contaminants and to pinpoint their sources so that remedial action could be taken.
R 4

32,898
Furry, D.E., Reeves, Elizabeth & Beckman, E. RELATIONSHIP OF SCUBA DIVING TO THE DEVELOPMENT OF AVIATORS' DECOMPRESSION SICKNESS. Aerospace Med., Aug. 1967, 38(8), 825-826. (USN Medical Research Institute, National Naval Medical Center, Bethesda, Md.).

The additional decrease in ambient pressure which occurs when a compressed air diver flies in an aircraft within a short time after diving may be sufficient to precipitate decompression sickness, even though the dive itself was in accordance with the U.S. Navy decompression tables. The current practice by both military and civilian divers of using air transportation after compressed air diving suggests the need for specific instructions regarding the decompression required before flying after diving. In order to quantitate the importance of this problem, an experiment was designed in which large dogs were exposed to compressed air for 7 hours at the "no-bends" pressure threshold as determined after the method of Reeves and Beckman. After pressurization, the animals were decompressed within 2-3 minutes to sea level. A sea level decompression interval of 1, 3, 6, or 12 hours was given prior to further decompression to a simulated altitude of 10,000 feet. The incidence of decompression sickness at altitude was 92.9 per cent for the 1 hour surface decompression interval, 30 per cent for the 3 hour interval, 27.8 per cent for the 6 hour interval and 0 per cent for the 12 hour interval. From these large animal studies it may be postulated that a surface decompression interval of at least 12 hours should be allowed before flying after compressed air diving of a depth and duration to require the use of diving tables.
R 14

32,900
Greenwald, A.J. & Melver, R.G. CABIN PRESSURIZATION CHARACTERISTICS OF USAF AND COMMERCIAL TRANSPORT AIRCRAFT. Aerospace Med., Aug. 1967, 38(8), 834-837. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

A reference list containing cabin pressurization characteristics of USAF and of several commercial transport aircraft has been compiled. It is anticipated that this list will be of value to physicians confronted with the necessity of transporting patients by air. Special emphasis has been given to the entity of decompression sickness. Personnel engaged in research and development related to problems of cabin pressurization and pressure suits should also find such a list of value.
R 20

32,901
Deane, F.R., Wood, C.D. & Greybiel, A. EFFECT OF DRUGS IN ALTERING SUSCEPTIBILITY TO MOTION SICKNESS IN AEROBATICS AND THE SLOW ROTATION ROOM. Aerospace Med., Aug. 1967, 38(8), 842-845. (USN Aerospace Medical Institute, NAMC, Pensacola, Fla.).

Seven exemplary antimotion sickness drugs and three "individually treated" placebos were investigated in ten men during twenty-four aerobatic maneuvers in an AIE "Skyraider" aircraft and in performance of the Pensacola Slow Rotation Room Dial Test. The rank order of drug effectiveness and of subject susceptibility under each condition was determined and compared. Individual difference in drug effectiveness was significant at the .01 level or better and was similar under the two conditions. Susceptibility to motion sickness in the SRR (Slow Rotation Room) was generally a good predictor of susceptibility in aerobatics in eight subjects, but in the remaining two it was grossly in error. A combination of scopolamine and d-amphetamine was by far the most effective of the drugs tested.
R 12

32,902
Crowley, W.J., Jr. & Liske, E. FOURTEEN AND SIX PER SECOND POSITIVE SPIKING--AN EEG FINDING IN SOME AIRCREW PERSONNEL. Aerospace Med., Aug. 1967, 38(8), 851-855. (USAF School of Aerospace Medicine, Brooks AFB, Tex.).

Opinion concerning the 14 and 6 per second positive spike phenomenon in some human electroencephalograms varies among clinicians. To obtain information about this phenomenon in flyers, a retrospective study of USAFSAM EEGs was made. Normal subjects (1,279) and medical referrals (4,115) revealed virtually the same incidence of this finding. Clinical correlations were weak for loss of consciousness, headache, abdominal complaints and character disorder. Correlation was very strong for drowsiness at the time of recording and suggests that 14 and 6 per second positive spiking may be a normal variant of sleep EEG patterns. Our data cannot support the policy of removing a pilot from flying status on the sole basis of 14 and 6 per second positive spiking in his electroencephalogram.
R 18

32,903
Tucker, G.J. & Reinhardt, R.F. AIRSICKNESS AND ANXIETY. Aerospace Med., Aug. 1967, 38(8), 855-858. (Psychiatry Dept., Yale University School of Medicine, New Haven, Conn. & USN Aerospace Medical Institute, NAMC, Pensacola, Fla.).

During a two-month period all Naval flight students (N=149) undergoing primary flight instruction filled out a detailed questionnaire immediately after their fifth flight. Seventy-two of these students, randomly selected, were studied more intensively, in that: a) their flight instructor also filled out a questionnaire after the fifth flight and, b) this group was surveyed again at the completion of primary training. The airsick group differed significantly from the non-airsick ($P = <.05$, correlation coefficient) in the following subjective areas: a) feeling more nervous, b) more autonomic symptoms, c) lower motivation, and d) found instructors less likable. The airsick group had a significantly higher attrition rate, 21 per cent ($P = <.05$, χ^2). The airsick group still experienced more anxiety at the completion of primary training. The data represent the first large scale correlation of airsickness in early flight training with subjective anxiety, and, as such, there are many theoretical and practical implications.
R 9

32,905
Joy, R.J.T. HEAT STRESS IN ARMY PILOTS FLYING COMBAT MISSIONS IN THE MOHAWK AIRCRAFT IN VIETNAM. Aerospace Med., Sept. 1967, 38(9), 895-900. (USA Medical Research Team (WRAIR), Vietnam).

The OV-1 (Mohawk) is a two place, twin engine, fast and maneuverable aircraft used for reconnaissance missions. Following reports of heat stress in Mohawk crews in June 1966 in Vietnam, 17 missions and 24 subjects were studied for water losses; in 7 of these missions 7 pilots and the investigator also had rectal and skin temperature measured during flight. Ground and cockpit WBGT's were measured. Low level visual reconnaissance flights during the day were found to be the most stressful, with water losses (sweat) of 405 ml/hr. man, while rectal and skin temperatures and heat gains were well compensated by the high sweat rates. An average of 82 kcal/hr. man of transient heat gain was acquired from the environment, and an average of 709 kcal/hr. man of heat was contributed to the cockpit environment. Evening and night missions were found to cause modest dehydration. It did not appear that the air crews were subjected to an uncompensable heat strain. These data are nearly identical to those secured by Adolph in 1944 in simulated tactical situations. At least for the variables measured, actual combat circumstances did not appear to cause additional physiological strain. In-flight water drinking, cockpit ventilation, and lighter clothing were recommended to reduce air crew discomfort and restore homeostatic conditions. These suggestions were implemented by command and appear to have alleviated the problem.
R 8

32,906
Chubb, R.H., Braue, G.C. & Shannon, R.H. EJECTION CAPABILITY VERSUS THE DECISION TO EJECT, Aerospace Med., Sept. 1967, 38(9), 900-904. (USAF Life Sciences Div., Norton AFB, Calif.).

Recent changes in ejection equipment installed in some USAF aircraft have improved the low altitude capability of the system to the extent that ejection from the runway is possible. Experience has shown that the advent of such improved systems leads to an increase in the number of low altitude ejections as compared to the total number of ejections. Even with the better systems, the fatality rate is higher at extremely low altitude than at higher altitude, largely as a result of unfavorable aircraft altitude or sink rate. This leads to the paradoxical situation in which the best systems have the worst overall success rate. If having a better system encourages pilots to attempt escape from situations in which they previously had no hope of escape, this is considered good. If having a better system encourages them to delay ejection, the overall effect is bad. This paper presents statistics relative to this problem and discusses the relative importance of these two factors, as well as other possible reasons for the observed effect of improved systems on the altitude of ejection.
R 4

32,907
Parsons, S.O., Shavelson, R.J. & Seminara, J.L. SENSORY DISCRIMINATION AND ATTITUDES TOWARD WATER RECLAIMED FROM URINE. Aerospace Med., Sept. 1967, 38(9), 903-908. (Missiles & Space Company, Lockheed Aircraft Corp., Palo Alto, Calif.).

Thirty-six subjects were asked to discriminate the smell and taste of tap water, distilled water, and reclaimed water. Each subject was given twelve samples containing the three waters in a counterbalanced sequence and asked to describe the smell, taste, pleasantness, and type of water after each sample. At the conclusion of the sampling, the subjects then responded to the questionnaire on the reverse side of the answer sheet. It was concluded that the subjects could distinguish tap water from distilled and reclaimed water, but that they could not distinguish distilled water from reclaimed water. It was also found that neither the water temperature, the amount of cigarettes smoked, nor the sex of the subject had any effect on the ability to discriminate liquids. Both the taste and smell of the three liquids were described primarily as tasteless and odorless respectively. Also all samples were described mainly as neutral in taste and smell. The questionnaire demonstrated that drinking recycled urine was quite acceptable and that using recycled body wash water and recycled fecal water would also be tolerated.
R 6

32,908
Collins, T.A. & Zeller, A.F. AEROMEDICAL RESPONSIBILITIES IN AIRCRAFT RELIABILITY. Aerospace Med., Sept. 1967, 38(9), 908-911. (USAF Life Sciences Div. Norton AFB, Calif.).

While the aeromedical fraternity has been concerned with and has contributed measurably to the decline in pilot error accidents during the last decade, lesser concern has been directed toward another important source of human errors, namely those committed at all levels of maintenance and servicing. This study presents the historical trends of Air Force accidents for the past 15 years and documents the increasing importance of the maintenance/material area. Because of their higher performance and lesser degree of redundant reliability caused by fewer engines, fighter aircraft are particularly susceptible to maintenance and servicing errors. Evaluation of these errors indicates that they involve all echelons of maintenance and involve a great variety of specific omissions or faulty commissions. The flight surgeon and his associates must place additional emphasis on the problems of the maintenance man, to insure that his capabilities are brought fully to bear. An aircrew effectiveness program can never be totally effective if aircraft are not mechanically reliable and if pilots lack confidence in their aircraft.
R 2

32,909
Conura, M.S., Snyder, R.E. & White, W.J. THERMAL COMFORT ZONES FOR HELIUM-OXYGEN ATMOSPHERES AT REDUCED PRESSURES. Aerospace Med., Sept. 1967, 38(9), 912-916. (Missiles & Space Systems Div., Douglas Aircraft Company, Inc., Santa Monica, Calif.).

Thermal conductivity for a helium-oxygen mixture is 2.5 times greater than the conductivity of a nitrogen-oxygen mixture at 7 psia. A direct result of this difference is that the convective heat loss from man is higher in a helium atmosphere. Therefore, thermal comfort zones in helium should show an elevation in temperature. Measurements of human comfort zones at pressures of 5, 7, and 10 psia using a random walk technique were made in the Douglas Space Cabin Simulator. Air velocities (20, 50, and 80 ft./min.), clothing (0.0 and 0.7 clo), and atmosphere diluents (helium and nitrogen) were systematically varied within the allowed time span. The data show that the midpoint of the comfort range for the clothes subject (0.7 clo) is highest for He-O_2 (85° ± 9° F) at 7 psia, lowest for N_2-O_2 (78° ± 6° F) at both 5 and 7 psia, and midway between these extremes for He-O_2 (82° ± 9° F) at 5 psia; for the subject at zero clo value, the midpoints of the comfort range show no difference; the low air velocities used in the study exerted a small inconsistent effect at all pressures, compositions, and clo values.
R 6

32,910
Thompson, L.J. & McCally, M. ROLE OF TRANSPHARYNGEAL PRESSURE GRADIENTS DETERMINING INTRAPULMONARY PRESSURE DURING IMMERSION. Aerospace Med., Sept. 1967, 38(9), 931-935. (USAF Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio).

It is not clearly understood why immersed seated subjects prefer to breathe at a pressure which is negative relative to the chest, rather than select a breathing pressure which is equal to the mean external pressure on the thorax. The role of transpharyngeal pressure gradients in setting intrapulmonary pressures was studied in eight seated subjects, immersed in thermally neutral water (33°-34° C). When breathing through a mouthpiece or a facemask, subjects chose pressures which were negative relative to the sternal notch (range 0 to -8 cm H_2O). When a helmet alone was used, breathing pressures ranged from -5 to +20 cm H_2O, suggesting that when no transpharyngeal pressure gradient is present, discrimination in choosing a breathing pressure is reduced. When breathing from a mouthpiece inside a helmet, an increase in breathing pressure resulted in the subject choosing an increased helmet pressure thus minimizing the transpharyngeal gradient (mean range 1 to 7.5 cm H_2O). A wide range of transthoracic pressure gradients (-30 to +40 cm H_2O) is subjectively more comfortable than a slight increase in transpharyngeal gradient (up to 7.5 cm H_2O).
R 10

32,911
Clark, B. & Stewart, J.D. VESTIBULAR AND NONVESTIBULAR INFORMATION IN JUDGMENTS OF ATTITUDE AND CORIOLIS MOTION IN A PILOTED FLIGHT SIMULATOR. Aerospace Med., Sept. 1967, 38(9), 936-940. (Ames Research Center, NASA, Moffett Field, Calif.).

The purpose of this study was to investigate the modulation of vestibular responses by tactual and proprioceptive stimuli in the perception of motion and cockpit attitude in a rotating flight simulator. Eight observers were rotated in the cockpit of the Ames five-degree [illegible] for 30 feet from the center of rotation. During the rotation, the cockpit or the head and body was pitched 35° or 70° to produce Coriolis accelerations. Head nodding was also studied. The reported Coriolis rotations were very similar for the three methods of producing head motion, and it was concluded that Coriolis rotation in this situation was not modulated in any significant way by the other sensory information available to the observers. On the other hand, the estimates of the attitude of the cockpit while the head and body pitched down were very similar to those when the body was pitched up. For both conditions, the estimates of cockpit attitude indicated that the nose of the cockpit was judged to be lower than its deviation from the resultant force during rotation at the lower velocities, while at 12 rpm the estimates were quite veridical. The data suggest, therefore, that the estimates of attitude are dependent upon tactual and proprioceptive information as well as upon information from the vestibular mechanism.
R 12

32,912
Lafontaine, E., Lavernhe, J., Courillon, J., Medvedeff, M., et al. INFLUENCE OF AIR TRAVEL EAST-WEST AND VICE-VERSA ON CIRCADIAN RHYTHMS OF URINARY ELIMINATION OF POTASSIUM AND 17-HYDROXYCORTICOSTEROIDS. Aerospace Med., Sept. 1967, 38(9), 945-947. (Medical Dept., Air France, Paris, France).

The influence of air travel east-west and vice versa on circadian rhythms of urinary potassium and 17 hydroxycorticosteroids was measured on flights between Paris to Anchorage and Anchorage to Paris. The urinary potassium and 17 hydroxycorticosteroids which, taking the average of the subjects involved, show the lowest standard deviation and the clearest circadian variation, seem particularly interesting for studying the biological effects of time-zone changes. After a quick round-trip with a 20-hour exposure to a negative time-zone change of 11 hours, the circadian eliminatory rhythm of potassium and 17 hydroxycorticosteroids immediately becomes concordant with the pre-existing reference rhythm again. During a journey with a 5-day exposure to a negative time-zone change of 11 hours, the circadian eliminatory rhythm of these same elements begins to adapt itself to local time on the third day; this adaptation is complete on the fifth day, the excretive rhythms then being in opposition to the pre-established reference rhythms.
R 9

32,913
Greene, T.D. EXPERIMENTAL BLACKOUT AND THE VISUAL SYSTEM. Aerospace Med., Sept. 1967, 38(9), 948-963. (Ophthalmology Dept., Jefferson Medical College, Philadelphia, Penn.).

Fifteen years of experimentation upon the effects of distal and local ischemia on the visual systems of man and lower animals has provided an opportunity to integrate the results. Blackout has been produced by centrifugation and ophthalmodynamometry. Changes in the visual system have been observed through direct observation, e.g., ocular movements, pupillary reflexes, ophthalmoscopy; through subjective responses, e.g., visual acuity, campimetry; and by indirect recordings, e.g., ERG, EEG, cerebral blood flow. The studies are correlated to other parameters of neurophysiologic responses in an attempt to outline the general problem of blackout.
R 133

32,914
Swearingen, J.J. EVALUATION OF POTENTIAL DECOMPRESSION HAZARDS IN SMALL PRESSURIZED AIRCRAFT. Aerospace Med., Oct. 1967, 38(10), 987-992. (US Civil Aeromedical Institute, FAA, Oklahoma City, Okla.).

More than 300 decompression tests have been conducted to determine potential hazards of ejection or incapacitating or fatal head injuries in small volume pressurized aircraft in the event of sudden decompression following the loss of a window, emergency exit, door or windshield. Evaluations were made to determine the relationships of cabin volume (100 to 700 cu. ft.), window area (100 to 900 sq. in.), pressure differential (5 to 9 psi); body weight and size (13 to 180 lbs.) and relative distance from the opening in terms of ejection and head impact injuries. Summary graphs and charts are presented showing which test configurations resulted in ejections or dangerous head impacts.
A 4

32,915
Pierson, W.R. NIGHT VISION AND MILD HYPOXIA. Aerospace Med., Oct. 1967, 38(10), 993-994. (Lockheed-California Company, Lockheed Aircraft Corp., Burbank, Calif.).

Ten male subjects were tested for absolute brightness thresholds and reading ability (the latter by the Hypoxia Demonstration Chart) while breathing 100 per cent oxygen and while breathing air at ground level (1,310 feet) and at a simulated 8,000-feet altitude. Oro-nasal masks were worn in both instances. They also were tested at a simulated altitude of 9,300 feet without oro-nasal masks. The tests were administered at ground level before each "flight", at altitude, and immediately after descent. The results indicate that brightness thresholds and Hypoxia Demonstration Chart scores are not significantly affected by the oxygen tension encountered at altitudes of 8,000 and 9,300 feet or by the use of supplemental oxygen at these altitudes.
A 9

32,916
Zeller, A.F. & Burke, J.M. RELATION OF TIME BETWEEN FLIGHTS TO THE ACCIDENT POTENTIAL OF CENTURY SERIES PILOTS. Aerospace Med., Oct. 1967, 38(10), 998-1001. (USAF Life Sciences Div., Norton AFB, Calif.).

The study evaluates the relation between aircraft accidents and the time lapse between flights. Two hundred and four (204) United States Air Force century series fighter accident pilots were studied. In addition, two control groups, each containing 204 comparable non-accident pilots, were used for comparison. The groups were carefully matched for kind of flying, age, date of graduation, and experience. Although it has been almost universally accepted that there is a relationship between the time between flights and accidents the current evaluation failed to offer any support for this hypothesis. There are various suggested reasons for this; one which appears probable is that pilots acutely aware of their lowered proficiency following lapses in flying compensate or even overcompensate in order to avoid situations which would involve them in accidents. No one study should be the best for refuting a long held opinion; this one does suggest that there is not as clear cut relation, within the time limits studied, of accidents and time between flights as has been assumed.
A 2

32,917
Scheafer, K.E., Clegg, B.R., Carey, C.R., Dougherty, J.H., et al. EFFECT OF ISOLATION IN A CONSTANT ENVIRONMENT ON PERIODICITY OF PHYSIOLOGICAL FUNCTIONS AND PERFORMANCE LEVELS. Aerospace Med., Oct. 1967, 38(10), 1002-1018. (USN Submarine Medical Center, New London Submarine Base, Groton, Conn.).

Two medical students were isolated for 9 days in a constant environment, in which the temperature was kept at 27°C ± .1°C, barometric pressure at 30.560 ± .004 in., humidity at 50 ± 5%. Respiratory rate, pulse rate, body temperature, skin temperature, basal skin resistance and 2 channels of EEG were continuously monitored with 8-channel biotelemetry systems during a 4-day control period, 9 days of isolation and during a 3-day recovery period. Nine urine functions and 4 saliva functions were studied in samples obtained 4-5 times daily. Psychomotor tests were carried out twice daily and included hand-steadiness, aiming and 2-hand coordination. The 2 subjects were of different body build and demonstrated distinctly different personality trait configurations. The 2 subjects reacted to the "constant environment" in an opposite way as indicated in an increased and decreased ketosteroid excretion and corresponding subjective experiences. The subjects shifted during the 9 days and 8 nights of isolation 1.75 hrs per day away from the local clock time. Their average total periodicity being 25.75 hrs. In contrast to pulse rate, body temperature, and basal skin resistance, respiratory rate did not follow the phase shift of sleep wakefulness cycle and became dissociated in both subjects. Most of the urine functions remained synchronized with the sleep wakefulness cycle for 5 days but broke away during the subsequent 3 days of the isolation period. Temporary predominance of 6 hr frequencies in respiratory rate and 12 hr frequencies in heart rate, body temperature and basal skin resistance of both subjects during the isolation period and recovery period indicate that the whole spectrum of frequencies was affected by the loss of circadian environmental time givers in these 2 subjects. The performance levels did not decrease during isolation but showed a tendency to further improvement. A 11

32. 8
Wo ren, B.H. HUMAN CIRCULATION TIMES DURING WEIGHTLESSNESS PRODUCED BY PARABOLIC FLIGHT. Aerospace Med., Oct. 1967, 38(10), 1019-1020. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

Arm to lung and arm to tongue circulation times of human subjects flying in the rear cockpit of NF 100F fighter-bombers were determined during parabolic flight maneuvers which produced 45 seconds of weightlessness. Control circulation times were determined on the ground prior to each experimental flight. Modifications of the ether-saline arm to lung circulation time test of Hitzig and the decholin arm to tongue circulation time test of Wintermitz, et al, were used in these experiments. The mean value of the control arm to lung circulation times was 6 seconds and the mean value during weightlessness was 6.7 seconds. The mean value of the control arm to tongue circulation times was 10.8 seconds and the mean value during weightlessness was 11 seconds. The results of these experiments support the assumption made in other experiments, that macro-aggregated human albumin (MAA) labeled with radioactive iodine would have sufficient time to reach the lungs during weightlessness when injected into an upper arm vein 20 seconds after entry into a 45 second parabola.
R 12

32,919
Rogge, J.D., Fasola, A.F. & Hartz, B.L. PERIPHERAL VENOUS RENIN LEVELS DURING +Gz ACCELERATION. Aerospace Med., Oct. 1967, 38(10), 1024-1028. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

Renin secretion, as measured by changes in peripheral venous renin levels, was used to evaluate the part played by the renin-angiotensin system in the response to +Gz acceleration. Centrifuge runs were done on the USAF SAM Human Centrifuge and the subjects were members of the USAF SAM Acceleration/Deceleration Panel. A larger increase in the renin level was found each time the run duration was increased at +2 Gz. The mean increase in the 20 minute samples was 0.36 ng./ml. ($p < 0.05$) and in the 30 minute samples was 0.76 ng./ml. ($p < 0.01$). A mean rise of 0.63 ng./ml., found after 30 minutes at +2 Gz while wearing an anti-G suit, was not significantly different from the rise found in the 30 minute runs without the G-suit. The renin-angiotensin system may play a part in the response to +Gz acceleration, either alone or in conjunction with the autonomic nervous system.
R 32

32,920
Sawyer, C.H. & Zeller, A.F. ANALYSIS OF USAF UNDERSHOOT AND OVERSHOOT ACCIDENTS, 1960-1964. Aerospace Med., Oct. 1967, 38(10), 1029-1033. (USAF Life Sciences Div., Norton AFB, Calif.).

Although a significant reduction has occurred in the incidence of undershoot and even more has occurred with overshoot accidents, these accidents continue to occur. Aircraft are destroyed and lives lost. There has been marked improvement in air base landing aids and aircraft and runway deceleration devices during the last decade. In spite of these improvements, 90 per cent of all undershoot accidents occur when the pilot fails to accomplish visual transition and to make the critical distance-rate-of-closure judgments required in a successful landing. Darkness, restricted, or distorted visibility due to weather, terrain, or air base factors, and possible misinterpretation of visual cues complicate this transition. Further reduction in undershoot accident experience will depend on improved information concerning the visual transition process for landings when the pilot must transition to successfully accomplish the landing. Even greater potential gain will come with the introduction of mechanical aids which will reduce or diminish the necessity for visual transitioning. This study again demonstrates that overshoot accidents are less frequent and less costly in life and materiel than undershoot accidents. Significant improvement in prevention of overshoot accidents is evident. Pilots should be made aware of the relative risk of undershooting as opposed to overshooting a landing. Current experience re-emphasizes the validity of many previous recommendations. The simplest and one of the most potentially useful involves only a well-marked touchdown point some distance from the approach end of the runway.
R 4

32,921
McIver, R.G., Beard, Sarah E., Bancroft, R.W. & Allen, T.H. TREATMENT OF DECOMPRESSION SICKNESS IN SIMULATED SPACE FLIGHT. Aerospace Med., Oct. 1967, 38(10), 1034-1036. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

Treatment of altitude decompression sickness primarily involves increasing both the barometric pressure and the partial pressure of oxygen sufficiently to alleviate symptoms and allow bubbles to dissolve while tissue oxygenation is being provided. Ideal treatment is not available in space flight, but pressures up to 9.5 psia with 100 per cent oxygen are possible, using a combination of cabin pressure and suit "pop-off" pressure. From a series of altitude chamber experiments it has been learned that oxygen at this pressure is effective in most instances in treating humans with bends occurring at 3.5 psia. Treatment must be continued for a minimum of 4 hours before a slow decompression to 5 psia can be accomplished without recurrence of symptoms. However, an interval of at least 24 hours is recommended before a second decompression to 3.5 psia can be safely undertaken. Emphasis should be placed on prevention of decompression sickness by lengthy avoidance of so-called inert gases. Pressure required for reported relief of symptoms was less in individuals having low body fat to lean ratio.
R 9

32,922
Bartek, M.J., Roberts, Ann J. & Gilvedal, F. STUDY OF HVH DURING A PROLONGED EXPOSURE TO OXYGEN AT 258 MM. HG TOTAL PRESSURE: SUPPLEMENTAL BIOCHEMICAL MONITORING. Aerospace Med., Oct. 1967, 38(10), 1037-1040. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

The effect of a slightly hyperoxic environment composed of 100 per cent oxygen at 258 mm. Hg total pressure on certain blood constituents was studied in conjunction with a recent trace contaminant experiment. Four h hy mules were maintained in this atmosphere for 21 days and the following measurements were made on their blood three times weekly: total serum lactic dehydrogenase and its isozymes, hematocrit, erythrocyte glucose-6-phosphate dehydrogenase, reduced glutathione and glutathione stability. A 17.2 per cent decrease in total lactic dehydrogenase and a relative increase of 31.7 per cent in isozyme #3 were observed in the chamber group. In addition to a 9 per cent decrease in hematocrit, a slight elevation of glucose-6-phosphate dehydrogenase was seen during the altitude phase along with a slight upward trend in reduced glutathione. Little if any evidence for increased instability of glutathione was observed. Minor changes in these blood volumes, if attributable to the hyperoxic environment, were not magnified by the presence of trace contaminants.
R 19

32,923
Weis, E.B., Jr. & Mohr, G.C. CINERADIOGRAPHIC ANALYSIS OF HUMAN VISCERAL RESPONSES TO SHORT DURATION IMPACT. Aerospace Med., Oct. 1967, 38(10), 1041-1044. (USAF Aerospace Medical Research Labs., Aerospace Medical Div., Wright-Patterson AFB, Ohio).

A series of experiments are reported in which human volunteers are exposed to impacts of less than 10 milliseconds duration and velocity change of up to 2.44 meters/second. Cineradiographic analysis (60 frames/second) of the resulting motion is reported. The implications of the results of this analysis and correlations in animal experiments are discussed.
R 7

32,924
Gibbens, H.L., Piechus, Judith L. & Mohler, S.R. CONSIDERATION OF VOLITIONAL ACTS IN AIRCRAFT ACCIDENT INVESTIGATION. Aerospace Med., Oct. 1967, 38(10), 1057-1059. (US Civil Aeromedical Institute, FAA, Oklahoma City, Okla.).

Six case histories are presented in which apparent general aviation accidents are revealed to be possible or probable volitional acts. Alcohol and/or drugs were frequently involved. Suicide ranks as a frequent cause of death and there is evidence that the automobile and other transportation means are utilized as suicide instruments. This paper suggests that general aviation aircraft are also utilized (although infrequently) as suicide vehicles and stresses the importance of obtaining autopsies, toxicological studies and, whenever possible, thorough human factors evaluations in aircraft accident investigation.
R 13

32,925
Kreider, M.B. DEATH AND SURVIVAL DURING WATER IMMERSION: ACCOUNT OF PLANE CRASHES NEAR CAPE COD AND HAMILTON BAY. Aerospace Med., Oct. 1967, 38(10), 1060-1062. (USA Research Institute of Environmental Medicine, Physiology-Medicine Div., Natick, Mass.).

Only three of twelve airmen who initially survived a crash landing at sea were rescued alive after immersion in water at 11°C for ten and a half hours. The causes of death may have been hypothermia or drowning. Unconsciousness, occurring from one or several possible causes, led to drowning in at least one man when his face was inadequately protected from the water. The survival of a second man two hours after becoming unconscious suggests that unconsciousness in cold water immersion may not be caused by hypothermia alone. The importance in survival of face protection, large body size, and the insulation of the anti-exposure suits are stressed.
R 8

32,926
Simpson, H.W. & Lobban, Mary C. EFFECT OF A 21-HOUR DAY ON THE HUMAN CIRCADIAN EXCRETORY RHYTHMS OF 17-HYDROXYCORTICOSTEROIDS AND ELECTROLYTES. Aerospace Med., Dec. 1967, 38(12), 1205-1213. (University Pathology Dept., Royal Infirmary, Glasgow, Scotland & Human Physiology Div., National Institute for Medical Research, London, England).

In Spitsbergen, seven fit adult subjects lived from one to seven weeks on a day/night routine lasting 21-hours instead of the usual 24-hours. On alternate weeks all urine was collected generally 2-hourly and the serial 17-hydroxycorticosteroids (17-OHCS), potassium, sodium, chloride and water excretion rates were estimated in order to study the effect of this shortened day/night routine on the circadian rhythms of excretion. The results show that adaptation of the 17-OHCS and potassium rhythms took at least five weeks while that for sodium, chloride and water tended to be more rapid but was not immediate. These differences in the response of the various rhythms resulted in a loss of their normal synchronisation (ie., maxima about midday, minima at night). A particularly interesting finding was that when experimental "days" fell on periods corresponding to deep sleep periods at home, adaptation was very slow. Twenty-four hour controls taken at the end of the 21-hour day experiment were normal. This indicates the fundamental nature of the 24-hour period in the promotion of these excretory rhythms.
R 11

32,927
Erickson, C.A. ANALYSIS OF F4 AIRCRAFT DAY AND NIGHT CARRIER APPROACHES. Aerospace Med., Dec. 1967, 38(12), 1215-1224. (Dunlap & Associates, Inc., Santa Monica, Calif.).

An attempt to quantify and define day/night pilot landing performance was the subject of a field experiment in which landing performance was recorded for 21 Navy F4 pilots during day and night carrier landing operations. Altitude and lateral error were the principal measures of pilot performance. Generally, pilots tended to approach slower and higher, and land harder and shorter by day than by night. Significant differences were found between day and night pilot altitude performance at 1/4 mile (<.01) and 1/8 mile (<.05) from touchdown with night altitude error variability at least twice that recorded during the day. By day, pilot approaches were consistently above glide slope while approximately 1/4 of all night landings were below glide slope. It was concluded that improved visual sources of altitude guidance information are required to assist the pilot in judging altitude at night, thereby reducing pilot landing performance variability and the dangerous tendency to fly low approaches.
R 2

32,928
Gerathewohl, S.J. AEROMEDICAL ASPECTS OF THE SUPERSONIC TRANSPORT: A REVIEW. Aerospace Med., Dec. 1967, 38(12), 1225-1229. (US Office of Aviation Medicine, FAA, Washington, D.C.).

Five medical areas of supersonic commercial transport, which were previously discussed in Aerospace Medicine, were reviewed as to their present state. The problems of concern are ozone concentration and cosmic radiation at SST (Supersonic Transport) cruising altitudes, hazards of rapid decompression of cockpit and passenger compartment, sonic boom effects on the population, and physical standards of the occupants of the SST. While most of the environmental and operational parameters of high-altitude supersonic flight are well understood, their physiological, psychological and medical consequences deserve further investigation. Progress in these areas and extrapolations from results presently available indicate that no insurmountable obstacles will prevent the safe transportation of passengers and crews at supersonic speeds.
R 24

32,929
Zhuravlev, V., Isayev, L. & Nafyorov, Y. RESPONSES OF THE HUMAN BODY TO A KNOWN FORCE LOAD DURING PROLONGED ISOLATION IN THE ENCLOSED SPACE. Aerospace Med., Dec. 1967, 38(12), 1234-1239. (Novosti Press Agency, Moscow, Russia).

Studies carried out with the aid of two provocative tests of different procedure: 5-minute bicycle ergometer exercises of 3 or 5 cycle duration with varying or constant work load, have demonstrated that a long-term (4 months) enclosure of men impairs his endurance of physical work. This is confirmed by an inadequate increase of some indices of human body functions, including external respiration. As the experiment continues, the indices show further deterioration, the percentage being very similar for the two provocative tests applied. These shifts in human functions appear to be induced by all the factors peculiar to the enclosed environment which promote the development of overall fatigue and asthenization observed in five male test subjects during the chamber experiment.
R 3

32,930
Ackles, K.N., Ernsting, J. & Macmillan, A.J.F. RATIONALE OF MASK-MOUNTED HYPOXIA WARNING SYSTEMS. Aerospace Med., Dec. 1967, 38(12), 1244-1247. (RAF Institute of Aviation Medicine, Farnborough, Hants., England).

The rationale of hypoxia warning systems, based upon the monitoring of PO_2 in aviators' breathing equipment, has been assessed. The Beckman Polarographic Hypoxia Warning System and a respiratory mass spectrometer were used simultaneously to measure the PO_2 within the mask cavity or beyond the expiratory valve. Expired PO_2 was observed at simulated altitudes up to 25,000 ft during respiratory manoeuvres (e.g. speech) both at rest and during exercise. To prevent false alarms, the warning level should be lower than the minimum PO_2 normally attainable. In these experiments, expired PO_2s of 54 mm. Hg were recorded while subjects breathed a gas mixture whose PO_2 was 160 mm Hg. A warning level less than 60 mm. Hg could allow serious hypoxia to develop before actuating the alarm. Adequate hypoxia warning without false alarms is unattainable when expired gas is monitored. Limited information with freedom from false alarms can be obtained by monitoring PO_2 at the mask inlet.
R 2

32,931
Shoenberger, R.W. EFFECTS OF VIBRATION ON COMPLEX PSYCHOMOTOR PERFORMANCE. Aerospace Med., Dec. 1967, 38(12), 1264-1269. (USAF Aerospace Medical Research Labs., Aerospace Medical Div., Wright-Patterson AFB, Ohio).

Human performance was measured on a complex of three psychomotor tasks, during short duration (30 minutes) vertical sinusoidal vibration (seated subject, $+1G_z \pm nG_z$) at peak accelerations of $\pm.20G_z$, $\pm.25G_z$, and $\pm.30G_z$ at 5 cps; $\pm.25G_z$, $\pm.30G_z$, and $\pm.35G_z$ at 7 cps; and $\pm.30G_z$, $\pm.45G_z$, and $\pm.60G_z$ at 11 cps. The tasks ("target identification," "probability monitoring," and "warning-lights monitoring") had relatively small motor components and were largely "mental" or intellectual in nature. The results provided very little evidence of decrement on these tasks as a result of vibration. Previous studies employing a two-dimensional tracking task showed significant decrements at .20G at 5 cps, .25G at 7 cps, and .37G at 11 cps. This previous task required a high degree of manipulative skill and was therefore more susceptible to direct mechanical interference from the vibration. These results, plus the fact that the greatest mechanical response of the human body occurs in this low frequency range, suggests that direct mechanical interference with the motor aspects of the task may be the most significant factor contributing to performance decrements during relatively low intensity short duration vibration.
R 9

32,932
Reighard, H.L. & Mohler, S.R. SOME ASPECTS OF SUDDEN INCAPACITATION IN AIRMEN DUE TO CARDIOVASCULAR DISEASE. Aerospace Med., Dec. 1967, 38(12), 1273-1275. (US Office of Aviation Medicine, FAA, Washington, D.C.).

"Incapacitation, due to coronary insufficiency, of the pilot-in-command at a critical point during a visual circling approach being conducted under instrument flight conditions," is the probable cause ascribed by the Civil Aeronautics Board, Docket SA-392, concerning a catastrophic Lockheed Electra accident in which eighty-three occupants died. The accident occurred at Ardmore, Oklahoma, on April 22, 1966. Eight airline transport pilot cardiovascular incapacitations occurred in the United States in the 1961-1966 period during, or shortly before or after, flight. Some of these, together with thirty-seven general aviation accidents which resulted from the effects of cardiovascular disease (1959-1965) will be discussed from the following aspects: a) the medical history, b) the physical examination, c) EKG and exercise tests and d) criteria for flight status. In the event of a fatal accident or fatal in-flight incident, the postmortem examination must include a thorough gross and microscopic study of the coronary artery system. In the absence of such study, the question of coronary artery system. In the absence of such study, the question of coronary artery disease cannot be resolved in a definitive fashion. The Federal Aviation Administration is attempting to further refine, commensurate with the state-of-the-art, the screening methods practical for medical certification of pilots.
R 5

32,933
Johnson, Leverne C. & Lubin, A. THE ORIENTING REFLEX DURING WAKING AND SLEEPING. EEG J., Jan. 1967, 22(1), 11-21. (USN Medical Neuropsychiatric Research Unit, Bureau of Medicine & Surgery, San Diego, Calif. & San Diego State College, San Diego, Calif.).

A 3 sec. tone was presented at 30-45 sec. intervals to seventeen subjects before sleep and during all night sleep sessions. For twelve of these subjects, 20 tones were presented during a day-awake session. The following components of the orienting reflex (OR) to the tone were measured: electroencephalogram (EEG), heart rate, respiration rate, electro-dermal, and finger plethysmogram. All measures habituated during the awake sessions. With sleep onset there was a return of the OR for all variables, but the magnitude of the restored OR differed for each variable. There was little, if any, habituation of the OR during sleep. While the smallest OR response was generally during I-REM (rapid eye movement), heart rate was a striking exception. The presence of a stimulus-evoked K complex was associated with increased responsiveness in all autonomic variables, but presence of eye movement bursts was associated with decreased cardiovascular response to the tone.
R 25

32,934
Walter, D.O., Rhodes, J.M. & Adey, W.R. DISCRIMINATING AMONG STATES OF CONSCIOUSNESS BY EEG MEASUREMENTS. A STUDY OF FOUR SUBJECTS. EEG J., Jan. 1967, 22(1), 22-29. (University of California, Los Angeles, Calif.).

Intensity of activity, mean frequency, equivalent bandwidth, and coherence values in four frequency ranges ("δ, θ, α, β") were calculated for four channels of electroencephalogram recorded from each of four normal adult human males, in five experimental situations, including periods of rest and of attention. Stepwise discriminant analysis was applied to the calculated values for all subjects simultaneously to develop formulas for automatic categorization of records into the situation in which they were recorded. After selecting only four parameters, the program correctly categorized 49% of the records; the erroneous categorizations were mainly into related situations. When the records from each subject were separately analyzed, and the four parameters for best discriminating his own records were applied, a higher proportion of records was correctly categorized; the parameters chosen only partially overlapped those chosen for the simultaneous discriminat... Thus an objective method of identifying parameters of the electroencephalogram which are important in distinguishing subjects' responses to differing situati is has shown its value for developing criteria applicable to many individuals; it has also shown that individuals differ substantially in the list of parameters most distinguishing for their own records.
R 6

32,935
Agnew, H.W., Jr., Parker, J.C., Webb, W.B. & Williams, R.L. AMPLITUDE MEASUREMENT OF THE SLEEP ELECTROENCEPHALOGRAM. EEG J., Jan. 1967, 22(1), 84-86. (University of Florida, Gainesville, Fla.).

Amplitude measurements were made on the sleep electroencephalogram (EEG) of seven subjects for two successive nights. The correlations between increases in amplitude and visually scored sleep stages were high. The EEG amplitude varied systematically throughout the night, following a pattern which has been previously reported for the stages of sleep. This parallel presents the possibility of developing an objective method for scoring the sleep EEG to replace current qualitative scoring techniques.
R 9

32,936
UCLA Brain Information Service. INDEX TO CURRENT ELECTROENCEPHALOGRAPHIC LITERATURE. OCTOBER-NOVEMBER 1966. EEG J., Feb. 1967, No. 1, 1A-16A. (Brain Information Service, University of California, Los Angeles, Calif.).

With this issue, the Journal presents the first quarterly index to Current Electroencephalographic Literature, compiled by the Brain Information Service of the University of California at Los Angeles. It covers the period Oct.-Nov. 1966. The index provides within the limits of allotted space, citations of the currently-appearing literature dealing with electrophysiological recording of brain processes. Initially, the selection of citations will give first priority to electroencephalography, both clinical and experimental, and then to studies of evoked potentials. As space permits, papers on single neuron activities and receptor potentials, including retinal or cochlear potentials, will be included. Citations are classified under one of the following headings: a) General and review articles, and books. b) Methodology c) Disease states. d) Drug effects. e) Experimental studies on animals. f) Experimental studies on human subjects. g) Receptor potentials. h) Sleep.
R Many

32,937
Lehmann, D., Beeler, G.W., Jr. & Fender, D.H. EEG RESPONSES TO LIGHT FLASHES DURING THE OBSERVATION OF STABILIZED AND NORMAL RETINAL IMAGES. EEG J., Feb. 1967, 22(2), 136-142. (Visual Sciences Institute, Presbyterian Medical Center, San Francisco, Calif.).

The electroencephalogram (EEG) potential evoked by repetitive 3.2/sec. flashes of light to the right eye was measured in six subjects; at the same time the left eye viewed various continuously presented targets, both in normal and in stabilized vision. The following observations were made: a) In stabilized vision, no significant change could be detected in the amplitude of the evoked potential during periods of clear visibility or of spontaneous fade-out. Thus, the changes in the state of central nervous system activity, indicated by low voltage fast EEG during periods of image visibility versus alpha activity during periods of fade-out, are not reflected by the evoked responses. b) The presentation of a structured target to the left eye in normal vision reduced the amplitude of the potentials evoked by flashes to the right eye. If the same target was stabilized on the retina, there was less reduction in the amplitude of the evoked potential. The greater reduction of amplitude of the evoked potentials during observation of the target in normal vision compared with the reduction measured during stabilized vision is interpreted as resulting from increased loading of the higher levels of the visual system in the former case; in this condition, fewer elements are available to participate in the evoked response to unpatterned light.
R 15

32,938
Volavka, J., Matoušek, M. & Roubíček, J. MENTAL ARITHMETIC AND EYE OPENING. AN EEG FREQUENCY ANALYSIS AND GSR STUDY. EEG J., Feb. 1967, 22(2), 174-176. (Psychiatric Research Institute, Prague, Czechoslovakia).

Twelve healthy subjects were examined. Electroencephalogram (EEG) and galvanic skin response (GSR) were taken when the subjects were resting with their eyes closed (C), resting with their eyes open (O), performing mental arithmetic with their eyes closed (A), and performing mental arithmetic with their eyes closed and promised financial reward (M). The number of GSRs in condition M was significantly higher than in any other condition. Frequency analysis was made of the EEG of the right parieto-temporal region and the number of GSRs was ascertained according to precisely specified criteria. In condition O relative quantities were on the average lower in all frequency bands than in conditions A and M. In conditions O, A and M theta and alpha activities registered a lower level than in condition C. In condition O beta activity decreased, while increasing on the average in conditions A and M. Compared with conditions C and O, the variability of beta activity in conditions M and A was lower. Frequency analysis did not disclose any significant difference between conditions A and M. The results indicate that beta activity (both its amount and variability) is more closely related to the general level of activation than are the brain waves in any other frequency band under study.
R 6

32,939
Yap, C.B. & Bushes, B. THE FREQUENCY AND PATTERN OF NORMAL TREMOR. EEG J., March 1967, 22 (3), 197-203. (Neurology & Psychiatry Dept., Northwestern University Medical School, Chicago, Ill.).

Average patterns of normal finger tremor, ballistocardiogram (BCG) and electrocardiogram (EKG), and interval histograms of finger tremor were obtained from seven healthy young adults with the aid of a Computer of Average Transients (400-B). This finger tremor can be averaged and a well-defined pattern established. Cardiac action as the origin of normal finger tremor is confirmed. Two distinct peaks can be identified in the average tremor pattern. The first and second occur respectively with the first and second footward movements in the BCG. It is suggested that handward displacement of the body is responsible for these peaks in finger tremor. The major rhythm as shown in the study of interval histograms is actually 11-13 cycles per second, a frequency somewhat faster and in a narrower range than the findings of other investigators. A possible reason for such discrepancy is discussed. The irregular fast rhythm of 17-30 cycles per second fails to show up in either average tremor pattern or in the interval histogram. This rhythm is therefore not dependent on heartbeat and its regularity and constancy of occurrence are not statistically significant.
R 30

33,940
Grass, E.G., Vaughan, H.G., Jr. & Valenstein, E. INHIBITION OF VISUAL EVOKED RESPONSES TO PATTERNED STIMULI DURING VOLUNTARY EYE MOVEMENTS. EEG J., March 1967, 22(3), 204-209. (Saul R. Korey Neurology Dept., Albert Einstein College of Medicine, Bronx, N.Y.).

Evoked cerebral responses were recorded to brief shifts of patterned stimuli under conditions of constant luminous flux during voluntary eye movements and ocular fixation. Virtually complete suppression of evoked response and perception of the pattern shift occurred during eye movements. In contrast, such dimmer test flashes presented against a dark field were suppressed to a substantially lesser degree. Retinal blur was eliminated as a factor in saccadic suppression, since inhibition was the same for horizontally and vertically oriented patterns. The results indicate that an inhibitory mechanism must exist which is specific for contour shift as opposed to change in luminance.
R 16

33,941
Hillyard, S.A. & Galambos, R. EFFECTS OF STIMULUS AND RESPONSE CONTINGENCIES ON A SURFACE NEGATIVE SLOW POTENTIAL SHIFT IN MAN. EEG J., April 1967, 22(4), 297-304. (Psychology Dept., Yale University, New Haven, Conn.).

A slow wave potential (CNV) was recorded extracranially from eleven subjects during the interval between a warning stimulus (flash of light) and a burst of clicks which they terminated by pressing a lever. When subjects were not required to respond to the clicks, no CNV appeared. When they were told to turn off the clicks the CNV increased in amplitude at a rate that depended on individual prior experience with the paired flash-clicks contingency. Omission of clicks with no warning to the subjects resulted in gradual diminution of the CNV; subsequent reinstatement of clicks caused the CNV to increase in amplitude again. A significant negative correlation between size of CNV and reaction time was found over a large group of trials. The relation of the CNV to subjective expectancy and intention to respond was discussed.
R 12

33,942
Eason, R.G., Oden, D. & White, C.T. VISUALLY EVOKED CORTICAL POTENTIALS AND REACTION TIME IN RELATION TO SITE OF RETINAL STIMULATION. EEG J., April 1967, 22(4), 313-324. (San Diego State College, San Diego, Calif.).

Using an averaging computer, visually evoked cortical potentials and reaction time were studied as a function of flash intensity, wave-length (red vs. blue) and site of retinal stimulation. All evoked potentials were comprised of periodic, sinusoidal deflections having a frequency equal to the subject's alpha rhythm, and which grew to a peak value then attenuated. Evoked potential latency and reaction time changed similarly as the eye was stimulated progressively more peripherally. Both increased out to 5°, decreased out to 10-20°, and thereafter progressively increased. The changes corresponded closely to Osterberg's rod-cone density function and to known differences in retinal sensitivity. Changes in evoked potential amplitude with retinal site differed for the two colors.
R 19

33,943
Kitajima, H. ON THE CEREBRAL EVOKED RESPONSE IN MAN AS A FUNCTION OF THE INTENSITY OF FLICKER STIMULATION. EEG J., April 1967, 22(4), 325-336. (Second Physiology Dept., Nagasaki University School of Medicine, Nagasaki, Japan).

The average evoked potentials (cross-correlograms of the flash stimulus and electroencephalogram (EEG) potentials) in six areas of the scalp of normal adults (parieto-occipital on both sides) elicited by flicker at 8-12/sec. were observed in relation to the stimulation intensity and location. In spite of individual variations, the response was predominant on the occipital and parieto-occipital regions and its size increased and its phase changed by increasing the stimulating intensity. In many instances, a sinusoidal response was induced using weak or intermediate intensity monocular stimulation, whereas the response configuration changed to a one to two correspondence with the stimulus with binocular or intense monocular stimulations. Typically, the maximal amplitude in the response and superimposed peak height in the frequency spectrum of the response had approximately linear relationships to the logarithmic amount of the relative strength of the mono- and binocular stimulations. Augmentative and depressive binocular interactions were revealed respectively by weak and intense stimulations. Peak latencies of the response components tended to be decreased by strengthening the stimulation. The fast response of 20-30 msec. peak latency showed little fluctuation, whereas the fluctuation in the later responses was considerable. The spatio-temporal contour of the evoked response were observed in relation to the stimulation intensity. It was postulated that the evoked potential in the parieto-occipital human scalp elicited by flicker at a frequency of about 10 f/sec. is a mixture of primary and secondary responses.
R 12

33,944
Lisker, E., Hughes, H.N. & Stowe, D.E. CROSS-CORRELATION OF HUMAN ALPHA ACTIVITY: NORMATIVE DATA. EEG J., May 1967, 22(5), 429-436. (USAF School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.).

Forty-two asymptomatic adult males were studied by history, physical examination and electroencephalogram (EEG). Cross-correlograms were generated from the EEG data derived from P_3-O_1 and P_4-O_2. Twenty-four subjects exhibited phase lead to the right and eighteen to the left. None were exactly in zero phase. Average phase shift for the group was 0.03 msec. to the right. The range of the phase shifts was from 4 msec. left to 7 msec. right. This report emphasizes that not all normal subjects are essentially synchronized with respect to their alpha activity, although in most normals there is clearly some imperfect neurological mechanism operating to phase align the alpha activity. In a number of normal subjects a surprising degree of right-sided alpha phase leading was seen, a degree not approached in these subjects in which left-sided alpha activity was phase leading. These findings tend to support textbook statements that cerebral dominance for alpha rhythm more often resides in the right hemisphere of normal humans in the sense that it more often exerts an average phase lead over the alpha activity generated in the left hemisphere.
R 18

32,945
UCLA Brain Information Service. INDEX TO CURRENT ELECTROENCEPHALOGRAPHIC LITERATURE, DECEMBER 1966-JANUARY 1967. EEG J., May 1967, No. 2, 17A-32A. (Brain Information Service, University of California, Los Angeles, Calif.).

This is the second of the quarterly indices on the current electroencephalographic literature (See HEIAS No. 32,936). It covers the period Dec. 1966-Jan. 1967.
R Many

32,946
Donchin, E. & Cohen, L. AVERAGED EVOKED POTENTIALS AND INTRAMODALITY SELECTIVE ATTENTION. EEG J., June 1967, 22(6), 537-546. (Neurology Div., Stanford University School of Medicine, Palo Alto, Calif.).

An attempt was made to determine the effects of attention on average evoked potentials when no general change in the alertness of the subject and when no peripheral gating of sensory inputs can be assumed to operate. Human subjects viewed a 50 msec. flash of light superimposed on a fluctuating background (e.g., a circle alternating aperiodically with a square). In one of the two experimental conditions, the subject was instructed to ignore the background alternations and to respond to the flash; in the other condition, the subject was required to ignore the flash and to respond to the fluctuations in the background. It was found that the stimulus to which the subject had to respond elicited an average evoked potential with a considerably enhanced late positive component (latency to peak 250-300 msec.)
R 17

32,947
Yamada, Y., Yamamoto, J., Fujiki, A., Hishikawa, Y., et al. EFFECT OF BUTYROLACTONE AND GAMMA-HYDROXYBUTYRATE ON THE EEG AND SLEEP CYCLE IN MAN. EEG J., June 1967, 22(6). 558-562. (Neuropsychiatry Dept., Osaka University Medical School, Osaka, Japan).

The purpose of the present paper is to compare a sleep state induced by butyrolactone and sodium γ-hydroxybutyrate with natural sleep in man with the aids of the electroencephalogram (EEG), electro-oculogram and electromyogram (EMG) of the mental muscle. The following results were obtained: a) The intravenous administration of 20-30 mg/kg of butyrolactone and sodium γ-hydroxybutyrate induced in man a peculiar state without marked change in consciousness and with high voltage slow waves in the EEG. b) When butyrolactone was administered at night, just prior to bed-time, the spindle and delta stages of sleep occurred earlier, the duration of the spindle stage became shorter and the delta stage tended to last longer than in the control night. The latency to the onset of the initial rapid eye movement (REM) period calculated either from the start of the injection or from the onset of sleep did not differ significantly.
R 14

32,948
Wilkinson, R.T. & Morlock, H.C. AUDITORY EVOKED RESPONSE AND REACTION TIME. EEG J., July 1967, 23(1), 50-56. (USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.).

Ten human subjects listened to auditory "clicks" coming in runs of 50, the inter-click intervals varying randomly between 1 and 3 sec. In some runs the subjects ignored the clicks, in others they responded to each click as quickly as possible by pressing a key. Incentive was varied in the responding runs by payment at a flat rate or based on performance. For each run records were taken a) of the auditory evoked response (AER) at the vertex to the clicks; b) of the average reaction time in each responding run. Three identical test sessions were held on separate days. Results were as follows: a) Responding to, as opposed to ignoring, the clicks affected the various components of the AER in different ways: the first positive and first negative components (at latencies of about 50 and 90 msec. respectively after the click) increased in amplitude, the second positive component (about 160 msec.) changed little, and the second negative component (about 260 msec.) was reduced. b) In general, adding incentive reproduced these changes to a smaller scale. c) Responding produced a large amplitude late wave in the AER, a possible "motor potential" of latency 350-450 msec., which was also increased by added incentive. d) There was no correlation between reaction time and either the amplitude or the latency of AER components. e) Great intra-subject consistency in AER patterns from one day to another contrasted with wide inter-subject variability.
R 21

32,949
Montagu, J.D. THE RELATIONSHIP BETWEEN THE INTENSITY OF REPETITIVE PHOTIC STIMULATION AND THE CEREBRAL RESPONSE. EEG J., Aug. 1967, 23(2), 152-161. (Pharmacology Dept., University College, London, England).

Sixteen healthy subjects were subjected to flicker at four intensities (modulation depths) of square wave stimuli from an electro-luminescent source. Each subject was stimulated at eight flash rates ranging from 6 to 30 cycles/sec. at each of the four intensities and the whole procedure was performed twice in one session. Recordings were taken from a single pair of electrodes on the occiput and vertex. The cerebral rhythms were analysed by means of a frequency analyser. The principal results were as follows: a) During stimulation at the lowest rate (6 c/sec.) and at the higher rates (16-30 c/sec.) the fundamental response increased with each increase in intensity. b) During stimulation at the intermediate rates (8- 12 c/sec.) the fundamental response increased with the intensity only up to a certain point. A further increase in intensity resulted in a decrease in response. c) During stimulation at 8-12 c/sec. the second harmonic response showed a similar trend with intensity to that of the fundamental response. It was concluded that the inverted U-shaped relationship between fundamental response and intensity at 8-12 c/sec. could not be attributed to blocking of the alpha rhythm at the higher intensities or to frequency doubling. The relationship between the pattern of response to stimulation and the frequency spectrum of the spontaneous rhythms was examined between subjects.
R 13

12,950
Matoušek, M., Volavka, J., Roubíček, J. & Roth, Z. EEG FREQUENCY ANALYSIS RELATED TO AGE IN NORMAL ADULTS. EEG J., Aug. 1967, 23(2), 162-167. (Psychiatric Research Institute, Prague, Czechoslovakia).

A group of 106 "normally" functioning subjects (age range 17-64) selected in a defined way were examined. The electroencephalograms (EEGs) were visually evaluated. EEGs from two frontal and two temporo-parietal derivations were processed by a broadband frequency analyser. The coefficients of correlation and of regression between frequency analysis outputs and age were calculated. The delta, theta and alpha quantities were found to decrease significantly with age, while beta activity showed an increase that was not significant. The theta/alpha ratio seemed to be a rather reliable indicator of the age change. The theta/alpha ratio and the occurrence of non-normal EEGs were not related to age. These results support some previously reported findings obtained with other methods in different populations. Furthermore, they provide a basis for future attempts to define the maturation of the EEG in terms of probability and may be useful for eventual automatic evaluation of electroencephalograms.
R 12

12,951
Agnew, H.W., Jr., Webb, W.B. & Williams, R.L. SLEEP PATTERNS IN LATE MIDDLE AGE MALES: AN EEG STUDY. EEG J., Aug. 1967, 23(2), 168-171. (University of Florida, Gainesville, Fla.).

The electroencephalogram (EEG) of sixteen 50-60 year old males was recorded and analyzed for the last three nights of sleep in the laboratory. The sleep of this group of subjects showed a marked reduction in the amount of EEG defined stage 4 sleep when compared with a group of younger subjects. In addition the group of older subjects showed an regressive distribution of stage 0 toward the last third of sleep. Four alternative hypotheses were examined in order to account for a decline in stage 4 sleep time by this age. None of these were sufficiently appealing to accept.
R 6

12,952
Walter, W.G., Cooper, R., Crow, H.J., McCallum, W.C., et al. CONTINGENT NEGATIVE VARIATION AND EVOKED RESPONSES RECORDED BY RADIO-TELEMETRY IN FREE-RANGING SUBJECTS. EEG J., Sept. 1967, 23(3), 197-206. (Burden Neurological Institute, Bristol, England).

Records were obtained of the electroencephalogram (EEG), pulse rate, respiration, evoked responses and Contingent Negative Variation (CNV) in four normal subjects and three patients with intracerebral electrodes. The subjects were free to move about within 30 meters of the receiving aerial. Auditory stimuli, synchronized with the operation of average response computers, were transmitted to the subjects by a separate radio-control link. These were used as conditional and imperative signals to the subjects to perform various tasks. Responses to the signals were averaged on line with two barrier-grid tubes and a 2-channel ophthalmograph and the intrinsic rhythms were analysed with a 2-channel frequency analyser. The pulse rate was indicated by a cardiotachometer. The initial responses and CNV during the reception of paired auditory signals were similar to those seen with direct connection, provided that the subjects were engaged in some task related to the signals. The amplitude of the intracerebral responses to the conditional and imperative stimuli in the patients with implanted electrodes was reduced when the scalp CNV was attenuated by isolation or distraction. During the performance of fairly complex tasks following the auditory signals, the CNV terminated only at the completion of the task, not at the moment of muscular effort. The radio-control link was also used to instruct an experimenter when to toss a ball to a subject or to feint. In this situation also the CNV developed only when the subject was sure the ball was in the air and terminated when it was caught. These observations suggest that the interactions of evoked responses and CNV seen in laboratory conditions also accompany normal activity and the performance of everyday tasks.
R 19

12,953
Brazil, E.M., Ritvo, E.R., Carr, E.M., La Franchi, S., et al. THE EFFECT OF SLEEP ONSET ON THE AUDITORY AVERAGED EVOKED RESPONSE. EEG J., Oct. 1967, 23(4), 331-341. (Neuropsychiatric Institute, University of California, Los Angeles Calif.).

The auditory averaged evoked response (AER) was measured at the vertex in normal children and adults during the transition from wakefulness to sleep and throughout the night. The amplitude of wave N_2 at sleep onset was compared to values obtained during subsequent non-REM (rapid eye movement) sleep. The largest amplitude of wave N_2 of the auditory AER occurred within 10 min. of sleep onset regardless of state of consciousness. The influence of sleep onset per se on wave N_2 amplitude was greater than the effect of stage of sleep.
R 12

12,954
UCLA Brain Information Service. INDEX TO CURRENT LITERATURE. EEG J., Nov. 1967, No. 4, 49A-64A. (Brain Information Service, University of California, Los Angeles, Calif.).

The index provides as full coverage as space permits of current literature dealing with electrophysiological recording of neural processes. Citations are classified under one (or rarely more) of the following headings: a) General and review articles and books. b) Methodology, including instrumentation techniques and mathematical and statistical procedures for analysis of electrophysiological data. c) Disease states, including trauma. d) Drug effects, including normal body constituents used in supraphysiological doses. e) Experimental studies on animals. f) Experimental studies on human subjects. g) Receptor potentials. h) Sleep, including only those concerned with the phenomenology of sleep. i) Electromyography, including nerve conduction studies. In all cases citations are classified only under the heading most descriptive of the primary concern of the paper and not under those descriptive of methods employed.
R Many

32,955
Allison, T. & Goff, W.R. HUMAN CEREBRAL EVOKED RESPONSES TO [illegible] STIMULI. EEG J., Dec. 1967, 23(6), 558-560. (US Veterans Administration Hospital, West Haven, Conn. & Yale University School of Medicine, New Haven, Conn.).

Presentation of brief pulses of odorized air to human subjects induces cerebral electrical activity which can be recorded by response averaging. The response is largest in the vertex region and consists mainly of a positive wave with a peak latency of 450-550 msec. It has distinguishing characteristics from vertex potentials evoked in other senses. Evidence suggests that the response may be evoked primarily by stimulation of olfactory receptors, but the possibility of nasal trigeminal afferent stimulation is evaluated.
R 14

32,956
Harter, M.R. EFFECTS OF CARBON DIOXIDE ON THE ALPHA FREQUENCY AND REACTION TIME IN HUMANS. EEG J., Dec. 1967, 23(6), 561-563. (University of Arizona, Tucson, Ariz.).

The effects of acute exposure (5 min.) to carbon dioxide (0-7.9%) on the electroencephalograms (EEGs) and reaction times of five humans were investigated. Alpha frequency and alpha amplitude were recorded from the central and from the occipital-parietal areas of the scalp while subjects reacted with their right index finger to flashes of light. Variance analyses indicated that the percentage CO_2 inhaled significantly affected alpha frequency and reaction time. Alpha frequency and reaction time were significantly faster under the 0-5.5% CO_2 conditions than under the 7.9% CO_2 condition. A slight increase in alpha frequency and decrease in reaction time were evident under the 3.5 and 5.5% CO_2 conditions as compared to the 0 and 1.5% CO_2 conditions.
R 12

32,957
Very, P.S. DIFFERENTIAL FACTOR STRUCTURES IN MATHEMATICAL ABILITY. Genet. Psychol. Monogr., May 1967, 75(Second Half), 169-207. (Psychology Dept., University of Rhode Island, Kingston, R.I.).

Quantitative, verbal, and reasoning factors were investigated in an effort to measure and describe mathematical ability. A battery of 30 tests was administered to 355 male and female college students. t-tests for differences between male and females' performances were performed. Results of the total group, of males only, and females only were factor analyzed. A comparison between males and females indicated a differential factorial structure, especially in the reasoning and spatial abilities. Cultural pressures for greater exposure to and superior performance in mathematics appear to have increased and sharpened the males' abilities; in the reasoning and spatial test areas the males were superior in both relative performance as well as the actual number of ability factors possessed.
R 16

32,958
Teele, J.E. CORRELATES OF VOLUNTARY SOCIAL PARTICIPATION. Genet. Psychol. Monogr., Nov. 1967, 76(Second Half), 165-204. (Harvard University, Cambridge, Mass.).

This study constituted an inquiry into the explanation of social isolation. The basic data of the research were the responses submitted by 649 subjects during a two-hour interview. The dependent variables of the study were four measures of voluntary social participation, including participation in voluntary associations, visits with friends, participation in social hobbies, and a combined measure of social isolation. Independent variables of the study included a variety of sociocultural variables. In addition, 12 personality variables were utilized as independent variables. The chief focus of the study was upon the relationships that existed between the independent and dependent variables. These variables were all intercorrelated, for males and females separately, and a number of zero-order relationships were discovered. Subsequently, higher-order analyses were undertaken. In addition to sex, social class (indexed by Warner's Index of Social Class) turned out to have strong explanatory power. With respect to the 72 hypotheses tested, 24 statistically significant relationships were found for females and seven such relationships were found for males. Of these, all but one--predictability of life among females--are in the hypothesized direction. There were 21 hypotheses oriented around relationship between sociocultural factors and participation; of these, 13 were supported for females and three for males. Among the 11 hypotheses involving personality characteristics, 10 were supported for females and four for males. More significant relationships exist when the combined measure is employed than for any of the individual participation variables.
R 34

32,959
Nelson, Ravenna. PERSONALITY CHARACTERISITCS AND DEVELOPMENTAL HISTORY OF CREATIVE COLLEGE WOMEN, Genet. Psychol. Monogr., Nov. 1967, 76(Second Half), 205-256. (Personality Assessment & Research Institute, University of California, Berkeley, Calif.).

This study is concerned with young women who were regarded by their college faculty as creative. It attempts to demonstrate that these women had as salient characteristics the same traits that have been shown to characterize creative men or have been hypothesized to characterize the creative person generally. It then attempts to show the continuity of these characteristics and the way in which they made the life of the creatives different from that of other young women. Findings were that an interest in creative symbolic activity and a high aspiration level characterized the creatives at least as far back as the late juvenile period. Results for parents were less clear. The creatives were found to have had relationships of about equal intensity with both parents; also, they appeared to have prepared during the late juvenile period, to have withdrawn in adolescence, to have shown strong intellectual interest and career orientation in college, and to have continued in creative development after college. Personality differences among the creatives were related to the "accommodative strategy" used in combining work and marriage. The creatives who became inactive after graduation appeared to be finding self-fulfillment in the roles of wife and mother, but to have less strong creative traits than the other creatives and to have married husbands who had less strong creative traits.
R 45

32,960
Baker, P.T., Buskirk, E.R., Kollias, J. & Mazess, R.B. TEMPERATURE REGULATION AT HIGH ALTITUDE: QUECHUA INDIANS AND U.S. WHITES DURING TOTAL BODY COLD EXPOSURE. Hum. Biol., May 1967, 39(2), 155-169. (Pennsylvania State University, University Park, Penn.).

Young adult males at high altitude (4050 meters) were exposed to total body cold while resting supine in the nude. There were two 120-minutes exposures at 10°C. and one at 15°C. The Quechua Indian highland natives, in comparison to partially acclimatized U.S. Whites, showed higher mean-weighted skin temperatures, and in particular, higher digital temperatures, before and during exposure. Rectal temperatures were also higher in the Quechua, but this difference might be abolished with repeat exposures or longer exposure periods. Total oxygen consumptions were similar in the two groups during the first hour of exposure, but in the final hour the Whites showed a greater metabolic increase than the Indians. However, relative to surface area, the smaller Indians had the greater oxygen-consumption during the initial hour, while the two groups were similar in the final hour. The Indians therefore showed higher heat production, and also higher heat loss, particularly from the extremities, in comparison to Whites.
R 10

32,961
Mfell, W.E., Ashcroft, M.T., Lovell, H.G. & Moore, F. A LONGITUDINAL STUDY OF THE DECLINE OF ADULT HEIGHT WITH AGE IN TWO WELSH COMMUNITIES. Hum. Biol., Dec. 1967, 35(4), 445-454. (Epidemiological Research Units, MRC, University of the West Indies, Kingston, Jamaica).

The heights of 336 men and 405 women in a Welsh mining valley, the Rhondda Fach, and of 428 men and 430 women in a neighbouring agricultural area, the Vale of Glamorgan, were remeasured by the same observer after intervals of 6 and 8 years respectively. From the changes in height recorded for individuals, the mean annual height decrements over decades of age from 25 to 85 years have been estimated. The decline in height started earlier in women than in men, and occurred earlier and to a greater extent in the mining than in the agricultural population. Height declined at an accelerating rate after the age of 35 years. It was estimated that by 70 years of age Vale men would be 1.7 cm (centimeters), Rhondda men 3.6 cm, Vale women 3.5 cm, and Rhondda women 4.3 cm shorter than they had been at age 25. Cross-sectional data for these four groups showed differences in height between subjects aged 25 and 70 to be about 7 cm, 6.2 cm, 7.2 cm and 6.0 cm respectively. The differences between these figures may be largely attributable to secular changes in living standards so that younger subjects have attained a greater adult height than did their elders, but the picture is complicated by previous migration of taller subjects from the areas, leaving residual populations of shorter stature.
R 8

32,962
English, W.K., Engelbart, D.C. & Berman, M.L. DISPLAY-SELECTION TECHNIQUES FOR TEXT MANIPULATION. IEEE Trans. on Hum. Factors in Electronics, March 1967, HFE-8(1), 5-15. (Stanford Research Institute, Menlo Park, Calif.).

Tests and analysis to determine the best display-selection techniques for a computer-aided text-manipulation system reveal that the choice does not hinge on the inherent differences in target-selection speed and accuracy between the different selection devices. Of more importance are such factors as the mix of other operations required of the select-operation hand, the ease of getting the hand to and gaining control of a given selection device, or the fatigue effects of its associated operating posture. Besides a light pen, several cursor-controlling devices were tested, including a joystick and a device developed by the Stanford Research Institute known as a "mouse." The study was aimed directly at finding the best display-selection means for our own text-manipulation system but generalizations applicable to other types of on-line systems were derived.
R 6

32,965
Ellis, T.O. & Sibley, W.L. ON THE DEVELOPMENT OF EQUITABLE GRAPHIC I/O. IEEE Trans. on Hum. Factors in Electronics, March 1967, HFE-8(1), 15-17. (Rand Corporation, Santa Monica, Calif.).

The desire for direct interaction between man and machine has led to the study of computer interpretation of free-hand motions of a stylus and the "real-time" responses to these motions. An operating environment is discussed, utilizing elements of pictorial and verbal languages.
R 6

32,966
Hombrackle, O.O. THE COMPUTER GRAPHICS USER/MACHINE INTERFACE. IEEE Trans. on Hum. Factors in Electronics, March 1967, HFE-8(1), 17-20. (University of California, Berkeley, Calif.).

In many instances, computer graphics can provide a powerful, rapid man-machine interface by proper application of simple pattern recognition techniques. The techniques briefly discussed are those used to classify real-time sequences of x, y coordinates such as occur with several graphical input devices, including the RAND tablet. Several examples show how graphics can improve a class of editors and debuggers generally operated with keyboard/printer consoles.
R 12

32,967
Brown, D.B. ALTERNATIVES TO HANDPRINTING IN THE MANUAL ENTRY OF DATA. IEEE Trans. on Hum. Factors in Electronics, March 1967, HFE-8(1), 21-32. (Sylvania Electronic Systems, Waltham, Mass.).

Many automated data-handling systems still require the handprinting of entries on special forms as an initial step. This investigation sought and evaluated methods for bypassing handprinting in the manual entry of data into computers. Three laboratory experiments were performed to obtain data on human performance rates in various input modes, including writing, printing, marking, and keying with both print and scope feedback. It is estimated that conversion to new input methods might initially slow down the input rate of analysts who formerly handprinted their entries but that practice would be likely to restore former speeds.
R 13

32,968
Grant, E.E. & Sackman, H. AN EXPLORATORY INVESTIGATION OF PROGRAMMER PERFORMANCE UNDER ON-LINE AND OFF-LINE CONDITIONS. IEEE Trans. on Hum. Factors in Electronics, March 1967, HFE-8(1), 33-48. (System Development Corporation, Santa Monica, Calif.).

This is the first known study comparing the performance of programmers under controlled conditions for a standard task. An experiment was conducted to compare the performance of programmers working under conditions of on-line and off-line access to the computer. Two groups of six programmers each, comprising a total sample of twelve subjects, coded and debugged two types of programs under on-line and off-line conditions in accordance with a Latin-Square experimental design. The on-line condition was the normal mode of operation for the System Development Corporation Time-Sharing System; the off-line condition was simulated using a two-hour turnaround time. Statistically significant results indicated faster debugging under on-line conditions. Perhaps the most important practical finding of this study, overshadowing on-line/off-line differences, concerned the large and striking individual differences in programmer performance. Attempts are made to relate observed individual differences to objective measures of programmer experience and proficiency through factorial techniques. In line with the exploratory objectives of this study, methodological problems encountered in designing and conducting this type of experiment are described, limitations of the findings are pointed out, hypotheses are presented to account for the results, and suggestions are made for further research.
R 12

32,969
Lawson, B.W. "AN EXPLORATORY INVESTIGATION OF PROGRAMMER PERFORMANCE UNDER ON-LINE AND OFF-LINE CONDITIONS." IEEE Trans. on Hum. Factors in Electronics, March 1967, HFE-8(1), 48-51. (Electrical Engineering Dept., University of California, Berkeley, Calif.).

The paper by Grant and Sackman (HEIAS No. 32,966), "An Exploratory Investigation of Programmer Performance Under On-Line and Off-Line Conditions" is discussed critically. Primary emphasis is on this paper's failure to consider the meaning of the numbers obtained. An understanding of the nature of an on-line system is necessary for proper interpretation of the observed results for debugging time, and the results for computer time are critically dependent on the idiosyncracies of the system on which the work was done. Lack of attention to these matters cannot be compensated for by any amount of statistical analysis. Furthermore, many of the conclusions drawn and suggestions made are too vague to be useful.
R 11

32,968
Bobrow, D.G. PROBLEMS IN NATURAL LANGUAGE COMMUNICATION WITH COMPUTERS. IEEE Trans. on Hum. Factors in Electronics, March 1967, HFE-8(1), 52-55. (Bolt Beranek & Newman Inc., Cambridge, Mass.).

This paper gives an overview of the problems involved in the construction of a computer-based question-answering system designed to interact with the user in English. The system is viewed as containing five distinct parts: a parser, a semantic interpreter, an information storer, an information retriever, and an English output generator. There is a need for extensive interaction among these subsystems, and between the subsystems and the user. Examples are given of the type of processing done by each subsystem, and the nature of the possible interactions. The syntactic analysis described is based on a Chomsky type of transformational grammar. The semantic store is characterized by a form of the predicate calculus, with additional algorithms for computation, and structures designed for fast access to relevant data.
R 12

32,969
Rath, G.J. THE DEVELOPMENT OF COMPUTER-ASSISTED INSTRUCTION. IEEE Trans. on Hum. Factors in Electronics, June 1967, HFE-8(2), 60-63. (Industrial Engineering & Management Science Dept., Northwestern University, Evanston, Ill.).

Development of computer-assisted instruction (CAI) at the IBM Research Center, the Decision Sciences Laboratory of Hanscom Air Force Base, the Systems Development Corporation, the University of Illinois, and Bolt Beranek and Newman is reviewed. This review covers the period 1958-1961.
R 22

32,970
Bitzer, D.L., Hicks, B.L., Johnson, R.L. & Lyman, Elisabeth R. THE PLATO SYSTEM: CURRENT RESEARCH AND DEVELOPMENTS. IEEE Trans. on Hum. Factors in Electronics, June 1967, HFE-8(2), 64-70. (Coordinated Science Lab., University of Illinois, Urbana, Ill.).

The PLATO computer-based teaching system is discussed. Current research activities are described, including research in teaching methods. New content areas and future developments are pointed out.
R 21

32,971
Hayes, Sylvia R. COMPUTER-BASED SUBSYSTEMS FOR TRAINING THE USERS OF COMPUTER SYSTEMS. IEEE Trans. on Hum. Factors in Electronics, June 1967, HFE-8(2), 70-75. (USAF Electronic Systems Div., AFSC, Hanscom Field, Bedford, Mass.).

This paper examines the training problems generated by computer-based information systems, and it describes the role of the computer in solving these training problems. The design and development of a model for a computer-based instructional subsystem for a military information system is outlined.
R 9

32,972
Uhr, L. TOWARD THE COMPILATION OF BOOKS INTO TEACHING MACHINE PROGRAMS. IEEE Trans. on Hum. Factors in Electronics, June 1967, HFE-8(2), 81-84. (Computer Sciences Dept., University of Wisconsin, Madison, Wisc.).

A computer program is described which attempts to compile written text into teaching machine programs. A discussion of the nature of the output is included. Several strategies are outlined.
R 4

32,973
Feurzeig, W. NEW INSTRUCTIONAL POTENTIALS OF INFORMATION TECHNOLOGY. IEEE Trans. on Hum. Factors in Electronics, June 1967, HFE-8(2), 84-88. (Bolt Beranek & Newman Inc., Cambridge, Mass.).

Two types of instructional interactions between a computer system and a student are in current use. In one type, the computer is assigned the dominant role in controlling the interaction. In the other, the student is given considerable freedom to manipulate the computer system throughout the interaction. Instructional systems exemplifying both types of interactions are described.
R 5

32,974
Pask, G. THE CONTROL OF LEARNING IN SMALL SUBSYSTEMS OF A PROGRAMMED EDUCATIONAL SYSTEM. IEEE Trans. on Hum. Factors in Electronics, June 1967, HFE-8(2), 88-93. (System Research Ltd., Richmond, Surrey, England).

The paper describes how an effective instructional subsystem involves a game-like interaction between student and teaching machine in the context of a variety of skills. A control model is used to predict the behavior of subjects in using specific skills.
R 25

32,975
Silvern, Gloria M. & Silvern, L.C. A GRADUATE LEVEL UNIVERSITY COURSE IN METHODS OF COMPUTER-ASSISTED INSTRUCTION. IEEE Trans. on Hum. Factors in Electronics, June 1967, HFE-8(2), 96-102. (Education & Training Consultants Company, Los Angeles, Calif.).

The curriculum outline, i.e., the type of computer exercises and programs used in a course which teaches computer-assisted instruction programmers, is discussed. The objectives of the course as well as composition and performance of one class are described.
R 8

32,976
Pew, R.W., Duffendack, J.C. & Fensch, Linda K. SINE-WAVE TRACKING REVISITED. IEEE Trans. on Hum. Factors in Electronics, June 1967, HFE-8(2), 130-134. (Human Performance Center, University of Michigan, Ann Arbor, Mich.).

A study of sine-wave tracking is reported which illustrates the extent to which the predictability of the input and of the control device dynamics can be utilized with extended practice. Analysis of the error power spectra establishes the presence of a stable source of noise power in the operator's output that has implications for deriving models of manual tracking performance.
R 9

32,977
Bydikov, A. SAMPLING WITH ADJUSTABLE FREQUENCY IN THE HAND MOVEMENT CONTROL SYSTEM. IEEE Trans. on Hum. Factors in Electronics, June 1967, HFE-8(2), 135-140. (Institute of Physiology, Academy of Sciences, Sofia, Bulgaria).

Experiments are performed to test the hypothesis of intermittency on the hand movement control system, especially the role of inertia in muscle tone level on the sampling frequency. Results indicate positive adaptation of sampling to these variables.
R 14

32,978
Hoffman, C.S. & Sweeney, J.S. AN EXPERIMENTAL INVESTIGATION OF RADAR TARGET DESIGNATION TRACKING. IEEE Trans. on Hum. Factors in Electronics, June 1967, HFE-8(2), 141-148. (Autonetics, North American Aviation, Inc., Anaheim, Calif.).

This paper describes a study of radar designation performance in a simulated high speed, low altitude aircraft. Hypotheses were derived by means of closed-loop analyses for combinations of aircraft velocity, antenna scan rate, continuous versus discrete cursor generation, and cursor stabilization at aircraft velocity versus nonstabilized cursor. The results of the study showed that best performance was attained using a continuous cursor at high scan rates. Cursor stabilization improved performance only with the discrete cursor. Indications were that the human performed as a linear operator in this control situation.
R 2

32,979
Williams, P.R., Harper, H.P. & Kronholm, H.B. AN EVALUATION OF AN INTEGRATED V/STOL DISPLAY CONCEPT. IEEE Trans. on Hum. Factors in Electronics, June 1967, HFE-8(2), 150-165. (Norden Div., United Aircraft Corporation, Norwalk, Conn.).

This paper is concerned with the evolution and evaluation of an integrated electronic display for V/STOL flight. Such design considerations as vehicle dynamics, handling qualities, and mission requirements are discussed. Data are presented on the performance improvements obtained with a representative display when compared with conventional instruments in two simulated tasks.
R 6

32,980
Troxel, D.E. EXPERIMENTS IN TACTILE AND VISUAL READING. IEEE Trans. on Hum. Factors in Electronics, Dec. 1967, HFE-8(4), 261-263. (Electronics Research Lab., Massachusetts Institute of Technology, Cambridge, Mass.).

The tactile sense is an important modality that can be used to present information to the blind. The experiments reported compared reading efficiencies of the tactile and visual senses. The tactile stimuli were administered with pneumatically operated poke probes or with a stenotype machine operated in reverse. Average visual reading speeds of 19.5 wpm were measured for letter-at-a-time and 108.5 wpm for word-at-a-time presentations of simple English prose. This suggests that the subjects were stimulus-rate-limited rather than comprehension-limited. A tactile reading rate of 18 wpm was obtained with a letter-by-letter presentation. With a word-at-a-time tactile presentation, one subject read lists of random words at an average of 44 wpm. The performance of the tactile and visual senses is clearly comparable when text is presented a letter at a time. When a word-at-a-time presentation was used, the tactile reading rate was approximately 40 percent of the visual reading rate. It is likely that the major reason for the disparity between the performance of the tactile and visual senses was because of the context available in the visual reading experiments. The principle limitation to information intake appears to be cognition, and not the sensory channel that is employed.
R 6

32,981
Perry, B.L. THE SYSTEM APPROACH TO THE DESIGN OF AN OPTICAL LANDING DISPLAY. IEEE Trans. on Man. Factors in Electronics, Dec. 1967, HFE-8(4), 269-278. (USN Research Lab., ONR, Washington, D.C.).

The general safety of landing aircraft aboard carriers is of utmost importance to the Navy. Reduction of the accident rate is best accomplished by a general increase in total system precision. Analysis of the closed-loop man-machine system, as presently configured, located two prime sources of system inaccuracy in the use of the current display. Its deficiencies are a) insufficient display gain or sensitivity, and b) the absence of a direct presentation of lead information. A new display was developed to provide optimum guidance information to the pilot in a manner that is compatible with his vehicular control capabilities. The Rainbow Optical Landing System provides high-gain lead information in the form of a color-sequence coded indication of error in rate of descent. The Altitude Rate Command (ARC) System, an outgrowth of the basic Rainbow System, provides the same rate error information by means of an intensity-sequence coded signal. In addition, on-glide-path and binary high-low information are provided by color coding the sequencing light of the ARC system. Both displays are optical-geometrical systems that require no mechanical or electronic sensing of flight parameters. A high level of accuracy is achieved in using either display because of three outstanding features: a) display sensitivity independent of range, b) provision of a quickening term, and c) sensitivity of display to angular rate inversely proportional to error from glide path.
R 9

32,982
Illuminating Engineering Society. LIGHTING PROGRESS--1966. Illum. Engng., Jan. 1967, 62(1)Sec. 1, 1-23.

Progress has continued in 1966 with innovations throughout all phases of the lighting industry. For example, in the light source field, new high-intensity discharge lamps are changing commercial as well as industrial lighting techniques. At the same time, low-voltage incandescent systems are adding glamour and interest to residential garden lighting. New concepts of architectural lighting show a growing trend in outdoor floodlighting. In addition, outdoor area illumination is increasing the amount of leisure and recreational time, both in urban and suburban communities. Electrical space conditioning has taken great strides in the commercial lighting field while family rooms within the home are being subtly illuminated with more built-in lighting. Very unusual uses and special applications of light sources and/or equipment in fields other than lighting have been developed this year. In education, the big news is the publication of the Fourth Edition of the Illuminating Engineering Society Lighting Handbook. All in all, 1966 has been a year of significant progress. This article illustrates, with brief notes, many new lighting installations.

32,983
Illuminating Engineering. A DRAMATIC USE OF BLACK LIGHT. Illum. Engng., Jan. 1967, 62(1) Sec. 1, 27-29.

Little use is made of black light in exterior applications; its effect is always sharply dramatic. Where, for all purposes, ambient light is nonexistent and where an object is involved, rather than a large area, black lighting can be not only a successful solution, but a very practical one as well.

32,984
Illuminating Engineering. LIGHTING KEEPS ABREAST OF THE MICROELECTRONIC AGE. Illum. Engng., Jan. 1967, 62(1)Sec. 1, 32-37.

Although microelectronics has revolutionized man's knowledge of the universe through space exploration and satellite communications, it has not changed his eye. Even working through a microscope while handling the tiny parts essential in the manufacture of all miniaturized electronic equipment is not enough to give his eye all the help it needs to cope with the new world: He needs help from a lighting system tailored to meet the new visual strains.

32,985
Eastman, A.A. VISIBILITY OF OFFICE-TYPE TASKS UNDER VARIOUS LIGHTING MATERIALS--PART II. Illum. Engng., Jan. 1967, 62(1)Sec. 1, 54-63. (Lamp Div., General Electric Company, Cleveland, Ohio).

The purpose of this study is to continue the investigation of the possible correlation between visibility and contrast values of several office- and school-type tasks as effected by various viewing angles, luminaire arrangements and lighting materials. In this report three arrangements were used: one-two- and three-row patterns. It was determined previously that for a full luminous ceiling none of the lighting materials used could be considered as having any advantage over the others as it effected the visibility of several office-type tasks. In this study the effect on visibility of ceiling pattern and lighting materials will be discussed. The effectiveness of the different criteria in revealing differences in visibility also will be covered.
R 2

32,987
Illuminating Engineering. THE VERTICAL COMPONENT IS WHAT COUNTS FOR INDUSTRIAL LIGHTING. Illum. Engng., Feb. 1967, 62(2), 86-87.

One act sometimes underemphasized in analyzing lighting is the vital importance of the vertical component in illumination for industrial operations. The vertical component is that part of the light distribution that produces vertical footcandles, and many of the tasks in an industrial operation are vertical, not horizontal. Reading instruments and gauges, operating cutters, machine controls, valves, and inserting and inspecting bolts and nuts--all these are vertical tasks that call for illumination with a high vertical component. This article describes the solution to lighting a large machine shop with a 17 ft. high ceiling.

32,988
Illuminating Engineering. ANTI-FOG LIGHTING IN EUROPE. Illum. Engng., Feb. 1967, 62(2), 88-89.

A critical spot for fog is the bridge where the Autobahn from Amsterdam to the Ruhr in West Germany crosses the Lippe River, near Wesel. The Lippe is a focal point for the fog since it carries off warm water discharged by factories in the area; the fog bank often occurs when the air cools down, especially in the evening or at night. Fast-moving traffic coming along the road through dry atmosphere and good visibility can hit the fog, brake suddenly and often find itself in a pile-up. Until recently there had been no optical aids of any sort for the motorist. The West German Transport Ministry found a solution which has had good results. Cylindrical lanterns, about 32 inches high and 16 inches in diameter, are placed along the center crash rail of the bridge, some 36 inches above ground level. Luminaires hold high-pressure 125-watt clear mercury lamps mounted in a longitudinal parabolic reflector. A flat mirror, set at a 45-degree angle behind the beam of the horizontal discharge arc, intercepts the light and directs it through an arched molded plastic window onto the road surface in a fan-shaped beam, much in the same manner as a Fresnel lens. The low lighting system is primarily one that provides guidance, such as tail lights of a car ahead help maintain a driver's orientation. It is a lighting plan of relatively low cost that has proved helpful to motorists driving through fog.

32,989
Burkarth, J.L. GROUND ILLUMINATION USING AIRBORNE ELECTRICAL LAMP SOURCES. Illum. Engng., Feb. 1967, 62(2), 90-97. (LTV Electrosystems, Inc., Greenville, Tex.).

An airborne illumination system is described which is capable of a mean flux density of 0.04 lumen per square foot over an area greater than two miles in diameter. The self sufficient system is designed for installation in a C-130 aircraft.

32,990
Rex, C.H. ROADWAY LIGHTING FOR THE MOTORIST. Illum. Engng., Feb. 1967, 62(2), 98-110. (General Electric Company, Hendersonville, N.C.).

The objectives of this paper are: a) To help provide an improved understanding of the night motorist's inherent and typical handicaps and those disabilities induced upon him by attempting to drive at night on unlighted or poorly lighted roadways; b) To increase understanding of new developments and the fundamentals of roadway lighting. Roadway lighting should be engineered, designed and installed for the benefit of the night motorist's visibility if it is to accomplish fully its major purpose of accident prevention with visual comfort, convenience and economy. The night motorist pays for roadway lighting, but now with rare exceptions does not receive its benefits.
R 34

32,991
Husby, O.E. CONTEMPORARY PLASTICS IN OUTDOOR LIGHTING. Illum. Engng., Feb. 1967, 62(2), 111-114. (Lighting Div., Westinghouse Electric Corporation, Cleveland, Ohio).

This paper attempts to illustrate the comparisons and predictions which may be made for the performance in service of certain plastics based on laboratory results. Parallel comparisons are made between transmission efficiencies and yellowness indices.
R 2

32,992
Mellin, R. PROGRESS REPORT ON LIGHTING HIGHWAY SIGNS: THE USE OF MERCURY LAMPS. Illum. Engng., Feb. 1967, 62(2), 115-120. (Holophane Company, Inc., New York, N.Y.).

The use of mercury lamps for sign lighting appears to present a new design choice for the highway planner. Developments in highway signing seem to be leading to higher signs. Some of these planned signs are as high as 18 feet. The mercury system has the flexibility to cope with lighting these signs by changing its main beam angle. Certainly, from every important standpoint, this new system deserves careful study by everyone planning to light signs.
R 6

32,993
Illuminating Engineering. A SPECULATIVE HOME WITH 7.4 KW OF BUILT-IN LIGHTING. Illum. Engng., March 1967, 62(3), 133-135.

Builders of speculative homes are just beginning to realize that some kind of built-in lighting other than the wiring and wall outlets can be as much of a come-on as wall-to-wall carpeting. The first efforts in this direction have been on a small scale. Therefore this installation seems all the more ambitious, since the lighting units, dimmers and lamps, even before installation, cost the builder three per cent of the market value of the home.

32,994
Jones, B.F. A FLEXIBLE SYSTEM OF EVALUATING LUMINAIRE BRIGHTNESSES. Illum. Engng., March 1967, 62(3), 143-153. (Scott-Holman Company, Inglewood, Calif.).

A procedure which gives guidance in the selection of luminaires and makes it possible to determine the range of conditions for which a given luminaire is suitable is described. This system is not intended to substitute for the accurate visual comfort calculation, but to supplement it in allowing the selection of luminaires which will do a decent job from a comfort standpoint. It should not be employed as a standard or as a limit, but specifically as a guide.
R 6

32,995
Einhorn, H.D. & Einhorn, P.D. INHERENT EFFICIENCY AND COLOUR RENDERING OF WHITE LIGHT SOURCES. Illum. Engng., March 1967, 62(3), 154-158. (University of Cape Town, Cape Town, South Africa).

A computer study of metameric spectra shows that the most efficient white illuminant would consist of two complementary wavelengths only, in the yellow and blue regions of the spectrum. Quantitative relations between efficiencies and colour rendering indices are established for a set of metameric whites obtained by gradually trimming the spectral range of a standard illuminant. Conclusions of potential value for the design and assessment of fluorescent and other lamps can be drawn.
R 4

32,996
Logan, M.L. THE RELATIONSHIP OF LIGHT TO HEALTH. Illum. Engng., March 1967, 62(3), 159-167. (Melaphane Company, Inc., New York, N.Y.).

The tremendous influence of abundant, cheap artificial light on the health, prosperity, growth and history of a nation has not yet been recognized by political leaders, economists or historians. Light is the latest of the climatic influences to be brought under local control, and its effect has been a greater and faster surge forward of mankind than has followed the introduction of any previous climatic control. Until now recommended lighting levels have been based on those needed to meet only one objective; the minimum levels at which study, work, or night traffic or recreation can be carried out. The idea that artificial lighting is an expense, to be cut as much as possible, still lingers; that is why the lighting industry has spent so much effort finding out what is the minimum lighting level at which a particular visual operation can be acceptably performed; instead of finding out how much light is needed to promote health, reduce the rate of aging, and increase both the useful life of people and their total life. These more fundamental and larger objectives appear to require higher levels of light than are needed for conscious seeing, and only now are we arriving at a standard of living which permits us to consider what is involved in the larger view. The object of this paper is to bring together some of the widely scattered data which indicate that indoor lighting levels in the median daylight range are desirable for the public good, in the hope that research to establish the facts will be stimulated.
R 29

32,997
O'Brien, P.F. & Balogh, E. CONFIGURATION FACTORS FOR COMPUTING ILLUMINATION WITH INTERIORS. Illum. Engng., April 1967, 62(4)Sec. 1, 169-179. (Engineering College, University of California, Los Angeles, Calif. & Columbia Lighting, Los Angeles, Calif.).

Extensive tables of configuration factors useful for the computation of illumination at particular locations on the base of the room cavity are presented. Three room proportions or length-to-width ratios of one, five and 100 are considered in a one-to-ten range of room cavity ratio. The data for the room of five times length-to-width ratio are found to be an approximate median of the data for the other two room proportions. The illumination contribution from the ceiling and from each of the walls may be computed separately with the configuration factor data presented.
R 6

32,998
O'Brien, P.F. & Gomas, A.V. LUMINOUS TRANSFER IN ROOMS WITH SEMIDIFFUSE-SPECULAR SURFACES. Illum. Engng., April 1967, 62(4)Sec. 1, 180-186. (Engineering College, University of California, Los Angeles, Calif. & Northrop Institute of Technology, Inglewood, Calif.).

Basic relationships that allow the prediction of luminous flux transfer in rooms bounded by surfaces that display specular and diffuse reflectance components are developed. The derivation is based on the postulate that the total surface reflectance is the sum of a specular and a diffuse component. Both matrix and network representations of the flux flow are presented. Several examples of the application of the analytical method are presented for representative geometries. The room cavity ratio (RCR) is shown to be useful to describe symmetrical rooms with semidiffuse-specular wall reflectances. Design data for a range of symmetrical room shapes and wall reflectances are presented.
R 10

33,999
O'Brien, P.F. TRANSFER FUNCTIONS FOR SYMMETRICAL ENCLOSURES. Illum. Engng., April 1967, 62(4)Sec. 1, 187-197. (Engineering College, University of California, Los Angeles, Calif.).

A comprehensive table of luminous transfer functions that allow the specification of illumination and luminous emittance distributions in symmetrical rooms is presented for design utilization. The transfer functions for square and infintely long rooms of equal room cavity ratio are found to exhibit differences which are generally less than ten per cent. This effective equality suggests that the transfer functions for the equivalent infinitely long room be employed for detailed design purposes. The configuration factors required for computation of illumination distribution are easily obtained from a scaled elevation view of the infinitely long room.
R 7

33,000
Kowalski, C.R. & Maguire, F.C. AUTOMATIC SCREEN LUMEN PHOTOMETER. Illum. Engng., April 1967, 62(4)Sec. 1, 236-238. (Lighting Div., Sylvania Electric Products, Inc., Danvers, Mass.).

The lighting industry today is faced with more complex measurement problems than ever before. Higher efficiency, speed and accuracy are demanded. The use of operational amplifiers with photocell detectors is one way to approach the linear characteristic desired for a light-measuring device. The proper conditioning of the signal now allows the use of analogue computer techniques to perform laborious and time-consuming calculations without loss in accuracy. The amplifiers may be combined in many configurations and used as the building elements of any desired system or instrument.
R 3

33,001
Weil, A.C. THE PHOTOMETRY OF COLORED LIGHT. Illum. Engng., April 1967, 62(4)Sec. 1, 239-242. (US National Bureau of Standards, Washington, D.C.).

Present day photometers usually incorporate a photosensitor for evaluating the illumination from an unknown source by comparing it with the illumination from a standard source. The photosensitor must be spectrally corrected to provide a sensitivity curve as close as possible to that of the photopic luminous efficiency function of the Committee on Illuminating Engineering (CIE) standard observer. This function is the design goal of a photosensitor-filter combination. An example of the goal and the realized spectral response of a particular phototube-filter combination is described in this note.
R 4

33,002
McCulloch, J.H. & McCulloch, H. FLOODLIGHT PHOTOMETRY WITHOUT SPECIAL PHOTOMETER AND WITHOUT TIPPING LUMINAIRE--A COMPUTER APPLICATION. Illum. Engng., April 1967, 62(4)Sec. 1, 243-245. (Independent Testing Laboratories, Inc., Boulder, Colo. & California Institute of Technology, Pasadena, Calif.).

This note describes a method for making photometric measurements on floodlights by using a high speed digital computer to take floodlight data on vertical polar axis coordinates and compute what the readings would have been in horizontal polar axis coordinates.

33,003
Douglas, C.A. REVIEW OF ELEMENTARY THEORY OF THE PHOTOMETRY OF PROJECTION APPARATUS. Illum. Engng., April 1967, 62(4)Sec. 1, 246-253. (US National Bureau of Standards, Washington, D.C.).

Equations based upon simple geometric relations are developed for the illuminance produced by a projector such as a searchlight, beacon, or floodlight at a distance from the projector. When the beam is rotationally symmetrical but not collimated and the image, virtual or real, subtends a smaller angle at the point of observation than does the objective of the projector, illuminance varies inversely as the square of the distance to the image. If the angle subtended by the image is larger than that subtended by the objective, the illuminance varies inversely as the square of the distance to the objective. The distance at which the two angles are equal is defined as the critical distance. Equations relating critical distance to the radius of the source, the radius of the objective, and the magnification of the system are developed. Approximations for use when the beam of the projector is asymmetric are developed. Very good agreement was found between the computed variation of illuminance with distance and the measured variation of illuminance with distance for a projector forming a virtual image 150 feet behind the objective.
R 6

33,004
Kaestner, P.T. VISUAL SIMULATION. Information Display, March-April 1967, 4(2), 49-54. (Photomechanisms Inc., Huntington Station, N.Y.).

When generating a display from a scale model for the realistic presentation of a view as seen from an aircraft or spacecraft, compromises with the real life situation are inevitable. These occur both in the initial imaging lens and in the final display. Factors such as resolution, light intensity and true perspective influence the imaging characteristics, while problems of parallax and image brightness limit the realism of the display. Fortunately, the choice of the compromises provides acceptable performance for most simulation systems. A typical simulation system is described and illustrated.

33,005
Kinney, G.C. & Showman, Diane J. THE RELATIVE LEGIBILITY OF UPPERCASE AND LOWERCASE TYPEWRITTEN WORDS. Information Display, Sept.-Oct. 1967, 4(5), 34-38. (MITRE Corporation, Bedford, Mass.).

The relative legibilities of common words typewritten in all-uppercase and all-lowercase letters were studied in three experiments. Human subjects identified the words shown one at a time for a short period. All-uppercase printing was found to be significantly more legible than all-lowercase in all three experiments. The "word-form" of all-lowercase words was not found to influence word identification. The use of uppercase letters is recommended for displays.
R 20

33,006
Roscoe, S.N. THE CASE FOR THE MOVING MAP DISPLAY. Information Display, Sept.-Oct. 1967, 4(5), 44-46. (Display Systems Dept., Hughes Aircraft Company, Culver City, Calif.).

A brief history of the moving map display is given. Critical issues in the design of map displays are discussed. These are: What shall be presented, i.e., the information content. How it shall be presented, i.e., the rules for encoding information. How the display shall be supported, i.e., questions of chart logistics.

33,007
Callender, R.B. THE STEREOPTIPLEXER: COMPETITION FOR THE HOLOGRAM. Information Display, Nov.-Dec. 1967, 4(6), 27-31. (Lockheed Aircraft Corporation, Burbank, Calif.).

An objective of this project was to prove the feasibility of stereoscopic photography and viewing in 360° aspect. Scenes in nature and solid objects, either animated or inert, are photographed with nearly conventional techniques and projected in such a way that the audience can surround the playback viewer and see a faithful reproduction of the scene or of the object in true stereo. As the observer changes his position (as with Holography) a smooth change in perspective occurs with no optical aids required at his eye level. Another objective was to provide the basis from which 3-D movies could be made a reality for the theatre going public. Still another objective was to provide a new tool for sales, education, advertising, 3-D X-rays, and military surveillance of remote planets and our moon. Three dimensional views can be represented inside a revolving drum containing a narrow aperture through which observers can see a scanned 360° accurate rendition of objects in nature. The aperture is 1/96th of the closure and hence screen illumination is reduced by 96 due to this fact, but tremendous screen gains are achieved using a "Fresnel lens-cylindrical lenticule diffuser-sandwich" in place of the screen to direct all of the available light to the slit. The picture appears 3-D if viewed with the line joining the two eyes somewhere between horizontal and 45°. The same picture appears 2-D from vertical to somewhere near 45°. The 3-D viewer is simple, uses a small number of parts, it is not critical in adjustment and relatively crude camera equipment is satisfactory. The number of pictures captured per circle depends on the maximum viewing distance from the vertical slit on the viewer's drum. The main objective of this project was realized, and a working model has been successfully constructed.
R 5

33,008
Slocum, G.K., Hoffman, W.C. & Heard, J.L. AIRBORNE SENSOR DISPLAY REQUIREMENTS AND APPROACHES. Information Display, Nov.-Dec. 1967, 4(6), 44-51. (Display Systems Dept., Hughes Aircraft Company, Culver City, Calif.).

There has been a steady, rapid increase in the performance of image-forming sensors in the last few years. The detection range and clutter discrimination performance of air-to-air radars has increased markedly; the resolution and image quality of mapping radar and IR (infrared) sensors used for reconnaissance have improved substantially; the performance of ground mapping radars and the sensitivity of low-light television applicable to tactical aircraft have also improved significantly. In addition, new sensors such as forward-looking infrared mapping sensors have been developed. During this same time period there have been few major improvements and new approaches for displays which can match the performance of these sensors. The problem of displaying the output of these sensors is compounded in many advanced weapon system applications by requirements for alternately displaying the output of several sensors, each with a different format and frame rate on a single time-shared display. In addition, computer driven symbology for aircraft steering must often be simultaneously presented. In many aircraft cockpit applications, the image on this multi-sensor display must be clearly visible with direct sunlight shining on it. A hypothetical two-man advanced tactical aircraft is used as an example in the discussion of requirements and approaches for the sensor or multi-sensor display. Many of the same requirements apply to interceptor, strategic, and reconnaissance systems, but each system has some unique problems and requirements.
R 1

33,009
Brouha, L. ROLE OF CLIMATIC AND ENVIRONMENTAL CONDITIONS IN WEIGHT CARRYING. Industr. Med. Surg., April 1967, 36(4), 257-266. (Physical Fitness Research Unit, University of Montreal School of Hygiene, Montreal, Quebec, Canada).

The reduction in physiologic stress can be evaluated by the lowering of heart rates and body temperatures. The aim is to organize the work so that at the end of the shift the reactions are the same, or nearly so, as they were at the beginning of the day. As a rule, maintaining temperature and humidity as low as ventilation cost permits reduces considerably the physiologic stress upon the cardiovascular system and the thermoregulating mechanisms of the workers; the result is less fatigue and greater efficiency. The pulse rate curves can be used as an index of the stress imposed upon the worker by his activity and the environment in which he performs it. Onset and course of increasing strain leading to fatigue can be detected and work being performed at too great a physiologic cost can be identified. Whether the work itself requires too great an expenditure of energy or whether environmental stress transforms a moderate task into a heavy one can be determined by studying the same operation under varying conditions of environment. It is fully acknowledged that pulse-rate records do not evaluate all the factors affecting work performance. Yet they have repeatedly provided a very useful method for quantitative evaluation of the adaptation of workers to work stresses.
R 3

33,010
Hipskind, H.M. HEARING TESTS IN INDUSTRY. Industr. Med. Surg., June 1967, 36(6), 393-402. (Stritch School of Medicine, Loyola University, Chicago, Ill.).

Prolonged exposure to the noises encountered in many industrial environments can produce a permanent hearing loss. This hearing loss is not amenable to treatment. Normal hearing cannot be restored once a noise-induced hearing loss has been acquired. Since we do not have a "pound of cure," we are forced to use the "ounce of prevention." Occupational hearing loss has haunted the scientific, legal and industrial communities for many years. Millions of dollars are poured by our courts into the pockets of claimants for occupational hearing loss. It is the responsibility of the physician to seek out the answer, whether the hearing loss is related to industrial noise or is related to nonoccupational causes. Comparative provisions for occupational loss in workmen's compensation cases are presented in tabular form.
R 2

33,011
Terrill, J.G., Jr., Harward, E.D. & Leggett, I.P., Jr. ENVIRONMENTAL ASPECTS OF NUCLEAR AND CONVENTIONAL POWER PLANTS. Industr. Med. Surg., June 1967, 36(6), 412-419. (US National Center for Radiological Health, Department of Health, Education & Welfare, Rockville, Md.).

The growth of the nuclear power industry in the last few years and its projected rapid growth gives rise to the question of what will be the effects of this recently competitive source of energy on the already heavily burdened environment. A comparison of fossil fuel power plants and nuclear plants must be made in order to evaluate the relative benefits as compared to the health risks associated with each type of plant. There are inherent difficulties in comparing conventional and nuclear power plants. It is the purpose of this paper to point out some of these difficulties and problems, present some of the data that is currently available, and indicate the activities in which the Public Health Service is engaged that will assist in establishing the relative health risks of these power sources.
R 24

33,012
McGaugh, J.L. CHEMICAL INFLUENCES ON MEMORY. Industr. Rex., Feb. 1967, 9(2), 81-83. (Psychobiology Dept., University of California, Irvine, Calif.).

A number of trends are emerging as a consequence of recent research on experimental modification of memory storage processes. First, although the biological basis of memory has not yet been worked out, this is an extremely active research area and progress is being made. Results indicate that memory storage processes are time-dependent. There also may be several independent processes underlying memory at various times after an experience, and recognition of this possibility will no doubt strongly influence research. Second, research concerned with memory storage must be approached from an interdisciplinary view. It seems clear that researchers in this field will need training in many disciplines. Collaborative efforts will be essential for continued progress. Finally, although the time has not yet arrived, it seems likely that in future years our understanding of memory storage will enable us to develop and use chemical therapeutics in dealing with memory pathology, such as in mental retardation, aphasia, and senile dementia. There is justification for the view that this speculation is not optimistic.

33,013
Radnofsky, M.I. SPACE SUITS. Int. Sci. Tech., Feb. 1967, No. 62, 32-39. (Manned Spacecraft Center, NASA, Houston, Tex.).

No longer is the major problem of designing a space suit simply one of constructing a garment that can be pressurized successfully. With astronauts expected to be out exploring the moon one of these days, suits must be built with joints that move easily enough to permit climbing around on rugged terrain. This requires keeping the suit volume constant at all times, thereby ensuring that minimum work is done on the enclosed gas. The traditional approach is via the so-called soft suit, which is constructed mainly of rubberized fabric. A variety of ingenious bellows and bladder arrangements have been devised to prevent it from ballooning at the joints. Problems still remain, however, and in an attempt to overcome them some designers have turned to "hard" suits of metal and plastic, and others to various hybrid suits. Out of such space-age garment-making will undoubtedly come not one suit but a whole wardrobe for tomorrow's astronauts.

33,014
Giuliano, V.E. HOW WE FIND PATTERNS. Int. Sci. Tech., Feb. 1968, No. 62, 40-51. (Arthur D. Little, Inc., Cambridge, Mass.).

Pattern discovery is more akin to the learning of meaning than to tasks of recognition and recall. Until recently it was expected that computers could generate artificial intelligence for discovery. Even when there are more data than a human can assimilate, as in many problems of big science, discovery remains a computer-aided human process. Patterns are more than a commonality or regularity of data. A pattern is embodied in meaning imparted to the whole, or to various aspects of it. Discovery of a pattern emerges from the stream of data only dimly perceived in one's existence. But patterns can be consciously sought by pragmatic modeling and rational use of logic and calculi. Thus discovery can be enhanced by computer and mathematical techniques of rearranging data.

33,015
Hyatt, A. BEYOND APOLLO. Int. Sci. Tech., March 1967, No. 63, 30-39. (North American Aviation, Inc., El Segundo, Calif.).

The U.S. program to put a man on the moon is already on the wane. It's been an expensive program, but because of it, man has learned more about his planet and its surroundings in these past ten years than he learned in all his previous efforts. The question we now face is what to do with the capability in space exploration we have spent so much effort in acquiring. There are basically four alternatives (aside from complete abandonment, and no one is suggesting that) and a practical program might be built around any one of them--or around a combination of them. The most beneficial of these alternatives in terms of direct return to mankind are programs that continue our present efforts to study and exploit the near-earth environment. A program of extensive manned exploration of the moon is another alternative but is considered somewhat speculative. A third alternative is to launch a manned orbiting laboratory to explore the limits of man's capability in space. The fourth and most ambitious alternative is a manned expedition to Mars in the 1986-1988 time period, for which a manned orbiting lab is an essential precursor. Present estimates indicate that a program including all of these alternatives except the manned exploration of the moon could be undertaken for a cost per year that would not exceed the present level of expenditure relative to the gross national product.

33,016
Herbert, E. SAFETY THINKING. Int. Sci. Tech., March 1967, No. 63, 66-72.

Pressures generated by new government safety standards already are being felt in the technical community. But most responses are still fragmentary, more given to isolated investigations of a problem to be solved rather than a system to be managed. Few automotive engineers performing energy absorption studies yet know enough about biomechanical engineering to correlate impact forces with human injury. Insurance companies aren't sure of the relevancy of their underwriting-oriented data to safety research needs, though they now have commenced a dialogue with the scientific community. Highway researchers, though cautious and inconclusive, show new concern for containing and controlling irrational behavior of drivers.

33,017
Mattson, H.W. TECHNOLOGY AND FOOD. Int. Sci. Tech., March 1967, No. 63, 76-84. (Monsanto Company, St. Louis, Mo.).

Every year the technological content of the food on your table increases. What's more, the technology covers a wider range and appears at more points in the food-production-processing-distribution chain. The impetus for applying the greater technological inputs varies--some increase total production by increasing yields of either the basic agriculture or the processing and preservation operations. Others increase the efficiency of the processor, on the farm or in the food plant and improve his business operations. Some even add to the nutritional value of the food product. By and large, this increased technology will continue to be a phenomenon of the developed world. The collateral inputs of capital and training required are beyond the reach of the underdeveloped nations. However, these people may gain some advantage from high technology products, via import. Certainly, every bit of food wherever produced, will be needed in the decades ahead.

33,018
Hull, E.W.S. TYS INDUSTRIAL ACTION. Int. Sci. Tech., April 1967, No. 64, 57-61.

This is a time in history when we are beginning to undertake in the ocean all of the manifold activities we are accustomed to performing ashore. These activities, and the means for executing them, are calling upon all of our scientific and engineering talents, and thus on all of our industry. Whether we choose to call this growing domain of activity oceanography, ocean engineering, hydrospace, inner space, or oceanology--it is a real domain of going business. It is important, therefore, in a survey article of this sort, that we get a feeling for the industrial effort that is emerging--the kinds of companies, the things they're focusing on, the money they spend, the goods and services they provide (or use). To this end, a chart has been prepared which shows how typical American industries are--variously--dabbling or plunging into the ocean environment. The word "typical" is used advisedly, for this list of 98 companies is by no means the full roster of those in the world ocean market. It could run to 1500-3000 firms--depending upon whether one included or excluded those specializing, for example, in systems, subsystems, bits, parts, and pieces for military submarines; those employed in off-shore oil exploration and production, or those companies that have been connected in traditional ways with the oceans for many years. There are about 1000 firms in the U.S. alone that can be thought of as suppliers of "classical" oceanographic goods and services.

33,018
Garvin, P.L. LANGUAGE AND MACHINES. Int. Sci. Tech., May 1967, No. 65, 63-76. (Bunker-Ramo Corporation, Canoga Park, Calif.).

Natural language research attempts to simplify man's problems of communicating with machines or through machines via automatic translation. Query languages resemble natural language and enable computers to compose answers to a limited variety of questions. But synonymy of words is frequently conditional, so computer programs must recognize semantic ambiguities and syntax as well as have large dictionaries. The automatic translation possible now is really machine-aided. There is strong disagreement whether development of a theory of language should precede the engineering of a reliable methodology for machine translation, for successful, if not perfect, data processing can be based on empirical knowledge.

33,020
Carlson, L.A. LIPID METABOLISM AND MUSCULAR WORK. Federation Proc., Nov.-Dec. 1967, 26(6), 1753-1759. (Internal Medicine Dept., Karolinska Sjukhuset & King Gustaf VIth Research Institute, Stockholm, Sweden).

Lipids are oxidized by muscle tissue during exercise. Two major routes of supply of fatty acids for this oxidation were discussed--transport via blood plasma and local pools. The effect of exercise on the three main components of the plasma lipid transport system--chylomicrons lipoproteins, and free fatty acids--was reviewed; exercise affects all three. Data were presented indicating that exercise reduces the content of esterified fatty acids, mainly triglycerides, of muscle tissue. Physical training lowers the content of triglycerides in plasma and liver.
R 48

33,021
Buskirk, E.R. & Mendez, J. NUTRITION, ENVIRONMENT AND WORK PERFORMANCE WITH SPECIAL REFERENCE TO ALTITUDE. Federation Proc., Nov.-Dec. 1967, 26(6), 1762-1767. (Human Performance Research Lab., Pennsylvania State University, University Park, Penn.).

A brief graphic review has been prepared of both old and more recent efforts to relate food and water requirements to variables associated with climate and physical work. Attention has been paid only to the young man of average body build and stature who works in various environments. In the absence of abnormal climate situations and gross disturbances in thermal balance, the most important factor for determining caloric requirement is physical activity, and for water requirements the important factors are environmental conditions including vapor pressure plus physical activity.
R 43

33,022
Meyer, Jean. NUTRITION, EXERCISE AND CARDIOVASCULAR DISEASE. Federation Proc., Nov.-Dec. 1967, 26(6), 1768-1771. (Nutrition Dept., Harvard School of Public Health, Boston, Mass.).

It is again the age of the great pandemics, with close to half of the men of the Western countries (and an increasing proportion of the women) dying of one disease--cardiovascular disease and, more specifically, coronary catastrophe. This is a disease which may be easier to prevent than to cure. As more evidence becomes available, it becomes clearer that a number of the components of our way of life may be involved in the explosive increase in cardiovascular mortality. A high saturated-fat diet among sedentary individuals seems more likely every day to be an important factor. The superb study of Leren in Oslo (Norwegian Monogr. on Med. Sci., 1966) gives convincing evidence of the importance of decreasing the amount of saturated fat in the diet in order to avoid a second cardiovascular crisis (second coronary, stroke, or angina pectoris). Mounting evidence suggests that cigarette smoking is one of the contributing factors. Untreated hypertension has, of course, long been recognized as predisposing to strokes as well as to coronary. Obesity, particularly in conjunction with hypertension, hypercholesterolemia or heavy cigarette smoking predisposes to heart disease. Excessive fatigue (lack of sleep) may be a factor. Finally, it appears that lack of exercise may be of critical importance in predisposing to heart disease--in part because of the relationship of inactivity to obesity and hypercholesterolemia--in part because of the benefits of exercise per se.
R 13

33,023
Astrand, P-O. DIET AND ATHLETIC PERFORMANCE. Federation Proc., Nov.-Dec. 1967, 26(6), 1772-1777. (Gymnastik-och Idrottshögskolan, Stockholm, Sweden).

The nitrogen excretion does not differ significantly on days of inactivity from days including vigorous activity. The heavier the exercise in relation to the work capacity of the muscle groups involved, the higher is the relative energy yield from carbohydrate, the metabolic respiratory quotient (RQ) approaching or reaching 1.00 during maximal exercise. The diet can markedly influence the interrelation between fat and carbohydrate metabolism. After days of an extreme fat diet, an energy yield from fat will dominate combustion even during exercise. The maximal work capacity is, however, reduced. A high-carbohydrate diet shifts the metabolism toward relatively high energy release from carbohydrate, and improves the capacity for prolonged heavy exercise. The diet on the days before a competition in endurance events may be of the utmost importance for success. The proper preparation for the competition or performance, with a work time exceeding 30-60 min, would be to exercise the same muscles to exhaustion about one week in advance. Then the diet should be almost exclusively fat and protein for some three days which procedure lowers the glycogen content of the exercising muscles low. Thereafter a carbohydrate-rich diet should be taken for the remaining days before the performance. The longer the work time, the more important is this preparation (e.g., marathon running, cross-country skiing, bicycling, hiking, mountaineering or military operations). However, in the long run, whatever the physiological principles for an optimal diet may be, the practical considerations dictate that it has to be acceptable to the individual. If an athlete believes in a food fad or a miracle pill, the fad or the pill may cause him to win, provided, of course, that it is harmless and that his diet is otherwise fully adequate.
R 12

33,024
Pfeiffer, C.C. (Chm.). THE EFFECTS OF NICOTINE AND SMOKING ON THE CENTRAL NERVOUS SYSTEM. Ann. N.Y. Acad. Sci., March 1967, 142(Art. 1), 1-333.

"The series of papers presented in this monograph is the result of a conference entitled 'The Effects of Nicotine and Smoking on the Central Nervous System' held by The New York Academy of Sciences on April 7, 8, and 9, 1966." They have been organized into three parts: basic neuropharmacology of nicotine and smoking, general neuropharmacological aspects of nicotine and smoking, and behavioral and genetic aspects of nicotine and smoking. (HEIAS)
R Many

33,025
Lieberman, J. (Chm.). BIOMEDICAL COMMUNICATIONS: PROBLEMS AND RESOURCES. Ann. N.Y. Acad. Sci., March 1967, 142(Art. 2), 335-545. (US Department of Health, Education & Welfare, Washington, D.C.).

"This series of papers is the result of a conference entitled Biomedical Communications: Problems and Resources, held by The New York Academy of Sciences on April 4, 5, and 6, 1966." The sections deal with present-day and future concerns, strengths and limitations of biomedical communication, the role of motion pictures and television, and the resources and facilities for this area. (HEIAS)
R Many

33,026
Spector, B., Steele, T.K. & Silbert, L.R. A SYSTEMS APPROACH TO TECHNICAL EDUCATION. Ann. N.Y. Acad. Sci., Oct. 1967, 115(Art. 24), 755-778. (Educational Escalation & Research Center, New York Institute of Technology, Old Westbury, N.Y.).

This is a collection of three articles describing the operation of Project ULTRA (Unlimited Training to All) at the New York Institute of Technology. This program represents a systems approach to the design of educational programs and to individual counselling of students, in which probability of success for the student is continually monitored. (HEIAS)

33,028
Brown, A.E. & Hopkins, H.K. INTERACTION OF THE AUDITORY AND VISUAL SENSORY MODALITIES. J. Acoust. Soc. Amer., Jan. 1967, 41(1), 1-6. (Lockheed Research Labs., Lockheed Aircraft Corporation, Palo Alto, Calif. & Research Dept., Agnews State Hospital, San Jose, Calif.).

The general observation that dual sensory input enhances signal detectability is of considerable interest from the information-processing standpoint. Previous experiments on the effects of intersensory interaction have been concerned primarily with an observer's performance on a vigilance task. These studies have not produced results that are sufficiently precise to define the extent and manner of sensory interaction. This study is concerned with obtaining precise measurements of interaction occurring between auditory and visual sensory-information-processing networks. Separate auditory and visual threshold functions are determined and analyzed in terms of signal-detection theory. A bisensory threshold function is also determined, using equated stimuli levels derived from the individual sensory functions. The results of the bisensory test are compared to a theoretically derived curve based on the hypothesis of probabilistic adding and are found to have good correspondence.
R II

33,029
McGilgan, S.E., Mulligan, M.J. & Stonecypher, J.F. CRITICAL BAND IN BINAURAL DETECTION. J. Acoust. Soc. Amer., Jan. 1967, 41(1), 7-12. Psychology Dept., University of Georgia, Athens, Ga.).

In order to account for binaural improvements in detection on the basis of interaural phase shifts, or time deviations, it is necessary to assume that the "critical band" is a sinusoidlike process and that corresponding processes from the two ears interact. Support for this assumption is reported for the binaural conditions N_0S_0, N_0S_0, N_0S_0, N_0S_π, and N_0S_π. It was found that neither interaural level nor bandwidth differences matter so long as the levels within the critical bands at the two ears are unaffected. Detection at one ear is affected only by a narrow band of frequencies at the opposite ear, thus confirming the assumption of a band-limited binaural interaction. Experiments were carried out with three different maskers: a narrow-band noise, a medium-band noise, and a medium-band noise with a gap in it. The narrow-band masker was as effective as the medium-band masker. The noise with a gap in it, however, produced a minimal release from masking when added at the nonsignal ear. These findings are discussed within the context of those of earlier investigations.
R 29

33,030
Schenkel, K.D. ACCUMULATION THEORY OF BINAURAL-MASKED THRESHOLDS. J. Acoust. Soc. Amer., Jan. 1967, 41(1), 20-31. (Institut für Nachrichtentechnik, Technische Hochschule Stuttgart, Stuttgart, Germany).

Two models describing binaural-masked thresholds (the delay-line model and the EC model) are checked by extended experiments. They prove only a limited validity. Therefore, a new model, the accumulation model, is proposed, one that does not use any delay at all and that is, therefore, able to process interaural differences on a more general basis. It is in full agreement with former calculation schemes for nonaural-masked thresholds. This model explains all effects in binaural-masked thresholds known so far. Binaural-masked thresholds computed according to this model are in good agreement with experimental data.
R 15

33,031
Scott, R.J. TIME ADJUSTMENT IN SPEECH SYNTHESIS. J. Acoust. Soc. Amer., Jan. 1967, 41(1), 60-65. (US National Security Agency, Fort George G. Meade, Md.).

Fairbanks' speech time-adjusting device has been simulated, using a hybrid computer. This device discards or repeats recorded speech segments to compress or expand the time dimension. A dichotic method for time compression of speech was investigated in which odd-numbered time segments were presented to one ear and even-numbered segments to the other ear. A preference test suggested that speech compressed with the dichotic method may be more intelligible than speech compressed with Fairbanks' method. Potential applications for time-adjusted speech and possibilities for further research are suggested.
R 14

33,032
Sergeant, R.L. PHONEMIC ANALYSIS OF CONSONANTS IN HELIUM SPEECH. J. Acoust. Soc. Amer., Jan. 1967, 41(1), 66-69. (USN Submarine Medical Center, New London Submarine Base, Groton, Conn.).

A phonemic-confusion matrix for speech in a helium atmosphere was constructed for use in predicting intelligibilities of specially constructed vocabularies for such environments. There is a marked similarity between helium speech and speech in air when intelligibility according to linguistic classification is observed. However, unaccountable differences do exist between the two breathing media for ranked intelligibilities of specific consonants.
R 12

33,033
Stover, W.R. TECHNIQUE FOR CORRECTING HELIUM SPEECH DISTORTION. J. Acoust. Soc. Amer., Jan. 1967, 41(1), 70-74. (Behaviorist Lab., KAB-Singer, Inc., State College, Penn.).

Some qualitative data on the nature of the speech distortion caused by respiration of a helium-oxygen atmosphere are presented. Previous corrective-processing techniques are discussed, and an advanced technique that overcomes their disadvantages is described. The experimental system is based upon time-domain speech-processing methods and is capable of retaining the natural pitch rate of the speaker's voice while correcting the formant shifts caused by the helium-rich atmosphere. This system uses digital-processing methods and is capable of operating on continuous speech in on-line applications. It promises a practical solution to the problem of providing normal voice communication in a helium environment.
R 6

33,034
Edelblute, D.J., Fisk, Joanne M. & Kinnison, G.L. CRITERIA FOR OPTIMUM-SIGNAL-DETECTION THEORY FOR ARRAYS. J. Acoust. Soc. Amer., Jan. 1967, 41(1), 199-205. (USN Electronics Lab., Bureau of Ships, San Diego, Calif.).

The purpose of this paper is to clarify the relationship between three different criteria for optimization of acoustic signal detection. Specifically, the maximization of array gain, the minimization of signal distortion, and the evaluation of the Neyman-Pearson likelihood ratio are shown to yield equivalent results at a single frequency.
R 7

33,035
Mariner, T. & Hahmann, H.W.W. IMPACT-NOISE RATING OF VARIOUS FLOORS. J. Acoust. Soc. Amer., Jan. 1967, 41(1), 206-214. (Armstrong Cork Company, Lancaster, Penn.).

The impact-noise transmission characteristics of approximately 75 floors have been examined using both the standard (ISO) hammer machine and real footfall as sources of excitation. The floors include concrete and wood-base construction, isolation layers, furred construction, simple and composite surfacing of various degrees of compliance, suspended ceilings. For each floor, the recently introduced Impact-Noise Rating (INR) derived from machine data is compared with the objective loudness computed from the spectrum of noise transmitted to the room below the floor when it is walked on by young women wearing hard-heeled, high-heeled shoes. The scatter of data confirms the authors' earlier conclusion that a rating method based on the standard hammer machine does not rank-order floors with adequate precision with respect to footfall noise. Floors having the same INR generally span a factor of 4 in loudness of hard-heeled female footfall. Floors producing the same loudness of footfall noise span in excess of 10 INR numbers. Since the loudness of transmitted hard-heeled footfall is self-consistent within ± 10% (or approximately one INR number on the average), the observed discrepancy is fundamental, not due to poor technique.
R 27

33,036
Patrick, H.G. & Boner, C.R. ACOUSTICS OF SCHOOL-BAND REHEARSAL ROOMS. J. Acoust. Soc. Amer., Jan. 1967, 41(1), 215-219. (University of Texas, Austin, Tex.).

The purpose of this investigation was to study the acoustical characteristics of certain school instrumental practice rooms that have been adjudged as satisfactory by the music teachers who use them. Public-school band and orchestra directors long have realized that special acoustical consideration must be given to the rehearsal space assigned to them for teaching purposes if they are to teach critical listening, intonation, musical balance, tone production, and dynamic control of tonal intensity. It is not likely that these attributes can be taught within the same acoustical conditions as that of the normal classroom or performance situation. This study located six rehearsal rooms that were reported as being satisfactory acoustically for teaching purposes by the music teacher. These rooms were analyzed for their acoustical characteristics. The study revealed that the several common factors existing among the six rooms differ considerably from the present standards of school music-room construction.
R 7

33,037
Sasion, M.G. FREQUENCY DISCRIMINATION AS MEASURED BY AB AND ABX PROCEDURES. J. Acoust. Soc. Amer., Jan. 1967, 41(1), 220-221. (Psychology Dept., University of Washington, Seattle, Wash.).

It is often reported that difference thresholds for frequency when measured by an ABX procedure are at least twice as great as those measured by an AB procedure. The relationship has always been rationalized in terms of the greater physical and judgmental complexity of the ABX procedure. The present experiment was performed at 120 cps, 70 db SPL (sound pressure level), with two practiced subjects. For frequency differences of plus or minus 0.3 cps, or 0.25%, responses were 95% correct for ABX, and 82% correct for AB. This result contradicts the usual findings, and suggests a need for a new analysis of frequency-judgment mechanisms.
R 3

33,038
Krauss, R.M. ; Bricker, P.D. EFFECTS OF TRANSMISSION DELAY AND ACCESS DELAY ON THE EFFICIENCY OF VERBAL COMMUNICATION. J. Acoust. Soc. Amer., Feb. 1967, 41(2), 286-292. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

Two experiments were performed to investigate the effects of transmission delay and access delay, respectively, on the efficiency with which speakers verbally encoded information for transmission in a two-person communication task. Both experiments employed echo-free four-wire voice circuits in an attempt to isolate each delay effect and to avoid the delayed echo effect found in commercial circuits. In the first experiment, three values of pure roundtrip transmission delay were used: no delay, 0.6 sec, and 1.8 sec. Using 14 pairs of male subjects in each condition, it was found that, whereas 1.8 sec of transmission delay deleteriously affected the efficiency of communication, subjects performed as efficiently using the 0.6-sec delay circuit as with no delay. In the second experiment, three values of access delay were used: no delay, 0.25 sec, and 1.8 sec. Ten pairs of male subjects and 10 pairs of female subjects were run in each condition. The effect of access delay was found to be different for the two sexes. Access delay of 1.8 sec had a greater effect on males than on females, whereas at 0.25-sec delay female performance was impaired slightly and male performance not at all. With no delay, male and female performance did not differ. These results are supported by data based on subjects' responses to a postexperiment questionnaire. The findings are discussed in terms of their relevance to problems encountered in two-way voice communication over long transmission paths.
R 11

33,039
Noll, A.M. CEPSTRUM PITCH DETERMINATION. J. Acoust. Soc. Amer., Feb. 1967, 41(2), 293-309. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

The cepstrum, defined as the power spectrum of the logarithm of the power spectrum, has a strong peak corresponding to the pitch period of the voiced-speech segment being analyzed. Cepstra were calculated on a digital computer and were automatically plotted on microfilm. Algorithms were developed heuristically for picking those peaks corresponding to voiced-speech segments and the vocal pitch periods. This information was then used to derive the excitation for a computer-simulated channel vocoder. The pitch quality of the vocoded speech was judged by experienced listeners in informal comparison tests to be indistinguishable from the original speech.
R 21

33,040
Öhman, S.E.G. NUMERICAL MODEL OF COARTICULATION. J. Acoust. Soc. Amer., Feb. 1967, 41(2), 310-320. (Speech Communication Dept., Royal Institute of Technology (KTH), Stockholm, Sweden).

The essential features of the coarticulation properties of Swedish dental stops in vowel-consonant-vowel contexts can be described by the formula $s(x;t)=v(x;t)+k(t)[c(x)-v(x;t)]w_c(x)$, where x represents the longitudinal distance between lips and glottis and $s(x;t)$ denotes the shape of the vocal tract at some instant of time, t, during the vowel-consonant-vowel utterance. The vowel component, $v(x;t)$ is a linear combination of the three "extreme" shapes of the vowels /i/, /a/, and /u/ with weights that vary as functions of time. The consonant is represented by $c(x)$, an ideal target shape, and $w_c(x)$, a so-called coarticulation function. A time-varying factor $k(t)$ represents the degree of excursion of the consonantal gesture. Vocal tract shapes measured from x-ray motion pictures of a set of Swedish vowel-consonant-vowel utterances compare well with shapes generated by the formula. This result is consistent with the authors' earlier conclusions about coarticulation, viz., that the vowel and consonant gestures are largely independent at the level of neural instructions.
R 15

33,041
Ramley, W.R., Upton, D.V.E. & Del Giorno, D.L. DIMUS PROCESSING WITH SEVEN-ELEMENT ACTIVE-SONAR ARRAYS. J. Acoust. Soc. Amer., Feb. 1967, 41(2), 439-444. (Advanced Sonar Systems Dept., IBM Federal Systems Div., Gaithersburg, Md.).

The aural detectability of a seven element DIMUS (Digital Multibeam Steering) array for active sonar has been studied experimentally. The array was simulated with sonar data recorded at sea. It was found that a DIMUS array consisting of as few as seven elements can be effectively used. Doppler detectability is preserved. If the interference consists of reverberation from a pulse having a sinusoidal amplitude distribution, the clipping loss is about 2.5 dB for small signal-to-reverberation levels. This loss is independent of the bandwidth of the transmitted pulse. If the interference is local noise, the clipping loss is less than 1 dB. It was also found that when equal pulse lengths are used, the detectability of slow targets is much greater with broad-band transmission pulses than with conventional Continuous-wave pulses in reverberation-limited conditions. The improvement in detection with the broad-band pulses was preserved with DIMUS.
R 3

33,042
Brandt, J.F. FREQUENCY DISCRIMINATION FOLLOWING EXPOSURE TO NOISE. J. Acoust. Soc. Amer., Feb. 1967, 41(2), 448-457. (Speech Pathology & Audiology Dept., University of Iowa, Iowa City, Iowa).

Measures of threshold and frequency discrimination were obtained at 1000, 2000, and 4000 Hz before and after exposure to wide-band noise. Two test-stimulus SPL's (sound pressure levels) were used during the postexposure discrimination measures such that stimuli were presented at 10 or 40 dB SL (sensation level) re TTS_3 (temporary threshold shift). The SPL remained constant throughout recovery during each experimental session. When test stimuli were equated in terms of SL, no differences between pre- and post-exposure jnd's (just noticeable differences) were noted at 40 dB SL or greater at any frequency. At low stimulus SL's (10-30 dB), however, a differential effect on the jnd occurred owing to noise exposure that was not explainable in terms of TTS. At 4000 Hz (where maximum TTS occurred), there was little difference between pre- and post-exposure jnd's. At 2000 Hz, a 10% impairment in the jnd existed in the latter stages of recovery. At 1000 Hz (no TTS), the postexposure jnd's were about 40% greater than pre-exposure jnd's and independent of recovery time. A paradox thus exists at low SL's between amount of threshold shift and frequency discrimination.
R 37

33,043
Goldstein, J.L. AUDITORY SPECTRAL FILTERING AND MONAURAL PHASE PERCEPTION. J. Acoust. Soc. Amer., Feb. 1967, 41(2), 458-479. (Instituut voor Perceptie Onderzoek, Eindhoven, The Netherlands).

The fundamental relation of limited auditory frequency resolution to monaural phase perception is studied. Old and new results are discussed for experiments employing sinusoidally amplitude-modulated (AM) carrier tones and quasi-frequency-modulated (QFM) carrier tones, which are related by a phase transformation. One experiment concerns AM and QFM modulation thresholds. A second experiment considers the quality differences between AM and QFM. Both experiments show that phase effects disappear for stimulus bandwidths that exceed a value roughly proportional to the critical band at the carrier frequency. The proportionality factor depends upon carrier level and differs greatly between experiments. A unified psychophysical account is given with a model consisting of a quasilinear bandpass analyzing filter followed by ideal envelope detection, and concluding with either a peak-to-minimum or peak-threshold decision. Parameter values in the model are evaluated from the phase-perception data, and these values support the assumptions that underlie the model. It is shown that the critical-bandlike experimental data do not provide a measure of the commonly conceived critical band. Rather, the critical-band scale merely normalizes the analyzing-filter parameters. This work indicates that the model employed offers wider application.
R 36

33,044
Jeffress, L.A. STIMULUS-ORIENTED APPROACH TO DETECTION RE-EXAMINED. J. Acoust. Soc. Amer., Feb. 1967, 41(2), 480-488. (University of Texas, Austin, Tex.).

The present paper is a reexamination of some of the conclusions of an earlier one. It is motivated by some new insights resulting from attempts to replicate experiments with human observers, through the use of an electrical model of the auditory system. It is concerned primarily with the effect of signal duration on detection in the presence of a continuous masking noise. The model, of those tried, that best fits human performance consisted of a bandpass filter obtained by subtracting the output of a 500-Hz sharp-cutoff, lowpass filter from another having a cutoff of 525 Hz. The filter was followed by a linear half-wave rectifier and it, in turn, by an integrator having a 100-msec decay time. The integrator can be thought of as a device that takes a running average of its input. The probability-density distributions for continuous noise and signal plus noise yielded by the model lie between the Rayleigh-Rice distributions on the one hand and a pair of normal distributions of unequal variance on the other. The exact shape of the two distributions depends upon both the bandwidth of the filter employed and the time constant of the averager.
R 34

33,045
Leshowitz, B. & Raab, D.H. EFFECTS OF STIMULUS DURATION ON THE DETECTION OF SINUSOIDS ADDED TO CONTINUOUS PEDESTALS. J. Acoust. Soc. Amer., Feb. 1967, 41(2), 489-496. (Brooklyn College, City University of New York, Brooklyn, N.Y.).

The effect of stimulus duration on the detection of sinusoids added to continuous pedestals was investigated in two studies. Gated 1000-Hz sinusoids were added in phase with continuous pedestals in the presence of a steady background noise at durations between 10 and 500 msec. Plots of signal intensity necessary for approximately 75%-correct detections as a function of duration revealed enhanced detectability and an intensity-duration reciprocity factor of 14 dB per log unit of time. In the second experiment, signal energy was held constant as duration of the probe was varied between 10 and 100 msec, and the proportion of correct responses was measured in a two-interval forced-choice procedure. Marked improvement in detectability obtained as signal duration was increased. When increment energy was held constant, discriminability remained unchanged in the face of a 10-dB decrease in signal energy. After correcting an energy-detection model for internal noise, the model accurately predicted the proportion of correct responses. Finally, it is argued that a description of detection data in terms of increment energy renders results obtained with pedestals simpler and more understandable.
R 10

33,046
Kelta, L.W. & Jaarsma, D. MORE ON THE DETECTION OF ONE OF M ORTHOGONAL SIGNALS. J. Acoust. Soc. Amer., Feb. 1967, 41(2), 497-505. (Electrical Engineering Dept., Duke University, Durham, N.C. & Cooley Electronics Lab., University of Michigan, Ann Arbor, Mich.).

Receiver operating characteristics (ROC's) for the classic problem of detecting the presence or absence of one of M orthogonal signals is presented. Previous results were valid for low detectability, for which the ROC is approximately normal (i.e., appears as a straight line with unit slope on normal-normal probability paper) and the detectability depends on the logarithm of the number of possible signals M. For high detectability, however, the ROC departs from normality. In addition, the rate at which detectability decreases as M increases is more rapid than that predicted by the classical approximation.
R 5

33,047
Small, A.M., Jr. & Daniloff, R.G. PITCH OF NOISE BANDS. J. Acoust. Soc. Amer., Feb. 1967, 41(2), 506-512. (University of Iowa, Iowa City, Iowa).

Ten subjects were asked to produce octave judgments, i.e., one octave above and one octave below a standard stimulus, with bands of low-pass and high-pass noise as well as sinusoids. For example, given a specific low-pass noise band as a standard, subjects adjusted the cutoff frequency of a second low-pass noise band so that its pitch was 1 oct above that of the standard. Results indicate that bands of noise have a pitch and that the pitch is correlated with cutoff frequency. For low-pass noise, there seemed to be a relatively linear relation between pitch and cutoff frequency from 80- to 10,000-Hz cutoff, whereas the linear relation for high-pass noise holds only for a restricted frequency range, 600-10,000 Hz. The pitch of both types of noise stimuli degenerates above 10 k Hz, possibly because of limited earphone response and a rising threshold of hearing. More difficult to explain is the static and vague pitch of high-pass noise at low cutoff frequencies. A discussion of several mechanisms is included.
R 7

33,048
Howes, W.L. ATMOSPHERIC EFFECTS ON SONIC BOOMS. J. Acoust. Soc. Amer., Feb. 1967, 41(2), 522-523. (Lewis Research Center, NASA, Cleveland, Ohio).

Whitham's equation for the sonic-boom-pressure signature is modified by using an invariant given by Blokhintsev in order to account for the effects of steady atmospheric variations on the boom. The resulting formula is expected to be useful for correlating experimental data. The atmospheric variations probably affect the boom primarily by wavefront distortion. When focusing of the wavefronts occurs, superbooms may result even from aircraft in uniform rectilinear flight.
R 8

33,049
Goldstein, J.L. AUDITORY NONLINEARITY. J. Acoust. Soc. Amer., March 1967, 41(3), 676-689. (Institute voor Perceptie Onderzoek, Eindhoven, The Netherlands).

Combination tones (CT's) produced by two-tone stimuli (f_1 and f_2) at relatively low sound levels contradict the classical view that auditory mechanics is an essentially linear process that suffers significant percentage distortion only at high sound levels. CT level and phase behavior were measured extensively with pitch-cancellation and loudness-balancing methods. Relative level of the most prominent CT $2f_1-f_2$ was nearly unaffected by stimulus level but decreased sharply with increasing frequency interval, being typically 15%-20% for $f_2/f_1=1.10$. In contrast, the difference tone was audible only for stimulus levels above 50 dB sensation level (SL), grew to 15% relative distortion only for estimated stimulus levels exceeding 100 dB SL, and was relatively insensitive to frequency interval. Other CT's of the form $f_1-n(f_2-f_1)$ were heard, and these decreased sharply in level with increasing integer n. The fact that CT's above the stimulus frequencies were inaudible is not caused by stimulus masking but rather reflects instead a mechanical frequency selectivity in the nonlinear source. Thus, although auditory mechanical analysis is not essentially linear, the concept that the cochlea performs a limited resolution frequency-place transformation is supported. Physical studies of the cochlea should elucidate the nature of the hypothesized essential cochlear mechanical nonlinearity.
R 15

33,050
McClellan, M.E. & Small, A.M., Jr. PITCH PERCEPTION OF PULSE PAIRS WITH RANDOM REPETITION RATE. J. Acoust. Soc. Amer., March 1967, 41(3), 690-699. (University of Iowa, Iowa City, Iowa).

Time-separation pitch (TSP) is a pitch effect that arises from temporally separated, highly correlated waveforms and is related to the reciprocal of time delay between the leading edges of such waveforms. On the assumption that spectral cues are responsible for TSP perception, it was suggested that random triggering of dc pulse pairs with fixed time delay would render the spectrum unspecifiable in an exact sense, thereby degrading the performance of subjects matching pure tones in pitch to TSP. On the assumption that a time-analyzing mechanism is responsible for TSP perception, it was predicted that the presentation of single, nonrepetitive dc pulse pairs would make TSP difficult to perceive since minimum information on which to base a pitch judgment would be available per unit time. The results were not as predicted, i.e., the distributions of pitch matches were essentially the same for conditions of random triggering and single pulse pairs and were highly similar to those generated with regularly triggered dc pulse pairs. These results suggest that the amount of "information" available per unit time is not particularly important to TSP perception and, further, that the assumption concerning a spectral mechanism does not hold.
R 17

33,051
Young, I.M. & Wenner, C.H. MASKING OF WHITE NOISE BY PURE TONE, FREQUENCY-MODULATED TONE, AND NARROW-BAND NOISE. J. Acoust. Soc. Amer., March 1967, 41(3), 700-706. (Jefferson Medical College, Philadelphia, Penn.).

Threshold measurements were made by Bekesy audiometry for white noise in the presence of pure tones, frequency modulated tones, and narrow-band noises in normal ears. Pure tones in the frequency range of 700-1000 cps caused maximal masking. When the masking tone had a high distortion factor (13 dB below the fundamental), the masking effect was greater than that for undistorted tone), and was centered between 300 and 400 cps at 120 db sound pressure level (SPL) and 500 cps at lower intensities. Tones with a distortion factor of 30 dB or more below the fundamental produced masking effects indistinguishable from pure tones with the distortion factor greater than 70 dB below the fundamental. The masking peak at 800 cps may be explained on the basis of mechanical resonant frequency. While there was some intersubject variation in the masking of white noise by frequency-modulated tones, the maximum effect obtained by frequency-modulated tones was centered at 800 cps, as is the case with pure-tone masking. The masking effect was independent of modulation rate and frequency deviation. Narrow-band noise centered near 2000 cps produced the greatest masking effect on white noise. Greater masking--both in shift and spread--was obtained from a narrow-band noise produced by a commercial noise generator than by Zwicker's narrow-band noise with a cutoff slope of 60 dB/octave.
R 15

33,052
Plomp, R., Pols, L.C.W. & van de Geer, J.P. DIMENSIONAL ANALYSIS OF VOWEL SPECTRA. J. Acoust. Soc. Amer., March 1967, 41(3), 707-712. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

Traditionally, the formant frequencies are regarded as the most important characteristics of the frequency spectra of vowels. It is possible, however, to approach the differences between vowel spectra in a more general way by means of a dimensional analysis. For a particular vowel, the sound-pressure levels in each of a number of frequency passbands can be considered as coordinates of a point in a multidimensional Euclidean space. Different vowel spectra will result in different points. Frequency spectra of 15 Dutch vowels were determined with 18 bandpass filters (10 speakers). The analysis indicated that the "cloud" of 150 points can be described by four independent dimensions that are linear combinations of the original 18. The percentage of total variance "explained" by these dimensions were 37.2%, 31.2%, 9.0%, and 6.7%, respectively. This approach presents interesting perspectives for the development of vowel-discrimination equipment.

33,053
Benson, R.W., Charan, K.K., Day, J.W., Harris, J.D.; et al. LIMITATIONS ON THE USE OF CIRCUMAURAL EARPHONES. J. Acoust. Soc. Amer., March 1967, 41(3), 713-714. (Robert W. Benson & Associates, Inc., Nashville, Tenn.).

Published material on the calibration of circumaural earphones is briefly reviewed. The present lack of knowledge about these earphones and about the earphone-to-ear coupling is indicated, and the resultant limitations on the routine use of circumaural earpones in clinical and industrial pure-tone audiometry are presented.
R 5

33,054
Zwislocki, J.J. & Hellman, R.P. COMMENTS ON "USE OF SENSATION LEVEL IN MEASUREMENTS OF LOUDNESS AND OF TEMPORARY THRESHOLD SHIFT" AND ON COURTESY IN WRITING. J. Acoust. Soc. Amer., March 1967, 41(3), 714-715. (Sensory Communication Lab., Syracuse University, Syracuse, N.Y.).

This is a response to an article by W.D. Ward entitled "Use of Sensation Level in Measurements of Loudness and of Temporary Threshold Shift" (HEIAS No. 29,967) in which Ward disagrees with the authors' conclusion that intersubject threshold differences are not accompanied by loudness recruitment. The attempt is made to show that Ward's demonstration of interfrequency recruitment in individual ears is irrelevant to the authors' conclusion. The authors also take issue with the style of writing used by Ward.
R 5

33,055
Ward, W.D. REPLY TO "COMMENTS ON 'USE OF SENSATION LEVEL IN MEASUREMENTS OF LOUDNESS AND OF TEMPORARY THRESHOLD SHIFT' AND ON COURTESY IN WRITING." J. Acoust. Soc. Amer., March 1967, 41(3), p.715. (Hearing Research Lab., University of Minnesota, Minneapolis, Minn.).

Rebuttal is given to the arguments of Zwislocki and Hellman (HEIAS No. 33,054). Comments attempt to clarify the discussion involved in the use of sensation-level measurements.

33,056
Howes, W.L. FARFIELD SPECTRUM OF THE SONIC BOOM. J. Acoust. Soc. Amer., March 1967, 41(3), 716-717. (Lewis Research Center, NASA, Cleveland, Ohio).

The pressure spectrum of the sonic-boom N wave is simply given by $P(\omega) = (2\pi)^{-1/2} TP(T) j_1(\omega T/2)$, where T is the boom duration, P(T) is the pressure amplitude, and $j_1(\omega T/2)$ is a spherical Bessel function of the first kind and order. The effective acoustic period of the N wave is approximately 3/2 times its duration. The present formulation is a simplification of those by Crocker and Young. The spectrum formula given by Zepler and Harel is incomplete.
R 7

33,05,
Bertram, J.F. EVALUATION OF THE PERFORMANCE OF ACTIVE SONAR RECEIVERS. J. Acoust. Soc. Amer., Apr 1 1967, 41(4)Part 1, 767-773. (Submarine Signal Div., Raytheon Company, Portsmouth, R.I.).

A method is devised for evaluating and comparing the performance of receivers used in an active sonar application. The basis of comparison is the level of background noise that will just bring the maximum signal excess, after system adjustment, to zero, given a propagation loss. The better system is the one that can withstand the higher level of background noise before the maximum signal excess goes to zero. This method is applied to the polarity-coincidence correlator and, for comparison, aural detection. It is found that the polarity-coincidence correlator compares favorably with aural detection.
R 8

33,058
Henning, G.B. FREQUENCY DISCRIMINATION IN NOISE. J. Acoust. Soc. Amer., April 1967, 41(4) Part 1, 774-777. (Defence Research Medical Labs., Toronto, Ontario, Canada).

Frequency-discrimination performance is measured as a function of the ratio of signal energy to noise-power density ($\mathcal{E}-\eta$) for several values of frequency separation at 250, 1000, and 4000 cps. Discrimination performance at all frequencies and all frequency separations increases with increasing $\mathcal{E}-\eta$, until $\mathcal{E}-\eta$ reaches 40 dB. No further increase in performance was apparent with a further increase of 40 dB in $\mathcal{E}-\eta$.
R 15

33,059
McFadden, D. DETECTION OF AN IN-PHASE SIGNAL WITH AND WITHOUT UNCERTAINTY REGARDING THE INTERAURAL PHASE OF THE MASKING NOISE. J. Acoust. Soc. Amer., April 1967, 41(4)Part 1, 778-781. (Hearing & Communication Lab., Indiana University, Bloomington, Ind.).

The basis for detection in those interaural conditions that lead to a masking-level difference (MLD) is presumed to be quite different from that in the non-MLD conditions. This experiment examined the effect upon detectability when listeners were uncertain whether an MLD or a non-MLD condition was to be presented. Detectability was measured at two values of signal energy for each of two interaural conditions, N0-S0 and Nπ-S0. The "yes-no" psychophysical method was used. On some blocks of trials, the blocks with "no uncertainty," only one interaural condition was presented. On other blocks of trials, the blocks "with uncertainty," N0-S0 signals were mixed with equally detectable Nπ-S0 signals. The listeners were informed which type of block was to be presented. There was essentially no difference between the data obtained with uncertainty and those obtained with no uncertainty. A supplementary experiment showed that on the blocks with uncertainty the listeners were quite poor at identifying the type of noise presented on a trial.
R 5

33,060
Taylor, M.M. & Creelman, C.D. PEST: EFFICIENT ESTIMATES ON PROBABILITY FUNCTIONS. J. Acoust. Soc. Amer., April 1967, 41(4)Part 1, 782-787. (Defence Research Medical Labs., Toronto, Ontario, Canada & University of Toronto, Toronto, Ontario, Canada).

An adaptive procedure for rapid and efficient psychophysical testing is described. PEST (Parameter Estimation by Sequential Testing) was designed with maximally efficient trial-by-trial sequential decisions at each stimulus level, in a sequence which tends to converge on a selected target level. An appendix introduces an approach to measuring test efficiency as applied to psychophysical testing problems.
R 9

33,061
Weston, P.B., Cengel, A.W. & Hirsh, I.J. EFFECTS OF VIBRATOR TYPES AND THEIR PLACEMENT ON BONE-CONDUCTION THRESHOLD MEASUREMENTS. J. Acoust. Soc. Amer., April 1967, 41(4)Part 1, 788-792. (Central Institute for the Deaf, St. Louis, Mo.).

Monaural bone-conduction thresholds in the quiet were obtained for 10 normally hearing young adults at both forehead and mastoid positions with two hearing-aid-type vibrators of different manufacture. Physical calibration data for the vibrators were obtained by other laboratories with two different Beltone artificial mastoids. Bone-conduction force thresholds (in root-mean-square dynes) are reported, along with identification of sources of variability.
R 4

33,063
Schroeder, M.R. DETERMINATION OF THE GEOMETRY OF THE HUMAN VOCAL TRACT BY ACOUSTIC MEASUREMENTS. J. Acoust. Soc. Amer., April 1967, 41(4)Part 2, 1002-1010. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

The geometry of the human vocal tract from the glottis (vocal cords) to the lips is one of the determining factors in human speech production and basic to a better understanding of articulation. Measurement of the vocal-tract geometry is difficult, especially that of its time-dependent behavior during connected speech utterances. Practically the only tools that have been available in the past for such measurements are radiography and cineradiography. Unfortunately, radiographic measurements and their evaluation are laborious. In addition, adequate cineradiography for longer utterances poses severe problems owing to dosage limitations. In this paper, it is shown that some of the desired vocal-tract-shape information can be obtained by purely acoustic measurements. Two kinds of acoustic methods are discussed in some detail: measurement of the eigenfrequencies (formants) of the vocal tract and measurement of the acoustic impedance at the lips. Both measurements allow the determination of an approximation to the cross-sectional areas of the vocal tract as a function of distance along its axis. The number of terms of the Fourier series, and therefore the spatial resolution of the approximation, increases with the number of measured eigenfrequencies of the tract or with the number of measured singularities of the impedance function. Both methods are applicable to dynamic measurements during nonstationary utterances and hold promise for supplying large amounts of area data necessary for specifying or refining articulatory models of speech production. The results can be portrayed by computer-drawn single frames or motion pictures of the acoustically derived area functions.
R 17

33,064
Fischler, H., Frei, E.H., Spira, D. & Rubenstein, M. DYNAMIC RESPONSE OF MIDDLE-EAR STRUCTURES. J. Acoust. Soc. Amer., May 1967, 41(5), 1220-1231. (Electronics Dept., Weizmann Institute of Science, Rehovoth, Israel).

Automatic tracing of vibrations from several locations on the tympanic membrane and from the stapedial footplate, in human anatomical preparations, was performed by use of a capacitive-probe vibration meter. Normally, the vibrations of the tympanic membrane at the umbo and along the junction with the malleus were in synchrony with those of the stapes. The motion of the eardrum as a whole agreed with that postulated by von Békésy. The direct measurements enabled examination of the ossicular-lever transformation of the middle ear under dynamic conditions. In normal cases, undulation of the lever ratio around the 1.3 value was evidenced. Pathological changes caused an artificial increase of the ratio, due to damping features of the ossicular-lever system; the characteristics of an otosclerotic ear served as a conspicuous example. With the CAT 4008, further increase of the sensitivity of measurements (down to 2 Å amplitude) was possible. Some tests were carried out on patients also. Determination of the acoustic input impedance of the ear is discussed and a possibility of simple conversion of the vibration response of the eardrum into the impedance characteristic is presented. A typical input-impedance curve for a human temporal bone preparation with the unloaded stapes is demonstrated.
R 11

33,066
Smith, N., Stevens, K.N. & Tomlinson, R.S. ON AN UNUSUAL MODE OF CHANTING BY CERTAIN TIBETAN LAMAS. J. Acoust. Soc. Amer., May 1967, 41(5), 1262-1264. (Massachusetts Institute of Technology, Cambridge, Mass.).

In certain Tibetan monasteries, the lamas are trained to chant in a distinctive way, yielding the impression that a single lama is singing a chord. The acoustics of this unusual vocal performance are discussed, and its contribution to the religious life of the lamas assessed.
R 3

33,067
Tove, P.A., Ejdesjö, L. & Svärdström, A. FREQUENCY AND TIME ANALYSIS OF POLYPHONIC MUSIC. J. Acoust. Soc. Amer., May 1967, 41 (5), 1265-1271. (Electronics Dept., Institute of Physics, University of Uppsala, Uppsala, Sweden).

Apparatus has been constructed to give a two-dimensional diagram with a three-dimensional representation of frequency, time position, and amplitudes of tones in polyphonic music. The apparatus consists of a frequency analyzer with constant relative bandwidth and sliding frequency setting, combined with a repeating (loop) tape recorder and an XY recorder with an auxiliary pen-deflecting mechanism for small, fast deflections. Examples of analyzed music are shown demonstrating the advantages of this method, which gives at a glance a survey showing frequency, time position, and amplitude, and thus offers objective notation and analysis of music.
R 8

33,068
Ainsworth, W.A. RELATIVE INTELLIGIBILITY OF DIFFERENT TRANSFORMS OF CLIPPED SPEECH. J. Acoust. Soc. Amer., May 1967, 41(5), 1272-1276. (Communication Dept., University of Keele, Keele, Staffordshire, England).

In a speech wave that has been subjected to infinite clipping, only the sequency of time intervals between zero crossings remains, and yet the result is fairly intelligible. If positive-going and negative-going zero crossings are signaled by pulses of either the same or opposite polarity, it is possible to distinguish the time intervals between adjacent zero crossings from those between alternate zero crossings (i.e., crossings in the same direction). It has been found that transforms that contain some indication of the polarity of the zero crossings are the most intelligible, whereas those that make no distinction are the least intelligible. The transforms in which zero crossings of only one kind are signaled form an intermediate category. Neither the polarity of the pulses nor the polarity of the zero crossings has any great effect on the relative intelligibility. Using data obtained in an experiment measuring the intelligibility of clipped speech, a confusion matrix of the various phonemes was constructed. It was found that vowellike phonemes are less often confused than fricativelike ones.
R 7

33,069
Davis, Julia. AUDITORY SEARCH FOR SYLLABLES EMBEDDED WITHIN MEANINGFUL SENTENCES. J. Acoust. Soc. Amer., May 1967, 41(5), 1277-1282. (Speech & Hearing Science Dept., University of Southern Mississippi, Hattiesburg, Miss.).

Sentence length, syllable position within a sentence, and grammatical class of word in which syllables were embedded were investigated with respect to their effects upon accuracy of syllable identification and response latency in a task of auditory search. Ninety-six university students listened to sentences, which were followed by a syllable that identified the target for search, and determined whether or not the identifying syllable appeared within the sentence preceding it. The time required for search was recorded in milliseconds. Results indicate a strong negative relationship between accuracy of syllable identification and time required for search. Greatest accuracy and shortest response latencies occurred when syllables were embedded within the shortest sentences of the series (15 to 25 syllables in length), within the final fourth of a sentence, and within nouns, verbs, conjunctions, or prepositions rather than within adjectives and adverbs. Indications are that the task of auditory search requires a rapid, low-level, minimal form of language processing and that semantic and syntactic clues are of major importance to successful, rapid processing. Theoretical concepts of selection, recoding, retention, and recall of auditory inputs are discussed in relation to the normal, daily processing of language.
R 5

33,070
Harmelstein, P. DETERMINATION OF THE VOCAL-TRACT SHAPE FROM MEASURED FORMANT FREQUENCIES. J. Acoust. Soc. Amer., May 1967, 41(5), 1283-1294. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

The vocal tract is modeled as a lossless acoustic tube and the relationship is considered between the resonant frequencies and the cross-sectional area function. Empirical results show that if the logarithm of the area function is band limited preserving only 2n Fourier components, the lowest n pole and n zero frequencies of the admittance function measured at the lips uniquely determine the area coefficients. The formant frequencies determined from the speech signal, the normal resonant frequencies of the vocal tract, correspond to the admittance poles. They alone do not suffice for unique area determination unless the even area coefficients are constrained to specified values or some other physical constraints are imposed. The output-admittance zeros are not obtainable from the speech signal, as they correspond to resonant modes for closed-lip boundary conditions. The above results allow the synthesis of band-limited vocal-tract shapes from admittance functions that have only their low-frequency singularities specified. They can be generalized to any system exhibiting wave propagation primarily in one dimension only, for example, nonuniform transmission lines, and allow a low spatial-frequency synthesis of the system from two sets of low-order eigenvalues.
R 19

33,071
Reddy, D.R. PHONEME GROUPING FOR SPEECH RECOGNITION. J. Acoust. Soc. Amer., May 1967, 41(5), 1295-1300. (Computer Science Dept., Stanford University, Stanford, Calif.).

A program for associating a given segment of speech with a phoneme group, such as a vowellike segment, fricativelike segment, etc. is described. Some disadvantages of the presently accepted grouping of phonemes into stops, fricatives, vowels, etc., are discussed. Grouping of phonemes used by Sanskrit grammarians seems to be more appropriate for computer speech recognition. A grouping of phonemes into several nonmutually-exclusive sets that combine the concepts of the presently acceptable grouping and those of the Sanskrit grammarians is proposed. This grouping is more suitable in that it permits algorithmic definitions of vowellike sounds, etc., in terms of easily obtainable acoustic parameters--namely, intensity and zero crossings. Some results obtained using the suggested algorithm are presented.
R 8

33,072
Burke, K.S., Shutts, R.E. & Hilo, A.P. ON THE ZWISLOCKI ACOUSTIC BRIDGE. J. Acoust. Soc. Amer., May 1967, 41(5), p.1364. (USA Walter Reed General Hospital, Walter Reed Army Medical Center, Washington, D.C.).

The problems involved in treating data obtained with the Zwislocki acoustic bridge are discussed. The practice of reporting data in arbitrary units is discouraged since these units are not comparable from bridge to bridge. Also, more study of the distribution of responses of nonpathologic ears is urged.
R 5

33,073
Henning, G.B. & Bleiwas, Sheila L. AMPLITUDE DISCRIMINATION IN NOISE. J. Acoust. Soc. Amer., May 1967, 41(5), 1365-1366. (Defence Research Medical Labs., Toronto, Ontario, Canada).

The experiment was designed to test a general model of the discrimination process. The discriminability of a given amplitude difference (in decibels) was found to be virtually independent of both the signal-to-noise ratio and the frequency of the tones to be discriminated, provided that the ratio of signal energy to noise-power density is sufficiently great. These findings lend support to a general model of the discrimination process suggested by Henning (J. Acoust. Soc. Amer., 1966, 40, p.1250).
R 5

33,074
Schwartz, M.F. SYLLABLE DURATION IN ORAL AND WHISPERED READING. J. Acoust. Soc. Amer., May 1967, 41(5), 1367-1369. (Temple University, Philadelphia, Penn.).

The average duration of the syllable in oral and whispered reading is studied. The results, obtained from 12 male speakers, indicate a significantly greater duration for the whispered syllable.
R 4

33,075
Carraway, Betty J. & Carhart, R. INFLUENCE OF COMPRESSOR ACTION ON SPEECH INTELLIGIBILITY. J. Acoust. Soc. Amer., June 1967, 41(6), 1424-1433. (Hearing Evaluation Center, University of Wisconsin, Milwaukee, Wisc. & Auditory Research Lab., Northwestern University, Evanston, Ill.).

The effects of compressor action, which reduces the long-term dynamic range of speech, on intelligibility of nonsyllabic words presented in quiet was investigated. Three ratios of change in input level to change in output level were used, namely, 1- to 1-dB, 2- to 1-dB, and 3- to 1-dB. Peak powers of the speech signals were adjusted for these three conditions of reproduction so as to achieve presentations of 0, 8, 16, and 24 dB sensation level. The interphonemic dynamic range of the speech signal was the variable under study. Performance of the normal hearers, patients with labyrinthine hydrops, labyrinthine otosclerosis, and presbycusis improved only slightly during either condition of compression. Moreover, the subjects with hearing loss did not achieve any greater benefit from compressor action than did normals. These results warrant the conclusion that neither the 2- to 1-dB nor the 3- to 1-dB compression ratio offered any important advantage over 1- to 1-dB reproduction when comparison was made only in terms of intelligibility at a given sensation level of the output signal.
R 31

33,076
Stron, W.J. MACHINE-AIDED FORMANT DETERMINATION FOR SPEECH SYNTHESIS. J. Acoust. Soc. Amer., June 1967, 41(6), 1434-1442. (USAF Cambridge Research Labs., L.C. Hanscom Field, Bedford, Mass.).

A semi-automatic analysis-synthesis scheme that can be viewed as a "manual formant vocoder" is described. A human operator makes decisions about formant positions on processed speech data. The parameters which result from the operator decisions are used to control a four-pole parallel synthesizer. Speech processed by the system had an error rate of 4.2% for vowels and 16.9% for consonants.
R 4

33,077
Carliss, Edith L.R. MECHANISTIC ASPECTS OF HEARING. J. Acoust. Soc. Amer., June 1967, 41(6), 1500-1516. (National Bureau of Standards, Washington, D.C.).

The results of a number of apparently diverse experiments on human hearing can be summarized via a simple model. Two mechanisms are required: One element emits unit responses whose number is proportional to the instantaneous amplitude of a sound. The other is a selector mechanism, analogous to a resonant circuit, that integrates the responses. Correspondingly, just two parameters are involved: the threshold of hearing and the "Q" of the selector mechanism. The system of equations representing the model makes it possible to derive the necessary parameters from the results of a number of different types of experiments. The theory of the selector mechanism is based upon a recent study of the limits of performance of a system capable of storing oscillatory energy reversibly. But the remainder of the theoretical description makes use of ordinary communication theory. The discrimination ability of the normal ear is shown to be proportional to the one-fourth power of the level above threshold, and to relate closely to the sensation of loudness. Many features of the behavior of normal and impaired ears can be predicted by application of familiar network theory to the parameters derived from the model. The properties of the model may be used as criteria in the choice of experiments to develop explicit data on the way the ear performs its functions.
R 38

33,078
Green, D.M. ADDITIVITY OF MASKING. J. Acoust. Soc. Amer., June 1967, 41(6), 1517-1523. (Psychology Dept., University of Pennsylvania, Philadelphia, Penn.).

Suppose, in separate experiments, the level of noise and the level of a sinusoid are adjusted so that each produces the same amount of masking of a gated sinusoidal signal. If now the noise and sine-wave masker are combined, how much must the level of the signal be increased to achieve the same level of masking effectiveness as before? Few conditions require only a 3-dB increment of the signal. It is argued that an increment greater than 3 dB implies that the processing of the signal when masked by noise and when masked by a sine wave are different.
R 33

33,079
Plomp, R. PITCH OF COMPLEX TONES. J. Acoust. Soc. Amer., June 1967, 41(6), 1526-1533. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

The question of whether the pitch of complex tones is based either on the frequency of the fundamental or on the periodicity of the sound as a whole was studied. Fifteen naive subjects participated. For fundamental frequencies of up to about 1400 Hz, the pitch of a complex tone is determined by the second and higher harmonics and not by the fundamental, whereas beyond this frequency the opposite holds; this is the case both for tones with harmonics of equal amplitude and for tones with harmonics of which the amplitudes fall by 6 dB/oct. For fundamental frequencies of up to about 700 Hz, the pitch is determined by the third and higher harmonics; for frequencies up to about 350 Hz, by the fourth and higher harmonics. The experimental results strongly suggest that the pitch of complex tones is based on periodicity rather than on frequency; it is reasonable that this also holds for simple tones.
R 36

33,081
Holland, M.H., Jr. ATTENUATION PROVIDED BY FINGERS, PALMS, TRAGI, AND VSIR EAR PLUGS. J. Acoust. Soc. Amer., June 1967, 41(6), p.1545. (USA Human Engineering Labs., Aberdeen Proving Ground, Md.).

Measurements of the attenuation of noise provided by use of the fingers, palms, tragi, and VSIR ear plugs are presented for nine test tones. The results of the study show that the tragi provide the best attenuation, the palms and fingers slightly less attenuation, and the ear plugs the least attenuation.

33,082
Bauer, B.B. RANDOM EFFICIENCY OF SECOND-ORDER GRADIENT MICROPHONES. J. Acoust. Soc. Amer., June 1967, 41(6), 1545-1546. (CBS Laboratories, Stamford, Conn.).

The random efficiency of the second-order Limaçon transducer family, $\rho = [n + (1-n)\cos\theta][n + (1-n)\cos\theta]$, is computed and minimum random efficiency of 0.125 is determined to occur when either n or n is 3/8 and the other is 0.
R 1

33,083
Williams, G. ASYMMETRIES IN THE CUMULATIVE PROBABILITY DISTRIBUTIONS OF THE SPEECH WAVEFORM INSTANTANEOUS AMPLITUDE. J. Acoust. Soc. Amer., June 1967, 41(6), 1546-1547. (Standard Telecommunications Laboratories Ltd., Harlow, Essex, England).

Asymmetries in the cumulative probability distribution of the speech waveform instantaneous amplitudes are studied. It is shown that the asymmetries which occur at large amplitude values are accompanied by a difference in the mean and median values of the distributions. Microphone characteristics and filtering reduce the gross asymmetry of the larynx fundamental waveform resulting in a reduction in the over-all asymmetry.
R 3

33,085
Alken, E.G. PROMPTING VERSUS CONFIRMATION IN THE DISCRIMINATION AND IDENTIFICATION OF TWO AUDITORY DIMENSIONS. J. Acoust. Soc. Amer., July 1967, 42(1), 121-123. (USN Personnel Research Activity, Bureau of Naval Personnel, San Diego, Calif.).

Two training procedures were compared for their efficiency in improving the identification and discrimination of acoustic stimuli. One procedure (prompting) involved presentation of the correct answer before the presentation of the stimulus or stimuli. The other procedure (confirmation) involved presentation of the correct answer after the stimulus or stimuli had been judged. Results of the first experiment indicated that confirmation was significantly superior to prompting in training pitch discrimination. Experiment 2 results revealed no difference between the procedures in improving either two-alternative pitch or loudness identification. In neither experiment did the difficulty of the perceptual task interact with the training procedures. It is suggested that the nature of the perceptual judgment required and degree of response uncertainty are both variables influencing the outcomes of comparisons of prompting and confirmation in perceptual learning.
R 8

33,066
Carhart, R., Tillman, T.W. & Johnson, K.R. RELEASE OF MASKING FOR SPEECH THROUGH INTERAURAL TIME DELAY. J. Acoust. Soc. Amer., July 1967, 42(1), 124-138. (Auditory Research Lab., Northwestern University, Evanston, Ill.).

Interference with binaural intelligibility of spondaic words produced by continuous white noise and of monosyllabic words produced by both continuous and modulated white noise as well as connected speech (single talker) was studied under a variety of interaural listening conditions. Performance during homophasic (N_0S_0) and antiphasic ($N_0\pi S_0$) listening was compared with that achieved under conditions involving various interaural time differences of the noise and/or the speech. These time differences ranged from 0.1 to 0.8 msec. Several signal-to-masker ratios were employed, but for the conditions involving modulated noise, only two modulation rates (4/sec and 100/sec) and a single magnitude of modulation (14 dB) were used. Transition from homophasic to antiphasic listening produced masking-level differences (MLD's) of about 7 and 4 dB for spondees and monosyllables, respectively. The MLD's produced by varying the interaural timing of either speech or noise increased systematically as the time differences were increased within the range studied here, but they never exceeded those for antiphasic listening and were usually appreciably smaller. As gauged by performance under 0.4- and 0.8-msec interaural time delay, the MLD for monosyllables was the same regardless of whether the time difference was applied to the masker or the speech. Furthermore, the MLD produced by simultaneous but opposing interaural time differences (masker leading in one ear and speech in the other) did not exceed the antiphasic MLD, even when the aggregate timing discrepancy between the two signals reached 1.6 msec. Some implications of these findings are discussed.
R 35

33,067
Corcoran, D.W.J. PERCEPTUAL INDEPENDENCE AND RECOGNITION OF TWO-DIMENSIONAL AUDITORY STIMULI. J. Acoust. Soc. Amer., July 1967, 42(1), 139-142. (Applied Psychology Research Unit, MRC, Cambridge, England).

The experiment was designed to test the fit of a simple independence model to two-dimensional auditory stimuli. Subjects (six in number) were required to name four stimuli, which were either high in pitch (1250 cps) or low (1000 cps) and either amplitude modulated twice per second at 60% or unmodulated. After attaining perfect identification the stimuli were presented in white noise (signal-to-noise ratio of -17.5 dB) and subjects attempted to name them as before. The resulting stimulus-response matrix was matched against a theoretical matrix derived from an independence theory. The pitch dimension was well described by independence, but modulation was not so well described. It was concluded that, although independence may not describe the underlying perceptual mechanism, it is nevertheless satisfactory as an over-all predictor.
R 8

33,068
Elliott, Lois L. DEVELOPMENT OF AUDITORY NARROW-BAND FREQUENCY CONTOURS. J. Acoust. Soc. Amer., July 1967, 42(1), 143-153. (Central Institute for the Deaf, St. Louis, Mo.).

Four experiments were performed to explore the hypothesis that time is required for the auditory system to develop steady-state contours corresponding to stimulation by a narrow band of frequencies. Four additive and interacting phenomena appear necessary to explain the observed results: on and off effects, temporal integration of acoustic energy, temporal persistence of the excitation pattern, and time-dependent organization of frequency contours.

33,069
Glattke, T.J. & Small, A.M., Jr. FREQUENCY SELECTIVITY OF THE EAR IN FORWARD MASKING. J. Acoust. Soc. Amer., July 1967, 42(1), 154-157. (University of Iowa, Iowa City, Iowa).

In a stimulus paradigm in which the masker terminates prior to the signal presentation (forward masking), threshold shifts as a function of signal frequency closely resemble those observed for simultaneous masking. The purpose of the present study was to determine if a "critical band" could be identified for forward masking. Two-component masker (primary) stimuli centered in the regions of 800 and 3200 Hz were presented to 10 listeners. The amount of forward masking was measured as a function of signal frequency, while the frequency separation of the sinusoids comprising the primary stimulus was varied systematically. Previously reported simultaneous-masking data suggested that a critical bandwidth could be defined as the frequency separation of masker components coincident with a change in the shape of the function relating amount of masking to signal frequency. For the conditions employed in the present study, no changes in this function were observed even at wide separation of the primary components.
R 22

33,090
Lucas, P.A. HUMAN PERFORMANCE IN LOW-SIGNAL-PROBABILITY TASKS. J. Acoust. Soc. Amer., July 1967, 42(1), 158-178. (Sensory Intelligence Laboratory, Ann Arbor, Mich.).

An extension of the theory of signal detection (TSD) to psychophysical tasks involving low-probability signals and free-response data is developed and evaluated. Emphasis is placed on tasks for which the observer is asynchronous--that is, the observer cannot perform optimally by making independent decisions on nonoverlapping intervals of time. A mathematical model of asynchronous observation in a class of temporally unstructured tasks with Neyman-Pearson solutions for optimal fixed-response rate is used to describe detection performance by human observers. Data from an experiment show a) a conservative fixed-response rate, b) a constant hit rate, and c) interresponse distributions for false alarms with a general exponential shape showing periodic modes. Detection efficiency in the temporally unstructured task was approximately 1/10 of alerted-detection efficiency for two observers and 1/2 of alerted-detection efficiency for a third observer. Points on the obtained receiver-operating-characteristic (ROC) curve are fit better by an inefficient asynchronous observer than by synchronous power-law observers. A post hoc analysis of the effect of training showed an effect for distribution of responses in time but showed no effect of an improvement in memory for the signal. It is concluded that highly trained observers detecting important signals show constant efficiency over observation periods of 30-45 min. The TSD psychophysical model of asynchronous observation seems to be an adequate description of human performance in the low-probability free-response task used in this study.
R 23

33,091
Melnick, W. EFFECT OF TWO INTERAURAL PHASE CONDITIONS FOR BINAURAL EXPOSURES ON THRESHOLD SHIFT. J. Acoust. Soc. Amer., July 1967, 42(1), 179-184. (Otolaryngology Dept., Ohio State University Hospital, Columbus, Ohio).

Monaural temporary threshold shift (TTS) was measured following 2 min of exposure under three conditions of presentation, monaural, binaurally in phase, and binaurally out of phase by 180°. When listeners were exposed to 500 and 750 Hz at 120 and 110 dB, respectively, TTS at test signals of 750 and 1000 Hz was greater for monaural than for binaural exposure conditions, and no phase effect was noted. For an exposure-test signal combination of 6000 and 6000 Hz, the binaural-monaural difference was eliminated but there was a significant phase effect for the two binaural exposure conditions. More TTS occurred when the exposure signal was 180° out of phase. No difference was observed among the exposure conditions for TTS at 750 Hz following exposure to a 400-600-Hz band of noise at 120 dB. The "frying-noise" tinnitus that follows high-level tonal exposure was reported to disappear at 70-80 sec postexposure for both binaural and monaural exposure.
R 8

33,093
Ritsma, R.J. FREQUENCIES DOMINANT IN THE PERCEPTION OF THE PITCH OF COMPLEX SOUNDS. J. Acoust. Soc. Amer., July 1967, 42(1), 191-198. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.)

This paper deals with measurements carried out with pulsive signals to determine the spectral region associated with dominant pitch perception. The stimulus consisted of the sum of a) a low-frequency band of a unipolar pulse train with fundamental frequency f_0 (or $f_0 \pm \Delta f$) and upper cutoff frequency f_c and b) a high-frequency band of a unipolar pulse train with fundamental frequency $f_c \pm \Delta f$ (or f_0) and lower cutoff frequency f_c. In the experiments f_0 was 100, 200, and 400 Hz, respectively; $\Delta f/f_0$ was either 3% or 6%; and overall sensation level was between 30 and 50 dB. When the fundamental frequencies were interchanged, a pitch change "up" or "down" was heard, depending on the "crossover" frequency f_c. For f_c larger than the sixth harmonic, the low-frequency band always dominated the pitch percept. Changing the sensation level of the low-frequency band with respect to the higher-frequency band, the minimum sensation level for dominant pitch perception was determined. It was found that, for a given f_c, the low band tended to dominate the pitch perception as long as its amplitude exceeded a minimum absolute level. Dominance was found to be independent of Δf. By selectively limiting the number of components in the low-frequency band, the spectral region dominant for the perception of pitch was determined more precisely. This spectral region covered the frequency band consisting of the third, fourth, and fifth harmonics for signals with fundamental frequencies in the range of 100-400 Hz.
R 12

33,094
Atherley, G.R.C., Harpstead, T.I., Lord, P. & Walker, J.G. RELIABILITY OF AUDITORY THRESHOLD DETERMINATIONS USING A CIRCUMAURAL-EARPHONE ASSEMBLY. J. Acoust. Soc. Amer., July 1967, 42 (1), 199-203. (Pure & Applied Physics Dept., University of Salford, Salford, England).

In a previous paper, a circumaural earphone that was intended to improve the reliability of auditory threshold measurements was described. This paper is concerned with its evaluation using the results from tests on 100 subjects. The test-retest variances at 1, 3, 6, and 8 kHz for the circumaural and supra-aural assemblies are compared. At 6 and 8 kHz, the "within-ear" variances for the circumaural assembly are 4.8 and 6.2 dB², respectively, and are significantly smaller than the corresponding values for the supra-aural device. At 1 and 3 kHz, the reliability is substantially unchanged. It would seem, therefore, that the use of the circumaural earphone will increase the accuracy of auditory-threshold determinations at high frequencies.
R 13

33,095
Bauer, B.B., Rosebeck, A.J. & Abbagnaro, L.A. EXTERNAL-EAR REPLICA FOR ACOUSTICAL TESTING. J. Acoust. Soc. Amer., July 1967, 42(1), 204-207. (CBS Laboratories, Stamford, Conn.).

As part of the development of an acoustical manikin, an artificial ear was designed to simulate the mechanical and acoustical properties of the external ear, up to and including the impedance of the eardrum. The sensing element is a B&K 4132 electrostatic microphone terminating a simulated ear canal with an acoustical impedance-matching network that, combined with the microphone, furnishes the eardrum impedance. The canal proper has dimensions approximating those of the real ear and is placed inside a skull of polyester-impregnated fiberglass, provided with a plastisol pinna of realistic dimensions and texture. The head is mounted on a fiber torso. The new artificial ear is suitable for testing all types of receivers and ear enclosures under realistic conditions. The inner portion of the artificial ear is made of reproducible metallic components, making it suitable for consideration as an artificial-ear standard.
R 8

33,097
Griffiths, J.D. RHYMING MINIMAL CONTRASTS: A SIMPLIFIED DIAGNOSTIC ARTICULATION TEST. J. Acoust. Soc. Amer., July 1967, 42(1), 236-241. (USAF Cambridge Research Labs., L.G. Hanscom Field, Bedford, Mass.).

The diagnostic approach to articulation testing examines the phonemic confusions in the responses made by an articulation test crew. Since a phoneme may be regarded as a sum of its essentially independent features or attributes (either the distinctive features or the conventional articulatory classifications of manner, place, and voicing), a phonemic confusion, or error in identification, may be regarded as a confusion in one or more of its independent attributes. A pair of phonemes which differ from each other in only a single feature or attribute is a *minimal feature contrast*, and an error in the identification of one of the phonemes for the other is a minimal feature confusion. Any phonemic confusion can be seen to be the sum of one or a number of minimal feature confusions. A test which includes all the minimal feature contrasts in a language can then estimate speech system performance for an input sample from the natural language. A previously reported test (NEIAS No. 25,844) has been modified to include all the minimal feature contrasts for initial and terminal consonants. This modification is an easily interpreted tool for diagnostic research, and in addition, retains the desirable characteristics of the original test: ease of administration and scoring, stable responses without learning effect, and use of naive listeners.
R 8

33,098
Campbell, R.A. ESTIMATION OF AN OBSERVED CRITERION OR BETA$_o$. J. Acoust. Soc. Amer., July 1967, 42(1), 267-268. (Western Reserve University, Cleveland, Ohio).

The specific steps are provided for estimating an observed-likelihood-ratio criterion, beta, given the proportions of hits and false alarms obtained from an observer in the YES-NO procedure.
R 6

33,099
Gjaevenes, K. DAMAGE-RISK CRITERION FOR THE IMPULSIVE NOISE OF "TOYS". J. Acoust. Soc. Amer., July 1967, 42(1), p.268. (Physics Institute, University of Oslo, Oslo, Norway).

Based on physical and medical data, the damage-risk criterion (DRC) for the impulsive noise from crackers and popguns is discussed, and a DRC of 155 dB peak pressure is proposed.
R 5

33,100
Reddy, D.R. COMPUTER RECOGNITION OF CONNECTED SPEECH. J. Acoust. Soc. Amer., Aug. 1967, 42(2), 329-347. (Computer Science Dept., Stanford University, Stanford, Calif.).

A system for obtaining a phonemic transcription from a connected speech sample entered into the computer by a microphone and an analog-to-digital converter is described. A feature-extraction program divides the speech utterance into segments approximately corresponding to phonemes, determines pitch periods of those segments where pitch analysis is appropriate, and computes a list of parameters for each segment. A classification program assigns a phoneme-group label (vowellike segment, fricativelike segment, etc.) to each segment, determines whether a segment should be classified as a phoneme or whether it represents a phoneme boundary between two phonemes, and then assigns a phoneme label to each segment that is not rejected as being a phoneme boundary. About 30 utterances of 1-2 sec duration were analyzed using the above programs on an interconnected IBM 7090-PDP1 system. Correct identification of many vowel and consonantal phonemes was achieved for a single speaker using the same speech material that was used for developing the recognition procedure. The time for analysis of each utterance was about 40 times real time.
R 20

33,101
Stover, W.R. TIME-DOMAIN BANDWIDTH-COMPRESSION SYSTEM. J. Acoust. Soc. Amer., Aug. 1967, 42(2), 348-359. (Behavioristics Lab., HRB-Singer, Inc., State College, Penn.).

A voice narrow-band-transmission system (VOBAX) is described. The concepts upon which the system is based are discussed, and an experimental system is described. The system operates in a digital transmission mode at data rates of 9600, 4800, 2400, or 1200 bits/sec. In the present form the experimental device is being used as a laboratory research tool in the general area of speech-processing research.
R 24

33,102
Oestheraga, B.H. & Henderson, D. AUDITORY SENSITIZATION. J. Acoust. Soc. Amer., Aug. 1967, 42(2), 438-440. (Sciences & Systems Div., Trecor, Incorporated, Austin, Tex.).

In three experiments, the attempt has been made to demonstrate the phenomenon of sensitization. The experimenters believe that they have succeeded. A brief high-frequency tone was added to a low-frequency carrier at various pulses of the low frequency. Classical threshold was shifted up when the stimulus was added between 200° and 360°, and threshold was shifted down between 0° and 180°. This effect was greatest when the low frequency was at ~5dB sensation level (SL). At 20 dB SL the effect was partially obscured by masking.
R 3

33,103
Elfner, L.F. & Perrott, D.R. LATERALIZATION AND INTENSITY DISCRIMINATION. J. Acoust. Soc. Amer., Aug. 1967, 42(2), 441-445. (Kent State University, Kent, Ohio).

This study reports the effects of various binaural intensity patterns on the discrimination of changes in the position and intensity of binaurally induced auditory images. The difference limen obtained for just-noticeable shift of an auditory image is in most cases not significantly different from the difference limen observed in discrimination of a just-noticeable change in the intensity of the signal. Only under low intensity levels is such a difference noted. Significant effects are observed as a function of the binaural intensity pattern employed. Also an increase in intensity of the signal invariably produced a smaller just-noticeable difference than a decrease in the intensity of the signal. A functional relationship is indicated between image movement and sensitivity to intensity change.
R 8

33,104
Nershman, R.L. & Lichtenstein, M. DETECTION AND LOCALIZATION: AN EXTENSION OF THE THEORY OF SIGNAL DETECTABILITY. J. Acoust. Soc. Amer., Aug. 1967, 42(2), 446-452. (USN Electronics Lab., Bureau of Ships, San Diego, Calif.).

The theory of signal detectability is extended to detection and localization (DAL). The experimenters treat the following problem: on each trial there are k noisy observation intervals, and at most one of these contains a known signal; an observer makes one of k+1 responses, indicating "NO SIGNAL IS PRESENT" or "THE SIGNAL IS IN INTERVAL j" (1≤j≤k). The observer is scored "correct" on a noise-only trial if he reports "NO SIGNAL", he is scored "correct" on a signal-plus-noise trial if he correctly localizes the observation interval containing the signal. The decision rules for maximizing percent correct, P(C), are derived; these are based on the likelihood ratio of the observation in each interval. The analysis shows that the ideal DAL receiver consists of the sequential application of YES-NO (YN) and forced-choice (FC) decision-makers. Under the assumption that monotonic transforms of the likelihood ratio are normally distributed, numerical results are obtained for P(C) as a function of k and the statistical separation of the noise and signal-plus-noise. Ideal performance on the DAL and FC problems is compared, and some multisignal cases are briefly considered.
R 10

33,105
Loeb, M. & Smith, A.P. RELATION OF INDUCED TINNITUS TO PHYSICAL CHARACTERISTICS OF THE INDUCING STIMULI. J. Acoust. Soc. Amer., Aug. 1967, 42(2), 453-455. (USA Medical Research Lab., Fort Knox, Ky. & University of Louisville, Louisville, Ky.).

After observers were exposed to intense pure-tone and broad-band acoustic stimuli, their temporary threshold shifts were measured, and they were asked to match the pitch of any resulting tinnitus by manipulating the frequency of an adjustable low-level pure tone in the opposite ear. It was found that both the frequency of tinnitus and the frequency of the tone used for the pitch match increased as the frequency of the traumatic stimulus increased, but maximum loss frequency and tinnitus frequency did not coincide. Although the observers were quite reliable in their judgments of tinnitus elicited by a stimulus, interobserver variability was considerable.
R 3

33,106
Northern, J.L. TEMPORAL SUMMATION FOR CRITICAL BANDWIDTH SIGNALS. J. Acoust. Soc. Amer., Aug. 1967, 42(2), 456-461. (USA Brooke General Hospital, Brooke Army Medical Center, Fort Sam Houston, Tex.).

Temporal summation patterns were established for noise signals with critical-bandwidth frequency spectrums centered at 1000 and 4000 cps. Critical-bandwidth levels were calculated from group-mean masked thresholds and converted to critical-bandwidth noise signals. These measures were conducted for nine stimulus durations ranging from 10 to 1000 msec in ten normal-hearing, and ten cochlear-impaired subjects. Temporal summation functions for critical-bandwidth signal thresholds were in good agreement except at 4000 cps in the cochlear-impaired group. These subjects showed no change in absolute threshold for the critical-bandwidth noise signals as a function of increasing stimulus-duration time.
R 9

33,107
Plomp, R. BEATS OF MISTUNED CONSONANCES. J. Acoust. Soc. Amer., Aug. 1967, 42(2), 462-474. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

Two simultaneously sounding simple tones of M and N cps, respectively, with M:N slightly different from m:n (both small integral numbers) may give rise to a beat sensation with m-n beats per second. For the case m = 1, these beats are usually explained as resulting from harmonics created in the ear by distortion. Experiments indicated, however, that for m ≠ 1 secondary tones cannot be the main origin of these beats because the beat sensation does not disappear when bands of noise are introduced in the frequency ranges around possible harmonics and combination tones. Other experiments in which, for a constant lower tone M, the sound-pressure level (SPL) of the higher tone N for most distinct beats was determined showed that this SPL decreases gradually for increasing frequency of M, irrespective of frequency ratio. Moreover, it was found that the beats for 200+601 cps manifest themselves in a weak tone sensation with a pitch shifting periodically in a sawtoothlike manner between about 610 and 730 cps. These experimental results suggest that, also for the case 1:n, the beats are not due to combination tones or aural harmonics but are related to periodic variations in the waveform of the overlapping vibration patterns along the basilar membrane, giving rise to corresponding variations in the time pattern of the nerve impulses.
R 56

33,108
Price, G.R. & Oatman, Lynn C. CENTRAL FACTOR IN AUDITORY FATIGUE--AN ARTIFACT? J. Acoust. Soc. Amer., Aug. 1967, 42(2), 475-479. (USA Human Engineering Labs., Aberdeen Proving Ground, Md.).

Three experiments were conducted to study further the influence of central factors on pure-tone auditory fatigue noted by Wernick and Tobias (HEIAS No. 23,756). Experiment I replicated the Wernick and Tobias study and produced similar data. Observations made during Experiment I led to several changes in procedure. Experiments 2 and 3 were concerned with the effects of the changes. The results indicated that if the subjects could resume post-exposure threshold tracking without being required to do something else simultaneously (such as write an answer to a problem), the differences between the experimental groups disappeared. Thus, the effect interpreted earlier as being the influence of a central factor seems to be procedural artifact. This interpretation--with one exception, which is discussed--is consistent with the procedure and data of previous experiments.
R 7

33,109
Thurlow, W.R. & Runge, P.S. EFFECT OF INDUCED HEAD MOVEMENTS ON LOCALIZATION OF DIRECTION OF SOUNDS. J. Acoust. Soc. Amer., Aug. 1967, 42(2), 480-488. (Psychology Dept., University of Wisconsin, Madison, Wisc.).

Localization of direction of sound sources was studied as a function of induced head movements. High- and low-frequency noise and pulse stimuli were used. Subjects had had no special training and were blindfolded to remove visual cues. Sources were located to the right and left of the subject, in front and behind, and above and below the horizontal plane through the ears of the subject. Induced head rotation was found to be especially effective in reducing horizontal localization error. Rotation, pivot, and rotate-pivot movements caused a small but significant reduction in vertical localization error for low-frequency noise stimuli.
R 8

33,110
Thurlow, W.R., Mangels, J.W. & Runge, P.S. HEAD MOVEMENTS DURING SOUND LOCALIZATION. J. Acoust. Soc. Amer., Aug. 1967, 42(2), 489-493. (Psychology Dept., University of Wisconsin, Madison, Wisc.).

Subjects were photographed with a moving-picture camera as they attempted to localize each of 10 sound sources in an anechoic room. High- and low-bandpass thermal noise stimuli of 5-sec duration were used. Changes in angular position of the head (and thus the ears) were measured from the film. Rotation movements of the head about a vertical axis (turning, left or right) were most commonly found--alone, in combination with tipping movement (nose up or down), or in conbination with both tipping and pivot movements. (A "pivot" movement involves an increase in vertical height of one ear and a decrease in vertical height of the other.) A number of subjects also showed reversals in movement. The reversals were most prominent in the case of rotation movements. Quantitative summaries of observed movements are given.
R 5

33,111
Coles, R.R.A. & Rice, C.G. CORRECTIONS FOR ATTENUATOR TRANSIENT EFFECTS IN DATA ON SELF-RECORDED AUDIOMETRIC THRESHOLD OF NORMAL-HEARING AND HIGH-TONE DEAF PERSONS. J. Acoust. Soc. Amer., Aug. 1967, 42(2), 509-511. (Sound & Vibration Research Institute, University of Southampton, Southampton, Hampshire, England).

Stud-type attenuators in a widely used model of self-recording audiometer are apt to be associated with transients and intermittencies in the intensity/time envelopes of their acoustic output. These have been shown to result in more acute threshold measurements in normal-hearing subjects, and the effect is greater at the higher frequencies in persons with noise-induced hearing loss. Correcting for the effect of these transients results in good agreement between the authors' earlier data (HEIAS No. 29,997) on normal threshold of hearing and current proposals for application of International Standardization Organization Recommendation 389 to audiometers using TDH-39 earphones calibrated on 9-A couplers.
S 7

33,113
Golden, R.M. COMMENTS ON "TECHNIQUE FOR CORRECTING HELIUM SPEECH DISTORTION." J. Acoust. Soc. Amer., Aug. 1967, 42(2), p.514. (Autonetics Div., North American Aviation, Inc., Anaheim, Calif.).

The time-adjustment technique for correcting the peculiar sound of helium speech (Stover, W.R. NEIAS No. 33,033) critically depends on the accurate determination of fundamental pitch period. Stover does not indicate that "...sensing the pitch rate of the speaker's voice..." is a crucial requirement of his system. However, it appears to this writer that reliable pitch detection plus the implied need for a voiced-unvoiced decision are the most difficult features to implement in his system.
R 4

33,114
Batchelder, J.H., Theyer, W.S. & Schultz, T.J. SOUND ABSORPTION OF DRAPERIES. J. Acoust. Soc. Amer., Sept. 1967, 42(3), 573-575. (Architecture Dept., Massachusetts Institute of Technology, Cambridge, Mass.).

Measurements were made of the acoustical absorption introduced by various configurations of draperies into a small reverberation room. The results are presented and compared here. A single layer of heavy material hung undraped at the center is most efficient. A center position is better than a position near the wall. The double-hung undraped configuration is better than the fully draped configuration. An end-wall position usually leads to flatter curve of absorption versus frequency than the center position. Double layers of material should be separated, not hung in contact with one another; however, too great a separation may be undesirable. Two half-length undraped banners widely separated are much better than either two half-length undraped banners hung together at the center or one single, full-length banner hung undraped at center. Patches of material hung across trihedral corners of room are better than the same amount of material hung as an undraped, half-length banner at center.
R 2

33,115
Elfner, L.F. & Homick, J.L. AUDITORY CONTINUITY EFFECTS AS A FUNCTION OF THE DURATION AND TEMPORAL LOCATION OF THE INTERPOLATED SIGNAL. J. Acoust. Soc. Amer., Sept. 1967, 42(3), 576-579. (Kent State University, Kent, Ohio).

The present experiment employed 20 college students who demonstrated an ability to make determinations of interruption or continuity in a random noise signal that alternated with a tonal burst. The primary purpose of this experiment was to investigate the effects of the duration and the temporal location of the interpolated signal on the perception of continuity under monaural presentation. The effect of frequency of the interpolated tone was also evaluated. The results showed that the perception of continuity in the noise was affected by both the duration and frequency of the interpolated tonal signal. The location of the interpolated signal had no significant differential effect on continuity thresholds.
R 6

33,116
Djupesnes, K. & Vigran, E. CONTRALATERAL MASKING: AN ATTEMPT TO DETERMINE THE ROLE OF THE AURAL REFLEX. J. Acoust. Soc. Amer., Sept. 1967, 42(3), 580-585. (Physics Institute, University of Oslo, Oslo, Norway).

Poststimulatory contralateral masking of pure tones at frequencies 200-1000 cps are determined on normal-hearing subjects. The masker was a high-frequency band noise. Delay interval and noise level have been varied. The masking effect is most probably caused by the middle-ear muscle reflex, but it seems not possible, on basis of the experiments to decide whether other mechanisms also are involved.
R 13

33,117
Treisman, M. & Irwin, R.J. AUDITORY INTENSITY DISCRIMINAL SCALE I. EVIDENCE DERIVED FROM BINAURAL INTENSITY SUMMATION. J. Acoust. Soc. Amer., Sept. 1967, 42(3), 586-592. (Bell Telephone Laboratories, Inc., Murray Hill, N.J. & Psychology Dept., University of Auckland, Auckland, New Zealand).

The problem of scaling the central effect of auditory stimulus intensity, I (in power units), is considered, and it is argued that there need not be a unitary neurophysiological correlate for "loudness." Different psychophysical tasks may draw on different central measures of stimulus intensity. A "metric dimension," L, which the subject may use in making quantitative judgments, is distinguished from a more peripheral "discriminal dimension," E, involved in the immediate processing of the stimulus input. Binaural intensity summation data are used to derive the form of the function relating E to I, and it is shown that for any particular range of intensities this can be approximated by a power function, $E = kI^n$, where the exponent n depends on the range of intensities used, approximating one near the absolute threshold and decreasing as over-all intensity increases. On the assumption that with binaural stimulation the over-all loudness is determined by the sum of E_L and E_R, the effects produced by the stimuli to the left and right ears, linear equiloudness curves are obtained.
R 27

33,118
Ward, W.D. FURTHER OBSERVATIONS ON CONTRALATERAL REMOTE MASKING AND RELATED PHENOMENA. J. Acoust. Soc. Amer., Sept. 1967, 42(3), 593-600. (Hearing Research Lab., University of Minnesota, Minneapolis, Minn.).

Previous knowledge is reviewed relevant to contralateral remote masking (CRM)--the elevation in threshold of a low-frequency sinusoid in the presence of a high-frequency band of noise in the opposite ear--and a series of additional observations is presented. CRM is nearly as great: a) in ears with paralyzed middle-ear muscles as in normal ears, b) for bone-conducted as for air-conducted test tones, or c) when a 50-msec tone pulse occurs simultaneously with the onset of the masking pulse as when it is presented half a second later. Furthermore, d) the gradual decrease of CRM with time, in the presence of a sustained masker, is not affected by abrupt changes in frequency or level of the masker, and e) only a low negative correlation between CRM and auditory fatigue exists. These facts all indicate that the middle-ear muscles play only a minor role in CRM. The course of adaptation of CRM is shown to parallel the course of development of perstimulatory fatigue. It appears, therefore, that CRM represents primarily central masking arising at one or more centers receiving afferent innervation from both right and left ears, and that the change in time of CRM can be ascribed to acaptation processes either in the noise channel or, via the efferent system, in the contralateral channel. Implications of this formulation in regard to auditory fatigue from diotic and dichotic exposure to noise is discussed.
R 37

33,119
Levitt, H. & Rabiner, L.R. BINAURAL RELEASE FROM MASKING FOR SPEECH AND GAIN IN INTELLIGIBILITY. J. Acoust. Soc. Amer., Sept. 1967, 42(3), 601-608. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

Relative importance of different frequency regions in binaural release from masking (for detection) and binaural gain in intelligibility was investigated. Experiments showed that the release from masking ($m0 case) for single words in high-level, broad-band Gaussian noise is roughly 13 dB and is determined primarily by interaural phase opposition in the low-frequency (<500 Hz) region. The binaural gain in intelligibility at the 50% level was on the order of 6 dB and only partly dependent on interaural phase opposition in the low-frequency region. Interaural amplitude differences were not considered in the investigation. Subjecting the speech to a large interaural time delay with the noise binaurally in phase resulted in a relatively constant masking level difference approaching 13 dB over the measured range from 0.5 to 10 msec. The corresponding binaural gain in intelligibility at the 50% level was on the order of 3 dB.
R 12

33,120
Levitt, H. & Rabiner, L.R. USE OF A SEQUENTIAL STRATEGY IN INTELLIGIBILITY TESTING. J. Acoust. Soc. Amer., Sept. 1967, 42(3), 609-612. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

In a recent experiment involving intelligibility testing, the response curve (intelligibility function) was found to flatten off sharply at moderately high intelligibilities. A sequential strategy of the up-down-transformed-response (UDTR) type was used in order to concentrate observations in the symmetric region of the curve. The transformed-response curve showed the departure from symmetry at a much higher intelligibility level. Precision of estimation for the 50% level was found to be higher than for the simple up-and-down procedure. The technique is designed for situations in which it is difficult or impossible to vary the step size.
R 8

33,121
Maher, R.F. MEASUREMENT OF ROOM ABSORPTION BY STEADY-STATE AND DECAY-RATE METHODS. J. Acoust. Soc. Amer., Oct. 1967, 42(4), 743-750. (Research & Development Center, Armstrong Cork Company, Lancaster, Penn.).

Steady-state and decay-rate methods of measuring A_2, the total sound absorption in the receiving room of a transmission-loss experiment, were compared to determine how well they agreed. The results of a series of experiments under controlled laboratory conditions showed a very close agreement between the two methods, with differences averaging less than half a decibel in measurements of 10 $\log_{10} A_2$. These results indicate that a steady-state method may be substituted for the reverberation-time method in measuring A_2 without sacrificing the accuracy of laboratory measurements of airborne sound transmission loss of building partitions.
R 7

33,122
Clack, T.D. AURAL HARMONICS: THE MASKING OF A 2000-Hz TONE BY A SUFFICIENT 1000-Hz FUNDAMENTAL. J. Acoust. Soc. Amer., Oct. 1967, 42(4), 751-758. (Kresge Hearing Research Institute, University of Michigan Medical School, Ann Arbor, Mich.).

Aural harmonic distortion is generated in normal ears with a constant 1000-Hz fundamental (f_1) while the listener traces his threshold for an interrupted 2000-Hz (f_2) objective tone. Both tones are presented simultaneously to the same ear with the consequent variations in the masked thresholds recorded during presentations of the time relation between f_1 and f_2. The technique and preliminary results are described in the first part of this report. These data show that the threshold shift (TS), produced with an f_1 of 60 or 65 dB sensation level (SL), depends critically upon the phase relation of f_2 to f_1. The TS varies sinusoidally as f_2 is phase shifted through one or two complete cycles. Section II presents a discussion of the assumptions used to explain these results. Accordingly a harmonic series is generated within the ear, vectorial summation occurs between the aural harmonic (AH) and the objective tone, and the task of the listener is to maintain this resultant at some level. An electronic analog model shows that, under these assumptions, the objective f_2 would undergo variations approximating sine waves if the AH is at a low effective level compared to that needed to attain audibility. The experiment of Section III confirmed that the general equation, $Y = A_1 + A_2 \sin(x+\rho)$, provides a satisfactory description of the variations in TS. In addition, a prediction was derived concerning the phase conditions causing maximum interference, both constructive and destructive. The changes in TS associated with these two phase conditions are approximately equal and opposite as predicted. In fact, the objective f_2 is heard at lower intensities than under quiet listening conditions when the f_1 intensity was increased up to 60 dB (sound pressure level). This rather bizarre reversal of the usual masking phenomenon, owing to augmentation between the AH and objective f_2, was anticipated from the model.
R 19

33,123
Fischler, H. MODEL OF THE "SECONDARY" RESIDUE EFFECT IN THE PERCEPTION OF COMPLEX TONES. J. Acoust. Soc. Amer., Oct. 1967, 42(4), 759-764. (Communication Sciences Center, Massachusetts Institute of Technology, Cambridge, Mass.).

The phenomenon of tonal residue in stimulation of the hearing system by sinusoidally amplitude-modulated tones is examined for its correlation with the temporal fine structure displacements of the basilar membrane. It is suggested that the deviations of the residue pitch from magnitudes anticipated on account of the stimulus pattern at the input to the ear (in anharmonic complexes) represent a secondary effect only. Probably, those deviations arise from the phase modulation of the major carrier peaks of the resultant basilar-membrane displacements, evoked during passage of the stimulating signal to the cochlea. The phase modulation is due to asymmetry introduced in the sideband energy of the stimulus as a result of the mechanical filtering by the inner ear. Representing a phenomenon in the time domain, the secondary residue effect is examined as a function of various compositions of the stimulating tone, at various locations along the basilar membrane. It is argued that the magnitude of the effect decreases with the harmonic-number relation between the carrier and modulation frequencies of the stimulus. Possibly, the region on the basilar membrane pertinent to characteristic frequencies lower than (but close to) the central component of the stimulating signal contributes most to determining the magnitude of the secondary effect.
R 15

33,124
Moray, N. & O'Brien, T. SIGNAL-DETECTION THEORY APPLIED TO SELECTIVE LISTENING. J. Acoust. Soc. Amer., Oct. 1967, 42(4), 765-772. (Psychology Dept., University of Sheffield, Yorkshire, England).

Recently, two papers have appeared that have applied signal detection theory to selective listening. Both have certain defects, and the present paper is intended to clarify some of the issues raised by the earlier papers. D.E. Broadbent and M. Gregory (DIVISION OF ATTENTION AND THE DECISION THEORY OF SIGNAL DETECTION. Proc. Roy. Soc., London, 1963, B159, 222-231.) used a tone detection task on one ear while presenting a memory load to the other and found that d' but not β altered for the detection task. A. Treisman and G. Geffin (SELECTIVE ATTENTION: PERCEPTION OR RESPONSE? Quart. J. Expt. Psychol., 1967, 19, 1-17.) recently reported on the "shadowing" situation (continuous repetition of an ongoing message) and again found evidence that d' but not β was affected. Treisman interpreted her results to mean that selection of input, not of response, was operative, basing her conclusions on the way in which the subject responded to homophones and homonyms. Detection of signals was signaled by the subject tapping the microphone. Unfortunately, Treisman was forced to use pooled data for the estimation of d' and β, which involved some strong assumptions about the relative performance of individual subjects. The present experiment was designed to provide a relatively "pure" selective listening task for the applicability of signal detection theory to the process of selective attention.
R 13

33,125
Wolte, L.W. THEORY OF SIGNAL DETECTABILITY: ADAPTIVE OPTIMUM RECEIVER DESIGN. J. Acoust. Soc. Amer., Oct. 1967, 42(4), 773-777. (Electrical Engineering Dept., Duke University, Durham, N.C.).

The theory of adaptive optimum receiver design is presented and its relationship to the classical theory of signal detectability of Peterson, Birdsall, and Fox is presented. The classical theory concentrated on the function description, i.e., the optimum detector for a fixed observation procedure is one that forms the likelihood ratio. Optimum detection performance depends on this input-output relationship. This paper concentrates on a more detailed description of the optimum detector; i.e., its realization or implementation. It is shown how optimum detectors can be implemented in a sequential manner, resulting in a receiver configuration that is adaptive. The sequential nature of the adaptive implementation is one in which both a classification and detection output is readily available and, in addition, the design is such that the terminal time of the observation need not be known a priori. The adaptive optimum receiver design theory stresses the use of the receiver memory.
R 3

33,127
Ross, S. MATCHING FUNCTIONS AND EQUAL-SENSATION CONTOURS FOR LOUDNESS. J. Acoust. Soc. Amer., Oct. 19 , 42(4), 778-793. (Language & Language Behavior Research Center, University of Michigan, Ann Arbor, Mich.).

Loudness balances were collected from three subjects, employing 57 combinations of 13 frequencies extending from 20 to 5000 cps. Determinations were made from levels close to threshold to the highest levels tolerable by the subjects, with 5-dB intervals. Stimuli were applied by an earphone through individually moulded ear inserts, and were measured in decibels sound-pressure level a few millimeters from the eardrum. For each subject, a symmetric and transitive subset of the data was employed for constructing a set of matching functions and a set of equal-loudness contours. Matching functions generally were linear, or showed a double inflection (in log-log coordinates). Equal-loudness contours generally agree with previous determinations, but show a steeper rise towards low frequencies; below 300 cps, and at medium levels, the contours approach straight lines with a slope of -40 dB/decade. Obtained matching functions are compared to three sets of theoretical functions, favoring the matching functions derived from loudness theories developed by Zwicker and by Zwislocki.
R 18

33,128
Botsford, J.H. SIMPLE METHOD FOR IDENTIFYING ACCEPTABLE NOISE EXPOSURES. J. Acoust. Soc Amer., Oct. 1967, 42(4), 810-819. (Bethlehem Steel Corporation, Bethlehem, Penn.).

A simple method for identifying acceptable noise exposures has been developed from the National Academy of Science-National Research Council Committee on Hearing, Bioacoustics, and Biomechanics (NAS-NRC CHABA) report describing hazardous exposures to intermittent and steady-state noise. First, an interrupted exposure was imagined in which the noise dropped to harmless levels periodically, thereby creating a number of identical exposure cycles distributed uniformly throughout the day. Next, the total duration of noise allowable per day was calculated for 39 different patterns of interrupted exposure using the CHABA graphs. This total noise duration permissible daily increased rapidly with the number of interruptions, passed through a maximum value for interruptions about 5 min. in length, and became constant for noise interrupted every 2 min. or oftener. Nine general contours of equinoxious octave-band sound pressure levels resolved from this analysis, and the A-weighted sound level equivalent to each contour was determined for noises of manufacturing industries. It is concluded that acceptable manufacturing noise exposures can be identified as accurately by using A-weighted sound levels as is possible by using octave-band sound-pressure levels.
R 4

33,129
Levitt, H. & Rabiner, L.R. PREDICTING BINAURAL GAIN IN INTELLIGIBILITY AND RELEASE FROM MASKING FOR SPEECH. J. Acoust. Soc. Amer., Oct. 1967, 42(4), 820-829. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

A simple, approximate procedure for predicting binaural gain in intelligibility and release from masking for detection of speech in broadband Gaussian noise is presented. The procedure assumes that the effect of binaural processing in the auditory system can be adequately represented by a frequency-dependent reduction in the level of the masking noise. The magnitude of this reduction is derived from data on release from masking for tones. Predictions of intelligibility are based on the Articulation Index as computed for the equivalent masking noise. It is predicted that the binaural gain in intelligibility for speech in white noise is greatest at low intelligibility levels, decreasing to about 3 dB at high intelligibility levels. The relative importance of low- and high-frequency interaural phase opposition in producing a binaural gain in intelligibility depends on the signal-to-noise (S/N) ratio. Low-frequency interaural phase opposition is of greater importance at low S/N ratios. Release from masking for detection represents a limiting case, the binaural gain being roughly 13 dB and dependent primarily on interaural phase information below about 500 Hz. Predictions based on this procedure are fairly consistent with data obtained in an earlier experiment. More data are required, however, for an adequate assessment of the technique. The implications for practical binaural systems are discussed.
R 22

33,130
Lindblom, B.E.F. & Studdert-Kennedy, M. ON THE ROLE OF FORMANT TRANSITIONS IN VOWEL RECOGNITION. J. Acoust. Soc. Amer., Oct. 1967, 42(4), 830-843. (Speech Communication Dept., Royal Institute of Technology (KTH), Stockholm, Sweden & Haskins Laboratories, New York, N.Y.).

An inventory of speechlike sounds was synthesized displaying systematic variations of the rate and direction of formant transitions. These sounds were specified by a set of vowel formant patterns selected along a continuum varying from [U] to [I], they were assigned to isolated, steady-state vowels, and to the points of zero rate of formant frequency change in symmetrical consonant-vowel-consonant syllables. The time variations of formant frequencies were made convex and concave by the choice of two consonantal frames: [w-w] and [j-j]. The results obtained in a series of vowel identification experiments indicate that a listener's categorization of the continuum varied as a function of the environment and the duration of the vowel. These findings suggest that, in the recognition of monosyllabic nonsense speech, the identity of a vowel is determined not solely by the formant-frequency pattern at the point of closest approach to target, but also by the direction and rate of adjacent formant transitions. In general, subjects adjusted their categorizations of the continuum in the consonantal contexts in such a way that complete transitions between loci and vowel target were not necessary: the transitions were permitted to undershoot the target frequencies for the vowel. In particular, the excursions of formants in the [w-w] syllables tended to be overestimated. Thus, there was a tendency for the categorizations to be made so as to compensate for the formant-frequency undershoot associated with vowel reduction. The effects observed are discussed in terms of an active model of vowel recognition, peripheral auditory analysis, distinctive features, and previously reported observations on vowel perception.
R 33

33,131
Pollack, I. NUMBER OF PULSES REQUIRED FOR MINIMAL PITCH. J. Acoust. Soc. Amer., Oct. 1967, 42(4), p.895. (Mental Health Research Institute, University of Michigan, Ann Arbor, Mich.).

The number of pulses required for minimal pitch was determined. For pulse intervals longer than 1 msec, approximately a constant number of pulses is required: about three. For pulse intervals shorter than 1 msec, approximately a constant duration is required, about 3 msec. The results are in close agreement with findings for the click pitch of pure tones.
R 3

33,133
Schwartz, M.F. TRANSITIONS IN AMERICAN ENGLISH /s/ AS CUES TO THE IDENTITY OF ADJACENT STOP CONSONANTS. J. Acoust. Soc. Amer., Oct. 1967, 42(4), 897-899. (Temple University, Philadelphia, Penn.).

A study was designed to investigate the role of perceived changes in /s/ as cues to the identity of adjacent stop consonants. Ten normal-speaking young adults recorded the words "last," "rasp," and "task" on a high-quality tape system. Three copies were made of the recording. Two of the copies were subjected to an editing procedure: in one, the final release was removed from each word; in the other, the /s/ as well as the release were removed. Each of the copies was presented, via loudspeaker, to a separate group of ten normal-hearing young adults who were instructed to listen to the stimuli and to transcribe what they heard, using phonetic notations. The results indicated that perceived changes in /s/ were important cues to the identity of /p/ and /k/, but not /t/.
R 5

33,134
Knudsen, V.O., Delsasso, L.P. & Leonard, R.W. REVERBERATION-ROOM ACOUSTICS--EFFECTS OF VARIOUS BOUNDARY CONDITIONS. J. Acoust. Soc. Amer., Nov. 1967, 42(5), 953-965. (Physics Dept., University of California, Los Angeles, Calif.).

An investigation of the sound field in a large reverberation room as influenced by a 2-in. mineral wool floor covering and/or an array of 96 suspended plywood panels yielded significant results: The panels do not increase the decay rates, that is, their absorption is negligible, for frequencies below about 250 cps; their added absorption to the room increased progressively at higher frequencies to 24 sabins at 4000 cps. Decay rates for low-frequency single modes in the empty room were linear and ranged from 2.1 to 5.7 dB/sec; the decay rates when two contiguous modes were excited were very nonlinear; their contours were predicted in terms of the decay rates and the phase differences of the two modes. With the floor absorptive, the 96 panels reduced the maximal levels of impulsive sounds (pistol shots), at frequencies below 250 cps, for all elevations above the floor; the average decrease was 4.6 dB. With the floor absorptive, the decay rate at 250 cps was only 6.2 dB/sec when source and microphone were in the upper part of the room, and 39.3 dB/sec when source and microphone were in lower part. The influence of these decay rates on the quality of recorded speech and music was shown to be large.
R 6

33,135
Brandt, J.F. & McAllen, H. UNDERWATER HEARING THRESHOLDS IN MAN. J. Acoust. Soc. Amer., Nov. 1967, 42(5), 966-971. (Speech Dept., University of Florida, Gainesville, Fla.).

The audibility threshold performance of the human ear submerged in water at ear depths of 12 and 35 ft was compared to its performance in air. Threshold SPL's (sound pressure levels) at 125, 250, 500, 1000, 2000, 4000 and 8000 Hz from five male and three female divers wearing open-circuit SCUBA equipment were obtained by the Békésy technique. Differences between water and air conduction thresholds ranged from 18 dB SPL re 0.0002 μbar at 125 Hz to 56 dB at 8000 Hz. Underwater thresholds ranged between 58 and 74 dB SPL, with maximum sensitivity around 500 Hz. Maximum sensitivity for air conduction thresholds was obtained at 2000 Hz. Slightly higher thresholds were obtained at 35-ft ear depth than at the 12-ft depth. Tentatively, the data suggest the importance of bone-conduction mechanisms in underwater hearing. However, it is apparent that further research must be carried out before it will be possible to predict the character and mechanism of the human ear submerged in water.
R 12

33,136
Campbell, R.A. & Lasky, Elaine Z. MASKER LEVEL AND SINUSOIDAL-SIGNAL DETECTION. J. Acoust. Soc. Amer., Nov. 1967, 42(5), 972-976. (Western Reserve University, Cleveland, Ohio).

Threshold signal-to-masker ratios were obtained for a 1000-Hz signal presented with either an identical frequency sinusoidal masker or a complex masker consisting of the same frequency as the signal plus two sidetones 300 Hz on either side of the central component. Data considered include signal durations of 20, 400, and 1600 msec with masker durations either equal to that of the signal or continuous for the block up-and-down, two-interval, forced-choice threshold run. The parameters of primary interest were the level of the masker and whether the masker was gated or continuous. The thresholds appear to indicate that when the excitation pattern of the masker is increased (by shortening its duration or adding sidetones) so as to equal or surpass that of the signal, masked thresholds tend toward an inverted-N function, as related to masker level, rather than being independent of masker level. Also, differences between the gated and continuous masker thresholds do not appear to be related to changes in signal certainty as reflected in the slopes of psychometric functions.
R 8

33,137
Bolen, T.R. & Robinson, D.E. EXPLANATION OF MASKING-LEVEL DIFFERENCES THAT RESULT FROM INTERAURAL INTENSIVE DISPARITIES OF NOISE. J. Acoust. Soc. Amer., Nov. 1967, 42(5), 977-981. (Indiana University, Bloomington, Ind.).

The detectability of a monaurally presented 500-cps signal was measured at each of several values of interaural correlation for a wide-band noise masker. The results, when expressed in terms of masking-level differences (MLD's), are in agreement with data reported by Whitmore and Wilbanks and show a function of similar form to that described by Robinson and Jeffress. Additionally, the detectability of a monaural signal was investigated as a function of the interaural intensive relations of a wide-band noise masker. The data are in agreement with results originally shown by Hirsh, and since, replicated several times. That is, detectability is greatest when the level of the noise masker at the two ears is equal, and decreases as the level of the masker at the nonsignal ear is attenuated. The data are used to estimate parameters for a simple model that attempts to account for changes in detectability that occur when a monaural signal is presented with binaural, correlated noise having an interaural level difference. The model proposes that at low external noise levels, internal noise leads to a decrease in interaural-noise correlation. Predictions from the model are in reasonable agreement with data reported previously.
R 17

33,138
Majewski, W. & Hollien, H. FORMANT FREQUENCY REGIONS OF POLISH VOWELS. J. Acoust. Soc. Amer., Nov. 1967, 42(5), 1031-1037. (Communication Sciences Lab., University of Florida, Gainesville, Fla.).

Frequency regions of the first two formants of Polish vowels are given. The method included specification of these formants by spectral analysis of spoken vowels and by perceptual evaluation of synthetic vocalic stimuli.
R 7

33,139
Young, M.A. & Campbell, R.A. EFFECTS OF CONTEXT ON TALKER IDENTIFICATION. J. Acoust. Soc. Amer., Dec. 1967, 42(6), 1250-1254. (Hearing & Speech Center, Cleveland, Ohio & Western Reserve University, Cleveland, Ohio).

The ability to identify talkers from monosyllables spoken in context was examined: Kersta's method of visually comparing spectrograms was employed. Ten observers were trained to identify five talkers from spectrograms of two words spoken in isolation. The experimental task then required the observers to identify the same talkers from the same words spoken in different contexts. The correct rates for the training task (78.4%) could not be reproduced in the experimental task (37.3%). The results were interpreted to indicate that different contexts decrease the identification ability of observers because: a) the shorter stimulus durations of words in context decreases the amount of acoustic information available for matching, and b) the different spectrographic portrayals introduced by different phonetic contexts outweighs any intratalker consistency.
R 7

33,140
Harris, J.D. RELATIONS AMONG AFTEREFFECTS OF ACOUSTIC STIMULATION. J. Acoust. Soc. Amer., Dec. 1967, 42(6), 1306-1324. (C.W. Shilling Auditory Research Center, Groton, Conn.).

In Experiment 1, six women were given 12 separate tests of short-duration auditory adaptation. Correlations among subjects showed that two subgroups existed, one pair differing from the others in exhibiting an interaction between stimulus strength/duration and slope of recovery. A battery of four tests is tentatively recommended that would sample the effects on different subjects of stimulus frequency, intensity, and duration, and of slope of recovery. In Experiment 2, 15 adults were given 47 tests of true auditory fatigue with pure tones. Previous data on temporary threshold shift (TTS) growth rates, equinoxious contours, recovery slopes, etc., were confirmed. An obverse factor analysis was performed, upon a correlation matrix not among tests but among subjects. A general-susceptibility grouping emerged; three individuals defined rather poorly a grouping with reduced high-frequency and increased low-frequency susceptibility; three other individuals showed recognizable specific patterns of susceptibility. Three specific tests can be shown to sample these groupings, and are recommended tentatively as an auditory fatigue battery for pure tones. Using a supplementary battery of 15 noise tests, a subgroup of three was sufficient to predict whole battery performance ($r = 0.81$), as against a prediction ($r = 0.65$) between any pure-tone combination versus the whole-battery noise data. Experiments 3, 4, and 5, used this information to study the prediction of susceptibility to noise-induced permanent threshold shift in man, rat, and monkey, respectively. A rather low level of success was achieved.
R 18

33,141
Henning, G.B. A MODEL FOR AUDITORY DISCRIMINATION AND DETECTION. J. Acoust. Soc. Amer., Dec. 1967, 42(6), 1325-1334. (Defence Research Establishment Toronto, Downsview, Ontario, Canada).

A modified energy detector is proposed as a predictor of human frequency- and amplitude-discrimination performance. The model consists of an initial bandpass filter followed by a square-law device and an integrator. The center frequency of the initial filter is assumed to be a random variable distributed over time. The predictions of the model for performance in two-alternative forced-choice frequency- and amplitude-discrimination on experiments are presented, together with data from human observers. While the model is able to predict the frequency and amplitude data very well, it is less successful with detection data.
R 21

33,143
Pollack, I. ASYNCHRONY: THE PERCEPTION OF TEMPORAL GAPS WITHIN PERIODIC AUDITORY PULSE PATTERNS. J. Acoust. Soc. Amer., Dec. 1967, 42(6), 1335-1340. (Mental Health Research Institute, University of Michigan, Ann Arbor, Mich.).

The perception of temporal gaps within periodic pulse patterns was examined in a forced-choice test. The task of the listener was to identify which one of four pulse patterns contained a temporal gap. Extremely acute gap detection (in the region of 1-10 usec) may be obtained with high pulse frequencies. Gap detection with high pulse frequencies is critically dependent upon the number of pulses; gap detection with low pulse frequencies is relatively independent of the pulse number. This result is consistent with the generalization, obtained in related studies, that extremely acute temporal discrimination is achieved at high pulse frequencies only with a large number of temporal samples, whereas the relatively poor temporal discrimination at low pulse frequencies is substantially less dependent upon the number of temporal samples. The temporal precision of the auditory system, in contrast with its precision of spectral analysis, appears to be insufficient to account for minimal gap thresholds.
R 12

33,144
Norton, J. COMMENTS ON "INTERACTION OF THE AUDITORY AND VISUAL SENSORY MODALITIES.". J. Acoust. Soc. Amer., Dec. 1967, 42(6), 1342-1343. (Applied Psychology Research Unit, MRC, Cambridge, England).

In deriving an equation to test the independence of sensory processing systems, Brown and Hopkins (HEIAS No. 33,028) appear to have built in an assumption of response patterns lacking generality. In addition, the performance of their subjects is in excess of predictions from alternatively derived independence models, as well as one derived from signal detection variables. These data can be accounted for only by assuming a high level of "internal noise."
R 3

33,145
Allistras, P.E. AMBIVALENCE IN SITUATIONS OF NEGATIVE INTERPERSONAL ATTITUDES. J. Psychol., Jan. 1967, 65(First Half), 9-13. (Queens College, City University of New York, Flushing, N.Y.).

This paper reports the results of a study that shows that more attitudinal ambivalence exists with regard to disliked persons than liked persons. (HEIAS)
R 5

33,147
Schuh, A.J. ATTITUDES OF FORMER EMPLOYEES TOWARD THEIR JOBS. J. Psychol., Jan. 1967, 65 (First Half), 61-64. (USN Aerospace Medical Institute, NAMC, Pensacola, Fla.).

Fifty-three male salaried salesmen, leaving the employment of a Pacific Coast foodstuffs firm over a five-year period, answered a 48-item mail questionnaire. The responses were quantified and correlated against two criteria: a) whether the salesman quit or was discharged from his position and b) whether the salesman was willing to rejoin the company. At the .05 level of significance, five items differentiated subjects on "a", and 13 items differentiated subjects on "b". Subjects who were discharged reported poorer work habits and poorer customer relations than did the subjects who voluntarily separated. Subjects who were willing to rejoin the company were more satisfied with the pay, advancement opportunities, and fringe benefits that their former jobs offered than were subjects who were not willing to rejoin the company. No significant relationship was found between the separation "a" and re-employment "b" criteria.
R 7

33,148
Gavurin, E.I. ANAGRAM SOLVING AND SPATIAL APTITUDE. J. Psychol., Jan. 1967, 65(First Half), 65-68. (Hunter College, City University of New York, New York, N.Y.).

A substantial positive relationship exists between nonverbal manipulatory visualization (spatial aptitude) and the solution of anagram problems that require the implicit manipulation of symbols (letters). Whether this relationship is a general one, and holds for all problem situations that require the symbolic rather than the concrete manipulation of stimuli, must still be investigated.
R 3

33,149
Monty, R.A., Fisher, D.F. & Karsh, R. STIMULUS CHARACTERISTICS AND SPATIAL ENCODING IN SEQUENTIAL SHORT-TERM MEMORY. J. Psychol., Jan. 1967, 65(First Half), 109-116. (USA Human Engineering Labs., Aberdeen Proving Ground, Md.).

Performance of the keeping-track task described by Monty, Taub, and Laughery was examined as a function of the class of stimuli employed. It was found that a stimulus class possessing a natural or built-in order led to better performance than did a stimulus class lacking such order. It was suggested that the differences stem from the speed with which subjects complete encoding of the information to be remembered rather than from the time available for rehearsal between successive stimuli.
R 8

33,150
McDonald, R.L. "INFLUENCE OF PERSONALITY TYPE ON DRUG RESPONSE": A CRITICAL REPLY. J. Psychol., Jan. 1967, 65(First Half), 123-129. (Emory University School of Medicine, Atlanta, Ga.).

An article by A. Frostad, G. Forrest & C.B. Bakker (INFLUENCE OF PERSONALITY TYPE ON DRUG RESPONSE. Am. J. Psychiat., 1966, 122, 1153-1158.) is critiqued by the author who indicates methodological weaknesses and indicates how the research design could be strengthened. (HZIAS)
R 16

33,151
Waltzmar, M., Stellone, F. & Smith, G.M. PERSONALITY PROFILES OF HIGH, MIDDLE, AND LOW MAS SUBJECTS. J. Psychol., March 1967, 65(Second Half), 163-168. (Bird S. Coler hospital, New York Medical College, New York, N.Y.).

The Taylor MAS (Manifest Anxiety Scale), the Cattell 16 PF (Personality Factor Questionnaire), the Edwards PPS (Personal Preference Schedule), and the self-concept discrepancy were administered to 96 male college students. A third of the subjects had MAS scores from 1-7, a third from 12-17, and a third from 21-36, providing a low, middle, and high MAS group. Correlations between MAS scores and the personality measures and t-tests between MAS levels with respect to each measure revealed two contrasting personality profiles for the high and low MAS groups. The low MAS subject was described as one who, in comparison to the high MAS subject, had more understanding of a situation, more self-confidence, a higher self-evaluation, was more emotionally stable, more sophisticated, and less confused and tense in a new situation. It was suggested that performance with respect to MAS levels could be better understood by consideration of the differing personality profiles.
R 13

33,152
Gavurin, E.I. ANAGRAM SOLVING UNDER CONDITIONS OF LETTER ORDER RANDOMIZATION. J. Psychol., March 1967, 65(Second Half), 179-182. (Missile Electronics & Controls Div., Radio Corporation of America, Burlington, Mass.).

In this study, anagram solving under conditions of artificially produced random letter rearrangements was compared with anagram solving where such experimentally produced randomization of letter orders was absent. Results clearly indicate the superiority of the Random Rearrangement Condition, since it produced a significantly greater number of solutions in a significantly shorter period of time.
R 6

33,153
Orr, D.B. THE DEVELOPMENT AND TRYOUT OF A LABORATORY PROCEDURE FOR INDUCING PHYSICAL THREAT STRESS. J. Psychol., March 1967, 65(Second Half), 183-194. (American Institutes for Research, Washington, D.C.).

In summary, this paper has described the development of laboratory procedure for inducing stress of a physical threat nature at a very high level. The development of the situation was described in terms of the rationale underlying it. The laboratory implementation of the situation including its tryout with a group of subjects was described. The observed behaviors and reactions of the subjects to the situation were noted, and some inferences and hypotheses regarding performance under stressful conditions were stated.
R 15

33,154
Edgington, E.S. STATISTICAL INFERENCE FROM N = 1 EXPERIMENTS. J. Psychol., March 1967, 65 (Second Half), 195-199. (Psychology Dept., University of Calgary, Calgary, Alberta, Canada).

Although the value of N = 1 experiments has been recognized, very few experiments in recent years have been based on the study of only one subject. Perhaps the main reason for this is that editors expect experimental results to be evaluated by statistical tests and there is no guide for statistical evaluation of repeated measurements on one subject. To help alleviate this problem, a rationale is provided for testing the significance of a difference between treatments for an individual. The proposed hypothesis-testing procedure differs from the conventional random sampling approach to hypothesis testing in several respects it tests the null hypothesis of identical treatment effects, not the null hypothesis of identical rank effects, and it does not involve assumptions of random sampling of a population of individuals or a population of responses.
R 4

33,155
Cameron, Joan S., Specht, Priscilla G. & Wendt, G.R. EFFECTS OF MEPROBAMATE ON MOODS, EMOTIONS, AND MOTIVATIONS. J. Psychol., March 1967, 65(Second Half), 209-221. (Psychology Dept., University of Rochester, Rochester, N.Y.).

In four experiments conducted over a period of seven years on 144 normal male and female college-student subjects, 21 years or older, the authors made 234 determinations of the effects of meprobamate on moods, emotions, and motivations as determined by free-choice adjective check lists and forced-choice adjective check lists. These were compared to 318 determinations after placebo in the same subjects. These normal subjects, given doses of 400, 600, or 800 mg, showed sedation effects with a statistical significance often better than $p = .001$. They became more drowsy, washed-out, bored, and blue than after placebo, as well as less active, friendly, and industrious. It is concluded that meprobamate is an active drug and that normal subjects yield valuable information about its effects.
R 5

33,156
Shure, G.H. & Meeker, R.J. A PERSONALITY/ATTITUDE SCHEDULE FOR USE IN EXPERIMENTAL BARGAINING STUDIES. J. Psychol., March 1967, 65(Second Half), 233-252. (System Development Corporation, Santa Monica, Calif.).

This paper describes the steps used in developing a set of scales to evaluate the effects of individual differences on bargaining behavior. It presents a description of the scales in the schedule, together with descriptive statistical data and norms for the scales, and gives procedures for administering and scoring the scales. A copy of the currently used form of the schedule is included.
R 17

33,157
Matarazzo, J.D., Holman, D.C. & Wiens, A.N. A SIMPLE MEASURE OF INTERVIEWER AND INTERVIEWEE SPEECH DURATIONS. J. Psychol., May 1967, 66(First Half), 7-14. (Medical Psychology Dept., University of Oregon Medical School, Portland, Ore.).

Investigators in psychology, sociology, anthropology, journalism, and linguistics are showing increasing interest in study of such noncontent dimensions of speech behavior as frequency and duration of single units of utterance, latency, and interruption. The present paper describes a simple and inexpensive measure (word count from a transcript) which can serve as a highly reliable substitute for one of these, the more expensive and electronically derived duration of utterance measure. Suggestions for obtaining inexpensive measures of the other two variables are offered.
R 15

33,158
Miller, R.W. & Phelan, J.G. SOME EFFECTS OF VERBAL CONDITIONING ON PREFERENCE BEHAVIOR. J. Psychol., May 1967, 66(First Half), 39-45. (Psychology Dept., California State College, Los Angeles, Calif.).

The hypothesis that word meaning will condition to contiguously presented stimuli was tested and confirmed. Secondly, the hypotnesis that objects paired with conditioned labels will themselves be conditioned in the same direction as the conditioned labels was tested and confirmed. The degree of preference for the labeled objects was found to be a function of the conditioning or evaluative makeup of labels representing the objects.
R 13

33,159
Day, Merle E. AN EYE-MOVEMENT INDICATOR OF INDIVIDUAL DIFFERENCES IN THE PHYSIOLOGICAL ORGANIZATION OF ATTENTIONAL PROCESSES AND ANXIETY. J. Psychol., May 1967, 66(First Half), 51-62. (US Veterans Administration Hospital, Perry Point, Md.).

Individuals classified as right- or left-mover on a seemingly universal, visually observable eye-movement phenomenon of attention show systematic physiological differences in patterns of electroencephalogram and electrooculogram reactivity in the same simple reaction time sensori-motor sequences of events. This basic individual difference appears to relate to individual differences in higher verbal processes, anxiety, and characteristic functional differences in attentional processes. The phenomenon suggests a Wiener type model of central nervous system organization around an alpha (10 cps) and beta (45 cps) frequency, which is outlined.
R 19

33,160
Sohn, D. EFFECT OF SPATIAL STABILITY OF THE STIMULUS ON FREE RECALL-ABILITY. J. Psychol., May 1967, 66(First Half), 87-92. (Psychology Dept., University of North Carolina, Charlotte, N.C.).

Three similar experiments were performed to ascertain the effect of constant spatial location of nonsense syllables on free recall ability. In a constant spatial position (CP) condition, the same circular array of eight syllables was tachistoscopically presented 30 times. In a variable position (VP) condition, the positions of the syllables within the array were changed erratically on successive exposures. Following each presentation, the subject wrote, in any order, as many of the syllables as he could. The three experiments differed in exposure interval and time allowed for the free recall test. In all experiments, the rate of learning was significantly greater under the CP condition than under the VP condition.
R 6

33,161
Lillibridge, J. & Lundstedt, S. SOME INITIAL EVIDENCE FOR AN INTERPERSONAL RISK THEORY. J. Psychol., May 1967, 66(First Half), 119-128. (Albion College, Albion, Mich. & Western Reserve University, Cleveland, Ohio).

Individuals may choose voluntarily to give away influence and power to others and may do so in a variety of human social relations. The act of so doing is said to be based upon a degree of personal risk and its assessment by the individual. An explanation offered for this behavior is called "Interpersonal Risk Theory." A correlational study of personnel in a large organization showed that measures of subjective interpersonal risk behavior correlate significantly and positively with measures of trust and risk taking and that a strong negative correlation exists with measures of morale. There is some evidence also that subjective interpersonal risk behavior as presently measured is correlated positively with self-confidence. Its negative relation to morale in the present setting and its positive link in a multiple regression analysis to combined demographic variables attests to the complex determinants of the concept.
R 9

33,162
Swinehart, R.L., Jr. COMMUNICATION AND CONTRAST: A CASE OF CHANGING SOCIAL PERCEPTION BY INDIRECTION. J. Psychol., May 1967, 66(First Half), 129-141. (Columbia University, New York, N.Y.).

It was hypothesized that a communication may change perceptions of stimuli not presented in the communication through contrast with or assimilation to stimuli provided in the communication. Data were gathered in connection with a press conference for journalism students which featured Malcolm X, who was at that time a spokesman for Elijah Muhammed, national leader of the Black Muslims (BM). The remarks made by Malcolm X at the press conference constituted the communication. Perceptions of both the BM and the National Association for the Advancement of Colored People (NAACP) were measured before and after exposure to Malcolm X, using a modified form of the semantic differential presented orally. Since Malcolm X did not mention the NAACP in his presentation, it was hypothesized that perceptions of the NAACP would change as a function of the anchor produced by perceptions of the BM. The data provided support for the hypothesized contrast effect and revealed another phenomenon that was also interpreted as contrast, though it did not conform to the contrast paradigm. There was no statistically significant tendency for assimilation to occur.
R 4

33,163
Bronzo, A., Jr. & Powers, G. RELATIONSHIP OF ANXIETY WITH PAIN THRESHOLD. J. Psychol., July 1967, 66(Second Half), 181-183. (Psychology Dept., Anna Maria College, Paxton, Mass.).

An N = 1 study was designed to test the relationship of anxiety on pain threshold. The hypothesis that pain threshold would be lowered in an anxiety producing situation, as measured by an increase in pulse and blood pressure, was supported ($p < .01$) by the McNemar Sign Test statistic.
R 10

33,164
Bronzo, A.F., Jr. PRELIMINARY INVESTIGATION OF AFROTC CADET ATTRITION. J. Psychol., July 1967, 66(Second Half), 185-190. (Boston College, Boston, Mass.).

To determine if personality traits differ between AFROTC (Air Force Reserve Officer Training Corps) cadets and AFROTC dropouts, the Survey of Bureaucratic Tendency, Survey of Interpersonal Values, and Survey of Personal Values were administered to 94 AFROTC cadets and 89 AFROTC cadet dropouts. It was hypothesized that AFROTC cadets would value more highly than would AFROTC cadet dropouts the following traits: Bureaucratic Tendency, Conformity, Leadership, Achievement, Decisiveness, and Goal Orientation, while the cadet dropout would more highly value than would the cadet the traits of Independence, Support, Recognition, Conservence, Practical Mindedness, Variety, and Orderliness. t tests of mean differences supported the hypothesis on Bureaucratic Tendency ($p < .001$), Independence ($p < .001$), Leadership ($p < .001$), and Variety ($p < .01$).
R 14

33,165
Cameron, Jean S., Specht, Priscilla G. & Wendt, G.R. EFFECTS OF PLACEBO, DEXAMYL, AND LUCOFEN ON MOODS, EMOTIONS, AND MOTIVATIONS. J. Psychol., July 1967, 66(Second Half), 199-209. (Psychology Dept., University of Rochester, Rochester, N.Y.).

This report describes the effects of placebo and of two appetite suppressants, Dexamyl, and Lucofen, on 39 male and 39 female college students who were 21 years or older. Each volunteer received three placebo treatments and one each of Dexamyl and Lucofen, interspersed among other treatments. Comparison data of the effects of Dexedrine alone are included. The data presented are from two adjective checklists. The short, forced-choice adjective checklist (ACL) contains 32 pairs of self-descriptive adjectives plus other questions: e.g., degree of subjective awareness of drug effect. The long, free-choice adjective checklist gives the subject the opportunity to select which of 133 adjectives apply to his feelings at that time. Based on this experiment, one should not assert that the effects of Lucofen on emotional states differ from placebo. While women showed a slight positive reaction and men a slight negative reaction, the difference should be confirmed before acceptance. Dexamyl had uniformly desirable effects on both male and female normal subjects, characterized by feeling agreeable, sociable, friendly, and easygoing, and by reduction of negative emotions. The emotional and personality change after Dexamyl differed from that after Dexedrine in that some socially abrasive changes found after Dexedrine were not present after Dexamyl. Subjects less often reported a belief that they have had a drug after Dexamyl than after Dexedrine. This experiment included triple-control treatments (a sedative, a stimulant, and placebo) which yielded results typical of those obtained by the university laboratory over a period of 14 years of experimentation, thus suggesting that the data on the new drugs are valid.
R 5

33,166
Frye, R.L., Schauckler, E. & Butler, J.R. THE INFLUENCE OF WORD FAMILIARITY IN STEREOTYPING A LEADER. J. Psychol., July 1967, 66(Second Half), 221-225. (Psychology Dept., Louisiana State University, Baton Rouge, La.).

The purpose of the present study was to replicate part of an earlier study to determine if people agree in ranking of leaders based on limited cues and to evaluate the effect of word meaningfulness on agreement between raters in the assignment of traits to this leader. It was hypothesized that inter-subject agreement would be greater with more familiar terms, such as "outgoing" or "talkative," and lower with less familiar terms, such as "assertive" or "loquacious." The results support Frye's (Frye, R.L. RELATIONSHIP BETWEEN RATED LEADERS AND THE TRAITS ASSIGNED TO THESE LEADERS. J. soc. Psychol., 1965, 65, 95-99) finding that raters agree in their perception of the leaders. The mean correlation computed between the ranking of the three groups of the five pictures in terms of perceived leadership ability was .98. This would tend to support the hypothesis that leadership stereotypes exist.
R 9

33,167
Cavarin, E.I. THE RELATIONSHIP OF MENTAL ABILITY TO ANAGRAM SOLVING. J. Psychol., July 1967, 66(Second Half), 227-230. (Hunter College, Ci - University of New York, New York, N.Y.).

In spite of the fact that a large body of research data already exists on anagram solving behavior, relatively little is known about the relationship between solution success and the mental abilities. The most important findings from the few studies that are relevant to the question reveal that a) the relationship between anagram solving and general mental ability is either absent or relatively low, and b) anagram tests, when included in factor analysis studies of primary mental abilities, are located within the word fluency factor. The anagram tasks that some factorial studies employed were not, for the most part, representative of those typically used in problem solving research. As a result, the data that these studies have provided are not directly applicable to the discovery of the mental abilities required in anagram solving experiments. It is clear, therefore, that previous studies have not contributed sufficient knowledge with respect to the anagram solving abilities called for in the solution of standard anagram problems. Accordingly, correlational techniques were employed in the present study to determine the extent to which anagram solving skill is related to a variety of mental ability measures. The findings demonstrate that anagram solving is clearly related to general mental ability and spelling achievement. In addition, it is also significantly and positively related to the aptitudes for dealing with a) verbal concepts, b) numerical relationships, c) nonverbal abstractions, d) two-dimensional space relations, and e) three-dimensional space relations. The relative strength of these relationships, moreover, suggests that the ability to solve anagrams may be more closely-associated with nonverbal than with verbal skills, although this suggestion should be considered somewhat cautiously, since all of the correlations were not obtained with the same group of subjects.
R 8

33,168
Costello, C.G. TWO SCALES TO MEASURE ACHIEVEMENT MOTIVATION. J. Psychol., July 1967, 66 (Second Half), 231-235. (Psychology Dept., University of Calgary, Calgary, Alberta, Canada).

A factor analytic study of 100 self-report items designed to measure achievement motivation resulted in two main factors. The same two factors were obtained in a second factor analysis after some items were re-worded to avoid the effects of acquiescence response sets. Two new scales of achievement were developed. Scale I appears to measure a need to do well at a task. Scale II appears to measure a need to be a success and was significantly related to scores on scales of anxiety and neuroticism.
R 10

33,169
Sherman, R. INDIVIDUAL ATTITUDE TOWARD RISK AND CHOICE BETWEEN PRISONER'S DILEMMA GAMES. J. Psychol., July 1967, 66(Second Half), 251-258. (James Wilson Economics Dept., University of Virginia, Charlottesville, Va.).

Prisoner's dilemma experiments preclude long-run, strategic choices of game matrices; they permit only a choice of action within a given matrix. So confined, the experiments have not revealed any reliable connection between personality measures and cooperative behavior. Here a basis for game-matrix preference has been examined as an analogue to long-run choice, and found related to individual risk attitude. Two structural influences on game-matrix choices were distinguished. Dominance in payoff comparisons was found to lead to strong preferences. More subtle distinctions were also made, with the use of cooperation and defection measures that reflect relations among different payoffs in each prisoner's dilemma game matrix. Based on these latter distinctions some individuals indicated an interest in matrices that offered higher cooperation but lower defection measures, while others tended to prefer matrices with higher defection but lower cooperation measures. Those who preferred cooperative matrices tended to be more averse to social risk than those who preferred matrices with higher defection measures. The relation between risk avoidance and preference for cooperative games was stronger than that associating high tolerance for risk with preference for competitive games, where the relation was positive but not significant. The relationship between Social Risk Preference (SRP) score and matrix choice was equally strong among subjects, however, whether they expected that their choices would influence which matrix game they would later play in or they were simply expressing choices that had no future consequences for them.
R 12

33,170
Cahoon, R.L. EFFECT OF ACUTE EXPOSURE TO ALTITUDE ON TIME ESTIMATION. J. Psychol., July 1967, 66(Second Half), 321-324. (USA Research Institute of Environmental Medicine, Quartermaster Research & Engineering Command, Natick, Mass.).

The hypothesis that subjective time is slower at high altitude than at sea level was tested. Thirty-eight soldiers estimated short time intervals by three methods (verbal estimation, production, and tapping) at sea level and at 12,500 feet altitude. The results confirmed the hypothesis by the production method and are interpreted as being consistent with Hoagland's "chemical clock" hypothesis.
R 15

33,171
Inglis, J. & Tansey, Carol L. AGE DIFFERENCES AND SCORING DIFFERENCES IN DICHOTIC LISTENING PERFORMANCE. J. Psychol., July 1967, 66(Second Half), 325-332. (Behavioral Science Dept., Temple University Medical School, Philadelphia, Penn.).

It has previously been found that age is an important source of variance in dichotic listening. A decrease in performance has been found in groups of subjects after the third decade of life. It has been argued, however, that some part of this apparent alteration in capacity might be due to the particular scoring methods applied; in particular, it has been suggested that "fixed-order" recall requirements may penalize older subjects by calling upon a diminished organization ability. Dichotic stimuli were used that permitted the easy detection of transposition errors, and scoring methods were devised so as to involve varying degrees of organizational skill. It was found, whether the scoring criteria required more or less organization of the data received, that differences in dichotic listening performance continued significantly to discriminate between a young and an elderly group.
R 13

33,172
Hellizer, F. & Cutter, H.S.G. COGNITION AND RISK TAKING IN A CLASSROOM SETTING: TWO METHODOLOGIES. J. Psychol., Sept. 1967, 67(First Half), 25-45. (US Veterans Administration Hospital, Brockton, Mass.).

This report is part of an investigation in progress of the combination of judgment and guessing that is called risk taking. The investigation is being conducted in the classroom setting where the outcome is the very real determination of the students' grades for the course. The purpose of this article is to describe two new methodologies, with variations, that have been developed for the study. The authors are describing the methodologies at this time for two reasons. First, the space demands of journals would preclude an adequate description in combination with the report of the research and analyses of the data. Secondly, the authors would like to make these methodologies available to interested psychologists and educators for their own use or separate development without waiting upon final publication of the series of investigations now in progress.
R 9

33,173
Stonghouer, Mary K. THE RELATIONSHIP OF PSYCHOMETRICALLY DETERMINED PERSONALITY VARIABLES TO PERCEPTION OF THE AMES TRAPEZOIDAL ILLUSION. I. J. Psychol., Sept. 1967, 67(First Half), 91-97. (Psychology Dept., Marcy College, Detroit, Mich.).

The present study was designed to resolve differences in previously reported studies on the relationship of personality variables as measured by the Guilford-Zimmerman Temperament Survey and perception of the Ames Trapezoidal Illusion. Fifty female college subjects were tested on the illusion at 4 different times under 2 conditions of mental set and at 2 distances. The Guilford-Zimmerman Temperament Survey was administered at a fifth session. Rank-order correlations obtained between scores on the Guilford-Zimmerman subscales and the number of reversals when viewing the Rotating Trapezoid offered no support for earlier findings of significant correlations with the Friendliness, Objectivity, and Personal Relations subtests.
R 19

33,174
Green, Dorothy D. THE RELATIONSHIP OF PSYCHOMETRICALLY DETERMINED PERSONALITY VARIABLES TO PERCEPTION OF THE AMES TRAPEZOIDAL ILLUSION, II. J. Psychol., Sept. 1967, 67(First Half), 99-105. (Psychology Dept., Marcy College, Detroit, Mich.).

It was the purpose of the present study to elaborate on the work of earlier investigators by extending the range of viewing to include moving as well as static targets. The Ames Rotating Trapezoid constituted the stimulus used to elicit perception of illusion, and scores on the California Psychological Inventory served to measure the personality variables to be considered. Fifty female college undergraduates served as subjects. Rank order correlations between scores on the California Psychological Inventory subscales and number of reversals perceived when viewing the Ames Rotating Trapezoid were computed and compared with earlier findings.
R 7

33,175
Siegelberg, M. AN INQUIRY INTO THE RELATIONSHIP BETWEEN FIELD INDEPENDENCE-DEPENDENCE AND CREATIVITY. J. Psychol., Sept. 1967, 67(First Half), 127-140. (Psychology Dept., Adelphi University, Garden City, N.Y.).

This paper is an attempt to examine some connections between field independence-dependence and creativity. Previous research and theory are reviewed in an effort to show that these variables seem to be closely related to each other. Nevertheless, there has been surprisingly little work connecting them directly and such work has produced ambiguous results. It is proposed that an extension of concepts from developmental theory may succeed in clarifying some details of the relationship between these two variables. After brief excursions into the developmental status of field independence-dependence and creativity, the author concentrates on a rapprochement between these psychological islands and concludes with an overview.
R 61

33,176
Ginsburg, N. ASCENDING-DESCENDING DIFFERENCES IN CFF MEASUREMENT AS A FUNCTION OF ECCENTRICITY AND STARTING POINT. J. Psychol., Sept. 1967, 67(First Half), 161-167. (Psychology Dept., University of Alberta, Edmonton, Alberta, Canada).

Forty-two observers were tested for CFF (Critical Flicker Frequency) by the method of limits. Scores obtained from Ascending (A) trials were lower than those from Descending (D) trials. The difference between D and A increased with eccentricity, going from 5.6 cps at the fovea to 11.4 cps at 10°. Moving both D and A Starting Points 10 cycles in a direction away from the CFF increased the D-A difference from 1.83 to 10.13 cps. These results, as well as those of other investigators on acceleration, continuity-discontinuity, and brightness, were attributed to local Adaptation generated during A trials but not during D trials.
R 10

33,177
Cameron, Jean S., Specht, Priscilla G. & Wendt, G.R. EFFECTS OF TWO MEPROBAMATE-AMPHETAMINE COMBINATIONS ON MOODS, EMOTIONS, AND MOTIVATIONS. J. Psychol., Sept. 1967, 67(First Half), 169-181. (Psychology Dept., University of Rochester, Rochester, N.Y.).

Four experiments with a total of 144 normal college student subjects, 21 years or older, describe the effects of two meprobamate-amphetamine combinations on moods, emotions, and motivations as determined by free-choice and forced-choice Adjective Check Lists. Drug-placebo comparisons indicate that both combinations, 600 mg meprobamate + 10 mg Benzedrine and 400 meprobamate + 5 mg Dexedrine, were very positively received by the subjects who became more enthusiastic, friendly, work-oriented, and decisive; and simultaneously less depressed, apprehensive, apathetic, and nervous. The methodology was sufficiently sensitive to discriminate between the combinations: the higher dose of meprobamate produced the higher frequency of drowsiness, relaxation, and a reduction of nervousness. It was less prefered by the subjects than the lower dose.
R 6

33,178
Wolfe, J.W. & Wendt, G.R. SIMULTANEOUS ELECTRICAL RECORDING OF INDEPENDENT AND SUMMATED EYE MOVEMENTS. J. Psychol., Nov. 1967, 67(Second Half), 201-204. (University of Rochester, Rochester, N.Y.).

A method is described for the simultaneous electrical recordir of independent and summated eye movements. Problems of interpretation of the records are discussed with relevant examples.
R 4

33,179
White, W.F., Kingston, A.J. & Weaver, W.W. AFFECTIVE DIMENSIONS IN CONNOTATIVE MEANING IN READING. J. Psychol., Nov. 1967, 67(Second Half), 227-234. (University of Georgia, Athens, Ga.).

The purpose of the present study is to examine the predictive relationships of anxiety and introversion-extroversion factors in determining the connotative meaning that a student gives to the protagonist in a select reading passage, as well as the reader's own self-concept. The major suggestion from this study points to the theory that, as readers approach the meaning of behavior, of symbols, models, or main characters in a story, their interpretation is highly related to their own personality and self-concept variables.
R 27

33,180
Ohnmacht, F.W. & Muro, J.J. SELF-ACCEPTANCE: SOME ANXIETY AND COGNITIVE STYLE RELATIONSHIPS. J. Psychol., Nov. 1967, 67(Second Half), 233-239. (Educational Psychology Dept., University of Georgia, Athens, Ga. & University of Maine, Orono, Maine).

The present study adopts the position of Cattell in conceptualizing anxiety as a second order factor which subsumes a number of primary factors that make a contribution to the construct of anxiety. It then becomes a question of whether the primary factors contributing to anxiety are all predictably related to self-acceptance or whether certain primaries contribute to a given relationship and others do not. The major purpose of the study was to determine whether dimensions subsumed by the construct of anxiety all made a contribution to the relationship of anxiety with self-acceptance. The Barron Preference for Complexity Scale (BCS) purportedly measures at least one aspect of creativity, whereas both dogmatism and field independance have been invoked by some theorists in efforts to conceptualize factors predisposing to the creative act. Despite the criticisms of self-concept measures, such as the IAV (Index of Adjustment and Values), the bulk of the evidence serves to support the construct validity of the IAV self-acceptance score. The anxiety relevent scales of the 16PF (Personality Factors) all produced differences of a statistically significant nature in the expected direction.
R 16

33,181
Cameron, Jean S., Specht, Priscilla G. & Wendt, G.R. EFFECTS OF PLACEBO AND AN ACETAMINOPHEN-SALICYLAMIDE COMBINATION ON MOODS, EMOTIONS, AND MOTIVATIONS. J. Psychol., Nov. 1967, 67(Second Half), 257-262. (Psychology Dept., University of Rochester, Rochester, N.Y.).

A combination of acetaminophen and salicylamide, administered to 78 men and 78 women was assessed by means of free-choice and forced-choice adjective checklists. The results of both methods showed that its effects on moods, emotions, and motivations were not significantly different from placebo except for a possible slightly tranquillizing effect.
R 7

33,182
Cameron, Juan ..., Specht, Priscilla G. & Wendt, G.R. EFFECTS OF A CHAMAMINE-ANALGESIC-CAFFEINE COMBINATION ON MOODS, EMOTIONS, AND MOTIVATIONS. J. Psychol., Nov. 1967, 67(Second Half), 261-270. (Psychology Dept., University of Rochester, Rochester, N.Y.).

Acetaminophen plus salicylamide was combined with caffeine, with caffeine and dimenhydrinate, and with dimenhydrinate alone for administration to 39 males and 39 females. The effects were measured by forced-choice and free-choice adjective checklists. The effects of the three combinations were compared to those of dimenhydrinate alone, of the acetaminophen-salicylamide combination alone, and placebo. The sequence of effects, from slight mood improvement to considerable sedation were a) acetaminophen-salicylamide-caffeine; b) placebo, slight relaxation, c) acetaminophen-salicylamide; d) acetaminophen-salicylamide-caffeine-dimenhydrinate, e) acetaminophen-salicylamide-dimenhydrinate; f) dimenhydrinate. Dimenhydrinate (25 mg) combined with acetaminophen-salicylamide had effects qualitatively and quantitatively similar to those of 80 mg or 50 mg of dimenhydrinate.
A 8

33,183
Stebler, J.R. & Perry, O.B. LEARNING AND RETENTION AS A FUNCTION OF INSTRUCTIONAL METHOD AND RACE. J. Psychol., Nov. 1967, 67(Second Half), 271-276. (Psychology Dept., Louisiana State University, Baton Rouge, La.).

Comparisons were made between programmed instruction and conventional instruction and between Caucasian and Negro university students. Subjects were matched on sex, age, IQ, and Pretest scores. They were taught the same material for two weeks with either a programmed text, "The Analysis of Behavior" by Holland and Skinner, or by conventional methods. Posttest scores were reliably higher for students taught by programmed text than for students taught by conventional instruction and for Caucasian students than for Negro students. Racial differences on the Posttest were attributed to past and present environmental differences between segregated schools. A Retention Test administered six weeks later showed no differential loss in retention.
A 8

33,184
Hergenhahn, B.R., Otis, G., Capehart, J. & Myers, C. SAMPLING OF REDUNDANT CUES IN A SUCCESSIVE DISCRIMINATION PROBLEM. J. Psychol., Nov. 1967, 67(Second Half), 287-292. (Psychology Dept., University of Arizona, Tucson, Ariz.).

Sixty subjects participated in a three-stage successive discrimination problem. The experiment was designed to evaluate two diametrically opposed hypotheses concerning stimulus sampling during discrimination learning. Another study predicts sampling occurs only until an adequate solution to the problem is found and then stops. Still a different study predicts that sampling is a continuous process which results in the eventual sampling of all the elements present in the experimental situation. The data supported this second theory.
A 5.

33,185
Stebler, J.R. & Goodrich, Ann H. PERSONALITY AND FAMILY BACKGROUND CORRELATES OF STUDENTS' RESPONSE TO PHYSICAL DANGER. J. Psychol., Nov. 1967, 67(Second Half), 313-318. (Psychology Dept., Louisiana State University, Baton Rouge, La.).

Undergraduate students made eight weekly ratings of the danger involved and of their anxiety following the sinking of a chlorine barge near their university campus. Danger ratings were lower and less variable than were anxiety ratings. Anxiety ratings decreased while recovery operations proceeded smoothly, but rose as engineering difficulties occurred and the date of recovery was postponed. Biographical data indicated that anxiety was associated with being female, being an underclassman, and with not having had a course in chemistry. Three groups of students were compared on three psychometric tests, the EPPS (Edwards Personal Preference Schedule), the SAI (Stern Activities Index), and the Parent-Child Relations Questionnaire. High Anxiety Females reported greater needs for affiliation, dependency, and timidity than did Low Anxiety Females, and also that their fathers had been more casual, loving, and protective than were the fathers of Low Anxiety Females.
A 10

33,186
Lattal, K.A. & Lattal, Alice D. STUDENT "GULLIBILITY": A SYSTEMATIC REPLICATION. J. Psychol., Nov. 1967, 67(Second Half), 319-322. (University of Alabama, University, Ala.).

Each subject in two groups received an identical personality interpretation hypothetically based on his performance on a standardly used psychological test. For one group, the interpretations were disseminated without comment. A 15-minute lecture in which the various weaknesses of the personality test were elucidated preceded the distribution of the test interpretation to the second group. No significant differences in the ratings of the interpretations by the two groups were obtained. The number of "good" and "excellent" ratings in both groups exceeded a chance expectancy. The failure of the critical lecture to affect student acceptance of the interpretations is attributed jointly to the reinforcing value of knowledge of one's own personality and the apparent validity of the very general personality descriptions.
A 3

33,187
Kraft, T. & Al-Issa, I. DESENSITIZATION AND REDUCTION IN CIGARETTE CONSUMPTION. J. Psychol., Nov. 1967, 67(Second Half), 323-329 (St. Clement's Hospital, London, England & University of Calgary, Calgary, Alberta, Canada).

This report refers to the smoking behavior of five patients who were being treated for social anxiety in relation to alcoholism. It was found that, as their alcohol consumption decreased, there was a parallel reduction in their cigarette consumption. The lowered level of cigarette smoking was maintained for long periods following completion of treatment. It has been suggested that a low posttherapy anxiety level, as assessed by the Taylor Manifest Anxiety Scale (Taylor, J. A PERSONALITY SCALE OF MANIFEST ANXIETY. J. Abn. & Soc. Psychol., 1953, 48, 285-290.), may be an important requisite for the patient to maintain his lower level of cigarette consumption. Possibly some as yet ill-defined factors may have been operative in producing this change: for example, the mildly aversive gestures of the therapist, a nonsmoker, may have been a contributory factor, in addition to the systematic desensitization of the patients' social anxieties.
R 12

33,188
Eisenman, R. & Robinson, Nancy. COMPLEXITY-SIMPLICITY, CREATIVITY, INTELLIGENCE, AND OTHER CORRELATES. J. Psychol., Nov. 1967, 67(Second Half), 331-334. (Psychology Dept., Temple University, Philadelphia, Penn.).

The complexity-simplicity variable has been linked to creativity by previous studies which used line drawings primarily, and by some which employed polygons. Thus, a more intensive investigation of the complexity-simplicity dimension was undertaken, with the use of polygons of varying degrees of complexity, as defined by the number of points. With 75 high school students as subjects it was found that a) the paper-and-pencil personality measure of creativity, previously linked to originality, was related to preference for complexity, with high scorers on the "creativity test" tending to prefer complexity; b) there was no significant correlation between IQ and the creativity test, or between IQ and polygon preference; and c) there was a significant correlation of -.54 between most preferred and least preferred polygon choices.
R 8

33,189
Karlins, M. A NOTE ON A NEW TEST OF CREATIVITY. J. Psychol., Nov. 1967, 67(Second Half), 335-340. (Psychology Dept., Princeton University, Princeton, N.J.).

A new creativity test is described in which subjects are required to "make up a pun" to each of 30 one-word test items. The subjects' answers are scored according to the uniqueness (statistical frequency of occurrence) and type (the way the subject manipulates the stimulus word in arriving at his solution) of response. The conception of the creative process underlying the development of the test is presented.
R 10

33,190
Crook, M.N., Raben, Margaret W. & Wade, E.A. TRENDS AND DEVELOPMENTS IN VISUAL DISPLAYS. SELECTIVE REVIEW-1967. FINAL REPORT. Contract NONR 494 (13), Rep. NR 196015, IEIAS Rep. 107, Dec. 1967, 61pp. USN Engineering & Psychology Branch, ONR, Washington, D.C. (Institute for Psychological Research, Tufts University, Medford, Mass.).

Selected emphases in the literature of displays are surveyed, including: approaches directed at systematizing one aspect or another of the field; reviews and techniques concerned with comparative evaluations within particular display categories; characteristics of the operator, which are important for display design; recent developments (pictorial displays especially) devised to exploit more fully the operator's capacities; and potential new areas of display application.
R 137

33,191
Shootter, C. & Kerr, W.A. CERTAINTY AND STRATEGY UNDER COST-PAYOFF CONDITIONS ASSOCIATED WITH ITEM RESPONSE. J. gen. Psychol., Jan. 1967, 76(First Half), 35-42 (Illinois Institute of Technology, Chicago, Ill.).

A sample of 75 male sales executive personnel were administered a battery of 57 test variables, including item-risk measures from the Whisler Strategy Tests, which is composed of intelligence, aptitude, and general-information type of items, and which asks a subject to gamble for increased item-payoff return depending on the certainty of response. Under a pure chance strategy of responding, the expected value of an item return is a negative 1 1/2 point loss. Results indicated that although probability of a correct response remained constant across subjects of items-attempted, subjects willing to bet with certainty exhibited a better maximizing strategy. A factor analysis of the item-risk score indicated common variance with intelligence and aptitude measures, and with personality measures along a Boldness-Dominance dimension.
R 10

33,192
Borrowman, Ellen Y., North, Jane A. & Grant, D.A. STIMULUS-REINFORCEMENT INCONGRUITY IN DIFFERENTIAL EYELID CONDITIONING WITH VERBAL STIMULI. J. gen. Psychol., Jan. 1967, 76(First Half), 43-48. (University of Wisconsin, Madison, Wisc.).

Three groups of 30 subjects each were employed in an experiment on differential eyelid conditioning using as conditioned stimuli (CS) verbal stimuli that were congruent or incongruent with the reinforcement conditions. In one group the word PUFF was always reinforced and the words NO PUFF were never reinforced, congruent conditions. In another group, the words NO PUFF were always reinforced and the word PUFF was never reinforced, incongruous conditions. In the third group, both PUFF and NO PUFF were intermittently reinforced on 50 per cent of the trials. Excellent conditioned discrimination was obtained with both congruous and incongruous stimulus conditions. When the words PUFF and NO PUFF were both intermittently reinforced, PUFF was initially a more effective CS than NO PUFF, but by the end of 30 reinforced trials the two stimuli were equivalent in evoking CRs (conditioned responses). Thus Pavlov's remarks about the unique effectiveness of words as conditioned stimuli were amply corroborated. There was also some indication that the syncolic character of the stimuli was of initial importance in the conditioning process, but that excellent conditioned discrimination could be obtained in the face of incongruities between verbal stimuli and reinforcement contingencies.
R 11

33,193
du Preez, P. REPRODUCTION OF TIME INTERVALS AFTER SHORT PERIODS OF DELAY. J. gen. Psychol., Jan. 1967, 76(First Half), 59-71. (University of Cape Town, Rondebosch, South Africa).

In the present experiment, reproductions of time intervals ranging from 1 to 16 seconds at various intervals of delay, ranging from zero to 60 seconds, were required. The method is one that has been shown to be reliable. It consists of timed arm movements. It is known that spatial metaphors are common in our reference to time, and it is known that the judgment of time is dependent on the distance covered when young children are used as subjects. It appears, therefore, that subjects are able to use the distance of their movement to stabilize their reproduction of the time interval. A continuous signal was used in the present experiment. The results do not support fading trace theories of time judgment. Nor if there evidence that excitation-inhibition or satiation effects occur. It appears that the nature of the stimulus, which will determine whether encoding is possible or nor, is important.
R 23

33,194
Stricker, G. A PRE-EXPERIMENTAL INQUIRY CONCERNING COGNITIVE DETERMINANTS OF EMOTIONAL STATE. J. gen. Psychol., Jan. 1967, 76(First Half), 73-79. (Advanced Psychological Studies Institute, Adelphi University, Garden City, N.Y.).

On the basis of the data presented in this report, there seems to be no clear support for the hypothesis that an unexplained state of physiological arousal will be labelled in terms of available cognitions. Verbal reports in the original study were similar and artifactual, and behavior (while different) was modelled upon that of the stooge and may have been independent of the emotional experience. In any case, it is clear that the modelled behavior did not represent two dramatically different emotions, but two overlapping and similar emotional experiences. The foregoing criticism is directed toward the evidence for the hypothesis and not toward the hypothesis itself. What previously has been taken to be evidence for the hypothesis now needs supporting evidence. It is important that this challenging theoretical position be investigated in a more carefully controlled artifact-free situation.
R 17

33,195
Taylor, R.L. HABITUAL SHORT-TERM EXPECTANCIES AND LUCK. J. gen. Psychol., Jan. 1967, 76 (First Half), 81-84. (Psychology Dept., University of Oregon, Eugene, Ore.).

Twelve subjects who had been relatively lucky in predicting suit color for one sample of standard playing cards were compared with 12 relatively unlucky subjects in another task where each subject was to predict suit color for independently randomized samples. Without any direct feedback provided by the experimenter on successes, the lucky group continued to score higher ($p<.01$) than the unlucky group. The data were interpreted as evidence for differential validity in short-run predictive strategies.
R Y

33,196
Greenberg, Gloria U. & Frank, G.H. PERSONALITY CORRELATES OF ATTITUDE CHANGE: THE TENDENCY TO ALTER ATTITUDES TOWARD SELF IN OTHER-DIRECTED AND INNER-DIRECTED PEOPLE. J. gen. Psychol., Jan. 1967, 76(First Half), 85-90. (Psychology Dept., University of Miami, Coral Gables, Fla.).

Research had already established that attitudes toward self were modifiable, not only in a long-term experience, such as psychotherapy, but also as a function of the more traditional single laboratory experience. The purpose of the research was to test the hypothesis that changes in self-attitude would be different for individuals with different personality characteristics. The personality dimension explored herein was inner- and outer-directedness. College students were placed in an experimental situation contrived to induce an experience of success or failure on a task of reasoning. It was hypothesized that by virtue of the dynamics of their personality configuration, other-directed individuals would respond more to the success-failure experience with changes in their self-attitudes than would inner-directed individuals. The results of the investigation failed to confirm this hypothesis. All subjects responded with an increase in self-evaluation in response to the experience of success and with a decrease in self-evaluation in response to an experience of failure. Changes in the self-picture were observed, however, primarily with regard to those attitudes that were most specific to the ego-involvement of the subjects: i.e., the college students involved in an academic task reflected changes in their attitudes towards themselves in terms of a pattern of attitudes labeled "school self." The only differential reaction was that the self-attitudes of other-directed subjects became decreasingly consistent on retest, regardless of the experimental experience to which they were exposed. The general conclusion, therefore, at least as regards the conditions of this investigation, is that the experience of success or failure, per se, was the overriding parameter in producing changes in the self-attitudes.
R 24

33,197
Hersen, M. REPEATED INQUIRY DURING TRAINING IN A VERBAL CONDITIONING PARADIGM. J. gen. Psychol., Jan. 1967, 76(First Half), 107-111. (State University of New York, Buffalo, N.Y.).

The effects of repeated inquiry during training in a recently developed group paradigm of verbal conditioning were assessed. Consistent with data from other experiments, it was found that subjects able to verbalize the response-reinforcement contingency perform better than their Non-Verbalizer counterparts. Further, it was noted that some subjects displayed performance increments in the same trial block where the contingency was first specified. The small percentage of subjects able to verbalize the answer contingency on the basis of this inquiry technique suggests that repeated questioning has a confounding effect on subjects.
R 6

33,198
Hickok, C.W., Grant, D.A. & North, Jane A. FACTORS IN THE REVERSAL OF DIFFERENTIAL CONDITIONING OF THE HUMAN EYELID RESPONSE. J. gen. Psychol., Jan. 1967, 76(First Half), 125-137. (Psychology Dept., University of Wisconsin, Madison, Wisc.).

Two hundred and forty subjects were first given 60 differential eyelid conditioning trials with reinforced (CS+) and nonreinforced (CS-) stimuli. In a second, reversal, phase 90 more trials were given in which reinforcement contingencies of the two stimuli were altered so that the effects on responding to a CS (conditioned stimulus) that had been positive and now was negative of a) continuing or b) reversing the first-phase reinforcement contingencies of the second CS could be investigated. In control groups the second CS was completely eliminated during the reversal phase of the experiment. The two conditioned stimuli were differentially placed lights, and the UCS (unconditioned stimulus) was a corneal air puff delivered 800 milliseconds after the onset of the CS. The principal findings were as follows: a) The Vs (voluntary form responders) showed the higher rate of responding to both CS+ and CS- and also the greater difference or degree of conditioned discrimination between the two stimuli. b) The Levy, Grant, and Clark finding of less complete discrimination reversal to a reinforced CS that was formerly nonreinforced than to a nonreinforced CS that was formerly reinforced was again obtained with Cs (conditioners), but the difference was not statistically significant. c) Pavlov's observation of differential inhibition during discrimination reversal was confirmed with Cs but not with Vs. d) There was no evidence for generalization of excitation or inhibition from one CS to the other during the reversal phase of the experiment. e) Factors that produce voluntary form responding in human subjects in eyelid conditioning may override classical Pavlovian processes, so that parallels between his results and current eyelid conditioning results may be found more readily with Cs than with Vs.
R 12

33,199
Corbin, C.B. THE EFFECTS OF COVERT REHEARSAL ON THE DEVELOPMENT OF A COMPLEX MOTOR SKILL. J. gen. Psychol., April 1967, 76(Second Half), 143-150. (Physical Education Div., University of Toledo, Toledo, Ohio).

The purposes of this study were threefold: a) to investigate the effects of covert rehearsal and combined overt-covert rehearsal as compared with overt rehearsal in developing a skilled motor performance, b) to test the interaction effect between skill ability level and the type of rehearsal, and c) to test the lasting effects of covert rehearsal. Results indicate that covert rehearsal alone did not facilitate skill improvements. There was no interaction effect between rehearsal type and skill level. No type of rehearsal seemed to have more lasting effects than any other. It was concluded that actual experience at the task might be necessary if covert rehearsal is to be a variable in facilitating skill development. Since covert rehearsal was not observed to be a variable in improving performance, further study is indicated concerning the variables of skill level and lasting effects.
R 11

33,200
Dr sch, M.R. & Sternlicht, M. THE ROLE OF "SURPRISE" IN THE VON RESTORFF EFFECT. J. gen. P chol., April 1967, 76(Second Half), 151-153. (Yeshiva University, New York, N.Y. & Willowbrook State School, Staten Island, N.Y.).

The present experiment undertook to examine the "surprise" interpretation of the von Restorff effect, an interpretation asserting that it is not isolation in a temporal series as suggested by von Restorff that produces better recall, but the "surprise" aroused by being unexpectedly presented with a verbal item after a series of numerical items or vice versa. In order to test the "surprise" hypothesis, a situation was created in which the surprise value of an item was eliminated, but in which the isolation of the item still existed: namely, placement of the isolated item in the second position of the series. Under these conditions, superior learning of the isolated item was obtained (when compared with a homogeneous counterpart), a finding which demonstrates an isolation effect in the absence of surprise. In addition, a series was prepared in which the isolated item was placed in the next-to-the-last position. Under these conditions, too, an isolation effect was obtained, the effect being slightly, but nonsignificantly, greater than that obtained in the second position. These results suggest the inadequacy of the "surprise" explanation of the isolation phenomenon and the need for a relational interpretation of isolation, which considers the total context--both preceding and succeeding--in which the isolated item appears.
R 12

33,201
Steele, M. SIMILARITY AND DEGREE OF LEARNING AND OSGOOD'S SECOND LAW OF RETROACTION. J. gen. Psychol., April 1967, 76(Second Half), 161-166. (Psychology Dept., University of Miami, Coral Gables, Fla.).

The purpose of the experiment was to clarify the relation between similarity of verbal meaning and retroactive inhibition. There was evidence that the interaction of a third variable, degree of learning, obscured the relation; and that degree of learning should be kept low when similarity of meaning is the independent variable and retroactive inhibition is the dependent variable.
R 7

33,202
Crumpton, Evelyn, Wine, D.B. & Drenick, E.J. EFFECTS OF PROLONGED FOOD DEPRIVATION ON FOOD RESPONSES TO SKELETON WORDS. J. gen. Psychol., April 1967, 76(Second Half), 179-182. (US Veterans Administration Center, Brentwood & Wadsworth Hospital, Los Angeles, Calif.).

Twenty-six obese men, hospitalized for treatment of obesity, were maintained on zero calories for long periods of time; in some instances, a 300-calorie diet was instituted at about the second month. Before fasting began, and at the end of one week, one month, and two months of fasting, and monthly thereafter, subjects were asked to complete skeleton words consisting of letters and blanks. It was hypothesized that obese men would make more food-related responses to these incomplete words after being deprived of food for long periods. This hypothesis was confirmed for both the one-week and the one-month period of fasting, but not for the two-month period; the relative frequency of food-related responses did not increase as the length of deprivation increased, but was greater in the initial stages of deprivation.
R 3

33,203
Klein, P. & Kellner, L. CREATIVITY IN A TWO-CHOICE PROBABILITY SITUATION. J. gen. Psychol April 1967, 76(Second Half), 193-200. (Psychology Dept., Boston College, Chestnut Hill, Mass.).

This study investigated the performance of high vs. low creative subjects in a probability learning situation. Two groups of 16 subjects were tested in a two-choice probability paradigm with one choice reinforced 70 per cent randomly and the other reinforced 30 per cent. High creative subjects had significantly longer latencies at points preceding shifts from one choice to the other, and also tended to show better learning (i.e., matching objective probability with their own response pattern) than did low creative subjects. The results were discussed in the light of some hypotheses regarding the role of attitudinal determinants in problem-solving situations as they relate to creative functioning.
R 18

33,204
Baer, D.J. HYPERVENTILATION EFFECTS ON THE CRITICAL FLICKER FREQUENCY OF SMOKERS AND NONSMOKERS. J. gen. Psychol., April 1967, 76(Second Half), 201-206. (Psychology Dept., Boston College, Chestnut Hill, Mass.).

Critical Flicker Frequency (CFF) thresholds for heavy smokers, moderate smokers, and nonsmokers were determined following the conditions of rest, mild hyperventilation, rapid hyperventilation, and rest. The insignificant differences in CFF among the three groups indicated that when at least a one-hour smoking deprivation is observed by the subjects, the smoking history of individuals is not an important determiner of flicker thresholds. A significant (.01 level) decrease in CFF thresholds subsequent to slow and rapid hyperventilation conditions probably occurred because the CFF measurements were obtained during the apneic pause. The insignificant groups by hyperventilation condition interaction indicated that hyperventilation had the same effect on CFF for heavy smokers, moderate smokers, and nonsmokers regardless of hyperventilation rate.
R 11

33,205
Taylor, I.K. AN ANATOMY OF WORDS USED IN A WORD-MATCHING PHONETIC SYMBOLISM EXPERIMENT. J. gen. Psychol., April 1967, 76(Second Half), 231-239. (Lakeshore Psychiatric Hospital, Toronto, Ontario, Canada).

The purpose of the present examination is merely to point out that any conclusive proof of universal phonetic symbolism (UPS) based on word-matching experiments is difficult. The results and conclusion of the present re-examination of Weiss's data (Weiss, J.H. A STUDY OF THE ABILITY OF ENGLISH SPEAKERS TO GUESS THE MEANINGS OF NONANTONYM FOREIGN WORDS. J. gen. Psychol., 1966, 74, 97-106.) are different from those of Weiss, due to the difference in the procedures of selecting the determinants of guessing. Such difference in the procedures of selecting determinants arises from an arbitrary nature of a posteriori analysis of data of word-matching experiments. The present results show that the sound correspondence is hard to establish, and when it is established on some arbitrary grounds, is found to exist both in correct and wrong words from the two languages. The word length, on the other hand, seems to be similar more between the correct than between the wrong words, and at the same time is more influential than the sound factor in the subject's guessing. There are some imitative words in the stimulus material, which are guessed correctly most of the time, if other factors do not interfere. The above results lead to the conclusion that the stronger determinants of guessing are more likely the word length and imitative factors, rather than the sound factor. Thus, unless UPS is to be confined to the imitative (even among the imitative words, the sound correspondence is not too obvious), and unless UPS is assumed to be based on word length, the existence of UPS cannot be supported with the present results.
R 3

33,206
Mills, J.A. & Sacks, Sylvia. PROACTIVE INHIBITION OF DESCRIPTIVE PROSE AS A FUNCTION OF THE LENGTH OF RETENTION INTERVAL. J. gen. Psychol., April 1967, 76(Second Half), 241-249. (University of Cape Town, Cape Town, Union of South Africa).

The susceptibility of descriptive prose to proactive inhibition (PI) with retention intervals of 15 minutes, 24 hours, and seven days was tested. The material was taken from the writings of D.H. Lawrence. Learning and recall were measured by the serial anticipation method. The results indicate the presence of PI, but the amounts obtained do not reach significance. However, there was a significant increase in PI with time. The failure to get significant PI within each retention interval is ascribed to the supposed overlearning of descriptive prose. On the basis of an examination of error patterns, it was suggested that the major source of interference was extra-experimental, taking the form of unit-sequence interference. Some of the problems which the results pose for interference theory are discussed.
R 12

33,207
Mirabella, A., Taub, H. & Teichner, W.H. ADAPTATION OF LOUDNESS TO MONAURAL STIMULATION. J. gen. Psychol., April 1967, 76(Second Half), 251-273. (Electric Boat Div., General Dynamics Corp., Groton, Conn.).

Four experiments were conducted to investigate auditory adaptation using monaural, compensatory tracking of an acoustic signal. Changes in stimulus sound pressure level (SPL) as a function of time induced by the subject as he tried to maintain a constant reference loudness were used to infer changes in the subject's perception of loudness as a function of time. The results indicated the presence of two different kinds of perceptual response. A decrease in loudness with continued exposure was found to occur with low stimulus SPL; an increase in loudness similar to recruitment was found to occur at relatively high SPL. Contrary to the results of loudness-balancing experimental methods, these results suggested an inverse relationship between amount of loss of auditory sensitivity and SPL of the adapting sound. It was concluded that suprathreshold sound adaptation functions previously obtained may reflect a loss of attention or alertness to a great degree and an actual peripheral sensory change to a lesser degree than has been supposed. In particular, the attentional explanation offered was based on the following empirical findings: a) Blindfolded subjects showed less loss of auditory sensitivity than did nonblindfolded subjects. b) Subjects who were told that changes in SPL of stimulation would originate in their own ears showed less loss of sensitivity than did subjects who were told that the stimulus itself would change. In neither case was the sound varied. c) Subjects presented fluctuating tones showed less loss of sensitivity than did subjects who were presented steady tones.
R 21

33,208
Cruse, D.B. SOCIAL DESIRABILITY SCALE VALUES OF QUESTIONS AND ANSWERS. J. gen. Psychol., July 1967, 77(First Half), 17-30. (University of Miami, Coral Gables, Fla.)

The relationship between questions and answers in social desirability judgments was investigated by obtaining social desirability scale values of questions with Yes or No attached as text and answer. An inverse relation between questions with Yes and No attached, $r = -.97$, showed the importance of both questions and answers. Yes as text and answer, compared to No as text and answer, caused increases in social desirability scale values. Questions concerning socially desirable aspects of personality were judged with more precision and consensus than questions concerning socially undesirable personality aspects. The inverse relation between items with Yes and No attached was compared with reversing the meaning of items.
R 18

33,209
Pusroy, D.K. CIGARETTE SMOKING AND ACADEMIC ACHIEVEMENT. J. gen. Psychol., July 1967, 77(First Half), 31-34. (University of Maryland, College Park, Md.).

The relationship between cigarette smoking and academic achievement was investigated in two ways. When grade point average was used, it was found that the highest grades were obtained by nonsmokers, next by the light smokers. The moderate smokers' grades fall below the light smokers' and the lowest grades of all were obtained by the heavy smokers. The other measure obtained was whether or not the student returned to the University for his second year. It was found that the less one smoked, the greater was the likelihood of his returning to the University. An interpretation of these findings suggested that both cigarette smoking and academic achievement reflect the negative attitudes toward authority.
R 81

33,210
Murray, J.B. DRUG ADDICTION. J. gen. Psychol., July 1967, 77(First Half), 41-68. (St. John's University, Jamaica, N.Y.).

Psychological research on drug addiction was reviewed. Topics covered were the nature of drug addiction, drugs with addiction liability, the profile of the narcotic addict, and treatment procedures employed. Recommendations for dealing with young addicts and for future research were also made.
R 77

33,211
McClure, G.T. & Tyler, F.B. POLICY DECISIONS IN SCIENCE: PSYCHOLOGICAL CONSIDERATIONS AND IMPLICATIONS FOR PSYCHOLOGY. J. gen. Psychol., July 1967, 77(First Half), 69-86. (Psychology Dept., Southern Illinois University, Carbondale, Ill. & National Institute of Mental Health, Bethesda, Md.).

Beginning with an analysis of some necessary aspects of the process of experimental inference, such as the setting of sample size and the assignment of levels of significance, and adding to this an analysis of a simple case of discrimination drawn from psychological experiments with monkeys, this paper attempts to develop an argument that there is a necessary logical relation between a scientist's discriminations of what the facts are and his acceptance of some value criteria. The scientist can not, the argument says, report the "facts" without also exhibiting, at least tacitly, the value criteria involved in the policy decisions he must necessarily have made in setting up his experiment. The converse is also the case: expressions of values rest upon some assumptions as to what the facts are. Thus, the argument accords both fact and value a distinct role, but argues for a necessary mutual dependency. Anticipating charges that this involves vicious circularity, the authors devote the last portion of the paper to an argument that the "circle" involved is not vicious and that "experimental control" is, and has been, the basic operating principle that rescues the scientific enterprise from vicious circularity. The authors advocate a conscious recognition of the interrelationship between fact and value and the undertaking of new studies directed toward rational value-decision principles based upon the methods that have tacitly been in use all along in science. They then note the specific implications of these arguments for psychotherapy and psychological theory and research.
R 7

33,212
Schultz, D.P. EVIDENCE SUGGESTING A SENSORY VARIATION DRIVE IN HUMANS. J. gen. Psychol., July 1967, 77(First Half), 87-99. (University of North Carolina, Charlotte, N.C.).

Research using human subjects [illegible]d under conditions of sensory isolation, which suggests support for a drive for senso[illegible]riation, is reviewed and discussed. The first part of the review deals with indirect evidence that indicates that longer periods of sensory restriction or more severe degrees of isolation result in more severe physiological and behavioral effects than shorter periods and less severe degrees of isolation. This type of research evidence does not provide a direct test of the sensory-variation-drive hypothesis, but it does nonetheless indicate that behavior is impaired when the hypothesized incentive of varied sensory input is removed from the environment. The second part of the review discusses evidence which demonstrates that experimentally induced increments in drive (increments in length or degree of deprivation of the hypothesized incentive) are followed by significant increments in instrumental response behavior. This type of evidence provides a much more direct test of the sensory-variation-drive hypothesis.
R 41

33,213
Krause, M.S. THE LOGIC OF THEORY TESTING WITH CONSTRUCT-VALIDATED MEASURES. J. gen. Psychol., July 1967, 77(First Half), 101-109. (Institute for Juvenile Research, Chicago, Ill.).

Where operational interpretations for theoretical constructs are validated or invalidated by recourse to experimental results, it is inconsistent to use these interpretations to test the propositions involving the constructs in the same theory. Therefore, acceptance of the proposal in psychology to use such a form of validation would logically preclude any possibility of disconfirming the governing theory with data reflecting upon those of its concepts whose interpretations had been so validated.
R 8

33,214
Hall, J.F. PAIRED-ASSOCIATE LEARNING AS RELATED TO STIMULUS DURATION AND INTERTRIAL INTERVAL. J. gen. Psychol., July 1967, 77(First Half), 127-129. (Pennsylvania State University, University Park, Penn.).

This study examined the role of stimulus and stimulus-response presentation times, as well as the distribution of practice. A 3 X 3 factorial was utilized--stimulus and stimulus-response durations were either 2:2, 2:4, or 4:2 seconds, while the intertrial interval was either four, 20, or 40 seconds. Subjects consisted of 135 undergraduates, randomly assigned to one of the nine groups. Analysis of variance revealed that the 4:2-second stimulus-response presentation rate resulted in superior learning. Although superior performance was obtained with the 40-second intertrial interval, it was not statistically superior to either four or 20 seconds.
R 2

33,215
Tayal, O.P. COMPLEMENTARY HUES AND A SCHEMA FOR COLOR VISION. J. gen. Psychol., Oct. 1967, 77(Second Half), 151-163. (Indian Institute of Technology, Kanpur, India).

A schema on the analogy of forces acting on a point in a plane has been put forward toward an understanding of color vision. Also, as demanded under the schema, a chromaticity-hue (r-θ) Diagram for a graphic representation of the spectral and the extra spectral hues has been suggested, such that a consistent and unvariable representation could be obtained which would not be subject to any alterations, with variations either in selection of primaries, or in their saturations, or in both, and from which the characteristics of a mix could also be obtained on the principle of parallelogram of forces. It has further been suggested that the proposed r-θ Diagram may provide a basis to connect color vision of a deviant to that of the standard observer, and also account for variations in the same individual under different sets of conditions.
R 4

33,216
Vinacke, W.E., Lichtman, C.M. & Cherulnik, P.D. COALITION FORMATION UNDER DIFFERENT CONDITIONS OF PLAY IN A THREE-PERSON COMPETITIVE GAME. J. gen. Psychol., Oct. 1967, 77(Second Half), 165-176. (State University of New York, Buffalo, N.Y.).

The present experiment was conducted to compare strategy and ensuing coalitions under two conditions of play, called, respectively, deterministic and stochastic. The former fixes the moves of all players at each stage of play. The latter permits each player's move to be contingent upon his own action. Triads played a competitive board game. Deterministic procedure was established by having all players move after each throw of the dice. Stochastic procedure was established by allowing each player in turn to throw the dice to determine his own distance of move. In addition, a long and a short board were used to allow different perceptions of the necessity to form coalitions to operate. It was hypothesized that players would risk ending the game without coalition under stochastic and short board conditions more than under the other conditions. Ten triads of each sex were run under each of the four conditions. Analysis of various aspects of strategy disclosed significant differences especially between deterministic long board and stochastic short board, as expected. Chiefly, there were fewer coalitions under the stochastic and short board conditions than under the deterministic and long board conditions. The overall pattern of differences indicated that players tended to "gamble" in these conditions in an effort to win by their own resources. Sex differences occurred across all conditions in the same manner as in previous experiments.
R 8

33,217
McClure, G. & Tyler, F. ROLE OF VALUES IN THE STUDY OF VALUES. J. gen. Psychol., Oct. 1967, 77(Second Half), 217-235. (Southern Illinois University, Carbondale, Ill. & National Institute of Mental Health, Bethesda, Md.).

The authors attempt to provide a conceptual and an empirical base for an increasingly self-corrective and sophisticated realm of value-study. The central principle of this base is that value and fact are functions of one another. To the empiricist, the authors suggest that he consider doing some studies on value, then providing systematic intervening experiences, then predicting how the values would change, and following it all up. He would presumably predict that the changes would vary with cultural backgrounds: that is, with those background differences in the meaning of a given value to those persons. To the historian, the authors want to say that it makes sense to relate the developing values of a society to the quality of experience of the members of that society. They would like to point this out to people in the humanities, too. The authors are advancing a conception of man similar to that expressed by historians as "history does not reveal its alternatives." What the authors are saying is that this is also true for each individual: he is a developing product of the discriminations he makes, and the preferential outcomes that result from his sequence of choices.
R 14

33,218
Kippel, G.M. & Horowitz, M.W. NEGATIVE PERSONS SEEN AS SOURCES OF POSITIVE ACTS: AN INVESTIGATION INTO SOME VARIABLES INVOLVED IN COGNITIVE REORGANIZATION OF THE ELEMENTS IN UNIT RELATIONSHIPS. J. gen. Psychol., Oct. 1967, 77(Second Half), 243-258. (Queens College, City University of New York, Flushing, N.Y.).

An investigation into the nature of some of the variables influencing attitude dynamics was undertaken. Subjects were presented with unbalanced situations consisting of persons with a negative valence doing acts which had a positive value. It was postulated that combination of varying levels of person valence and act value would result in specific cognitive reorganization of the type indicated by Heider. The nature of attitude change resulting from a negative person doing a positive act more than once was also investigated. Resultant rating scale data were subjected to analysis of variance and the importance of the significant main effects is discussed.
R 14

33,219
Hoerlein, C.A. & Navarro, S.O. A SINGLE DIAGRAM FOR COMPUTATION OF TETRACHORIC CORRELATIONS. J. gen. Psychol., Oct. 1967, 77(Second Half), 263-265. (Addiction Research Center, National Institute of Mental Health, Lexington, Ky.).

A method for the rapid calculation of tetrachoric correlations is presented which is simpler than older methods and employs a single computing diagram. One diagram is necessary for computation because marginal totals are equalized by dividing each marginal total by itself and multiplying by 100.
R 5

33,220
Pitt, W.B. A STRATEGY FOR PSYCHOLOGICAL RESEARCH. J. gen. Psychol., Oct. 1967, 77(Second Half), 267-276. (Columbus Labs., Battelle Memorial Institute, Columbus, Ohio).

A general strategy for psychological research is proposed. The strategy is based upon the notion of an "ideal type," which is defined as a conception of the optimum state of a given system. The proposed strategy consists of three basic steps: a) investigation of the present situation, b) construction of an ideal type, and c) formulation and implementation of recommendations. There are several important characteristics of the proposed strategy. First, it assumes that the psychologist is interested in understanding and influencing man and his environment. Second, it is problem oriented rather than theory or method oriented. Third, the strategy makes use of different theories and different methods, and does so in a systematic manner. Fourth, while it is grounded in reality, it encourages the behavioral scientist to look beyond what is presently known. Fifth, it is guided by reason. The proposed strategy is related to other methods of inquiry. For example, Step I is empiricism. Step II may be viewed as one version of rationalism. Step III is clearly consistent with the pragmatism of William James. Several words of caution are in order. First, the proposed strategy encompasses both fact and speculation, and the investigator must keep in mind which is which. Second, ideal types are dynamic and can be expected to change with time. Third, "the construction of abstract ideal types recommends itself not as an end but a means" (Max Weber). The proposed strategy holds these promises for psychology: a) it can help bring together scattered facts in an objective manner, b) it can provide a framework for determining the appropriateness of different theories and methods for given problems, and c) it can indicate directions for appropriate action.
R 13

33,221
Krause, M.S. THE CONSTRUCT VALIDITY OF MEASURING INSTRUMENTS. J. gen. Psychol., Oct. 1967, 77(Second Half), 277-284. (Institute for Juvenile Research, Chicago, Ill.).

Instrument validity is ultimately a pragmatic matter upon which the cumulation of research is dependent. If the scientists interested in a certain construct agree that a particular measuring instrument is valid for it, then the validity of the instrument is secure in the consensus (except for changes in substantive theory or definition or for technological discoveries). Such a consensus can be founded on a substantive theoretical, technological, or semantic "network," but the argument is quite different from each. The empirical testing of fit for data to acceptable theoretical curves is the crux of arguments for the substantive theoretical construct validity of an instrument. The independence of the measurements of an instrument from the influence of possible biasing variables is the crux of arguments for its technological construct validity. The logical derivation of the specifications of an instrument from an acceptable conceptual analysis is the crux of arguments for its semantic construct validity. In the usual case of a mixed network of all three types, the order of research priorities should be semantic, theoretical, and technological. Where several construct-valid instruments exist for the same construct, discrepancies among their measurements can be resolved by factor analysis.
R 10

33,222
Childress, D.S. & Jones, R.W. MECHANICS OF HORIZONTAL MOVEMENT IN THE HUMAN EYE. J. Physiol., Jan. 1967, 188(1), 273-284. (Electrical Engineering Dept. & Bio-Medical Engineering Center, Northwestern University, Evanston, Ill.).

The mechanics of the muscle-eyeball system of the human has been re-investigated by careful examination of the motion of the eye after it is mechanically adducted and released by means of a suction contact lens attached to it. Orbital stiffness during adduction is found to be about 1.25 g/deg which is near the value of 1.2 g/deg reported by a previous study for adduction. However, the results also show that the stiffness decreases to 0.6 g/deg after approximately 5° of adduction. It is concluded that for horizontal motion the globe may be considered as being in a series with an elastic component which has a stiffness of 9.0 g/deg. This series elasticity, arising from the extraocular muscles, muscle tendons, and from other orbital tissue appears to increase in stiffness as muscle innervation increases. The experiments show that the muscle-eyeball system of the human is heavily damped which confirms the results of a previous investigation. Evidence is presented which indicates that the extraocular muscles are dominant factors in horizontal eye motion.
R 11

33,223
Alba, T.S., Alpern, M. & Hasseldvaag, F. THE ELECTRORETINOGRAM EVOKED BY THE EXCITATION OF HUMAN FOVEAL CONES. J. Physiol., March 1967, 189(1), 43-62. (University of Michigan, Ann Arbor, Mich.).

A 2° test stimulus foveally fixed and viewed against a blue background (40° in extent and producing 2.0×10^4 scotopic td of retinal illuminance) evokes a small voltage which can be recorded from the human eye with a conventional contact lens electrode if the test stimulus is flashed at a rate of 15 c/s, and the responses to at least several hundred flashes are averaged. The action spectrum of the response obtained in this way agrees reasonably well with the observer's psychophysical foveal luminosity curve. For the peripheral retina, the action spectrum is similar to that of the fovea when allowance is made for differences in screening macular pigment. Such responses diminish when the test stimulus is focused on the peripheral retina and disappear when the test light is focused on the blind spot. Therefore, the response to the test light fixated centrally is the result of the excitation only of cones mainly, if not exclusively, in the fovea. When the intensity of the background is reduced by a factor of 10, the action spectrum shows evidence of the effect of excitation of rods in the blue part of the spectrum and of cones in the red. These red and blue responses add linearly when combined together, provided they are adjusted to coincide in phase.
R 21

33,224
Wilson, M.E. SPATIAL AND TEMPORAL SUMMATION IN IMPAIRED REGIONS OF THE VISUAL FIELD. J. Physiol., April 1967, 189(2), 189-208. (Institute of Neurology, Queen Square, London, England).

Spatial and temporal summation have been measured in perimetrically impaired regions of the visual field. Two classes of impairment have been studied: that resulting from lesions in the pre-geniculate visual pathways, and that resulting from post-geniculate lesions (optic radiation and/or striate cortex). Control measurements were made in the perimetrically normal visual fields of subjects without visual pathway damage. Spatial summation was found altered in all impaired visual fields: the greater the threshold elevation produced by the lesion, the more nearly complete was spatial summation. The above relation between threshold and spatial summation has also been given numerical form. This has been shown to be very nearly identical to the threshold-spatial summation relation which is seen as stimuli are increasingly peripherally presented in normal visual fields. It has been shown that the alterations of spatial summation brought about by a lesion are found only in those parts of the visual field which are perimetrically impaired: spatial summation is always normal in perimetrically normal regions of a visual field, even if other parts of the same field show impairment. Temporal summation has been found altered in visual fields impaired by post-geniculate lesions: the greater the threshold elevation produced by the lesion, the more nearly complete was temporal summation. These changes in temporal summation were found only in perimetrically impaired regions of the field. Temporal summation was normal in visual fields impaired by pre-geniculate lesions.
R 17

33,225
Alpern, M. & Rushton, W.A.H. THE NATURE OF RISE IN THRESHOLD PRODUCED BY CONTRAST-FLASHES. J. Physiol., April 1967, 189(3), 519-534. (Ophthalmology Dept., University of Michigan, Ann Arbor, Mich. & Physiological Lab., University of Cambridge, Cambridge, England).

The rod threshold for seeing a flash on a 2 1/2° square is raised by a nearly simultaneous flash that falls on the surround. When this 'contrast-flash' is held fixed in intensity, it raises the log test threshold by a fixed amount no matter how far that threshold has already been raised by light adaptation owing to background or bleaching. This is surprising since fixed backgrounds and bleachings raise the log test threshold much more when the eye is dark than when light adapted. When the test flash is held at some fixed supra-threshold value, the contrast flash exhibits a 'critical level', above which the test will no longer be seen. If the surround region upon which the contrast-flash falls is adapted by background or bleaching, its efficacy is reduced so that the 'critical level' is raised. Surround adaptation raises the log 'critical level' by the same amount that it raises the log threshold for seeing the contrast-flash itself. The way the contrast flashes raise the test threshold is thus entirely different from the way that adaptations by bleachings or backgrounds do. Contrast-flash signals appear to inhibit test-flash signals by interaction at some point central to the site where adaptation occurs. This permits the effect of adaptation on signals to be measured. A given state of adaptation attenuates all flash signals in the same proportion. And in any state of adaptation a single flash will reach threshold when the attenuated signal has a fixed size.
R 10

33,226
Westheimer, G. SPATIAL INTERACTION IN HUMAN CONE VISION. J. Physiol., May 1967, 189(3), 139-154. (Neurosensory Lab., University of California, Berkeley, Calif.).

The adaptation state of a uniformly illuminated patch of human cone retina was determined by finding the threshold for a small, brief light spot seen flashing in its centre. When the illuminated patch of the retina is increased in diameter, the adaptation state is first raised, and beyond a critical background diameter, lowered. This is interpreted as a manifestation of excitatory and inhibitory interaction of adaptation stimuli: illumination of retinal regions in the immediate neighbourhood of the area tested acts to raise the adaptation level, and of those further removed acts to lower it. The critical area beyond which adapting light produces inhibition is about 5 min. of arc in diameter in the eye's object space for foveal observation. For peripheral cone vision it increases much as the minimum angle of resolution. The inhibiting action of outlying areas is substantially reduced, or perhaps even eliminated, by lowering the background luminance. Surrounding the retinal patch with a pair of juxtaposed narrow concentric black and white rings superimposed on a uniform field, simulating a border, irrespective of diameter, does not influence the threshold of the probing spot. This argues against a possible threshold raising effect of the border of the background. The inhibiting action on a patch of cone retina of a surrounding annulus occurs only when the annulus is seen by the same eye and not when it is seen by the other eye: the site of inhibitory interaction is, therefore, retinal.
R 18

33,227
Sutton, G.G. & Sykes, K. THE EFFECT OF WITHDRAWAL OF VISUAL PRESENTATION OF ERRORS UPON THE FREQUENCY SPECTRUM OF TREMOR IN A MANUAL TASK. J. Physiol., May 1967, 190(2), 281-293. (Royal Radar Establishment, Malvern, Worcestershire, England).

When a subject attempts to exert a steady pressure on a joystick he makes small unavoidable errors which, irrespective of their origin or frequency, may be called tremor. Frequency analysis shows that low frequencies always contribute much more to the total error than high frequencies. If the subject is not allowed to check his performance visually, but has to rely on sensations of pressure in the finger tips, etc., the error power spectrum plotted on logarithmic co-ordinates approximates to a straight line falling at 6 db/octave from 0.4 to 9 c/s. In other words the amplitude of the tremor component at each frequency is inversely proportional to frequency. When the subject is given a visual indication of his errors on an oscilloscope the shape of the tremor spectrum alters. The most striking change is the appearance of a tremor peak at about 9 c/s, but there is also a significant increase of error in the range 1-4 c/s. The extent of these changes varies from subject to subject. If the 9 c/s peak represents oscillation of a muscle length-servo it would appear that greater use is made of this servo when positional information is available from the eyes than when proprioceptive impulses from the limbs have to be relied on.
R 7

33,228
Green, D.G. VISUAL RESOLUTION WHEN LIGHT ENTERS THE EYE THROUGH DIFFERENT PARTS OF THE PUPIL. J. Physiol., June 1967, 190(3), 583-593. (Ophthalmology Dept., University of Michigan, Ann Arbor, Mich.).

Threshold contrasts for resolution of sinusoidal gratings imaged on to the retina through a decentred 2 mm pupil were measured. No loss in resolution was found when the pupil was decentred parallel to the lines of the gratings. A loss in resolution by a factor of 3 occurred when the pupil was decentred by 3 mm perpendicular to the lines of the gratings. The effects of focus on the threshold contrast for a grating viewed through a centred and decentred pupil were used to show that at least a portion of the loss in resolution is due to optical aberrations. Using a neon-helium gas laser as a coherent light source, interference fringes were produced on the retina directly. Threshold contrasts for resolution of the fringes were determined for different positions of entry of the beams of light through the pupil. When the Stiles-Crawford brightness effect was compensated for, no loss in resolution was found to occur for decentred entry of the beams. It is concluded that the off-axis loss of visual acuity is wholly due to optical aberrations in the eye. The ratios between the threshold contrasts for sinusoidal gratings and for interference fringes are used to calculate the optical transfer functions of the off-axis aberrations of the eye.
R 17

33,229
Sutton, G.G. & Sykes, K. THE VARIATION OF HAND TREMOR WITH FORCE IN HEALTHY SUBJECTS. J. Physiol., Aug. 1967, 191(3), 699-711. (Royal Radar Establishment, Malvern, Worcestershire, England).

Total root-mean-square (r.m.s.) error over an effectively unrestricted band, and error power spectra from 0.256 to 12.5 c/s were measured for four subjects attempting to maintain fixed forces of 1-6 Lb. (0.45-2.72 kg) on a pressure joystick. The subject could see his errors as the deflexion of a cathode ray tube spot. The total r.m.s. error increases linearly with force with a considerable (positive) intercept when the line is extrapolated to zero force. Hence accuracy in the sense (r.m.s. error)/(force) increases with force for this type of control. The rate of increase of total r.m.s. error with force is greater in subjects with prominent tremor peaks in their power spectra at 8-10 c/s. At each frequency the r.m.s. error per unit bandwidth also increases linearly with force. Except at the very lowest frequencies the rate of increase is greater in subjects with prominent tremor peaks at 8-10 c/s. This is thought to account for the observation described above. The frequency of the tremor peaks near 8-10 c/s is almost independent of the force exerted.
P 4

33,230
Borg, G., Diamant, H., Ström, L. & Zotterman, Y. THE RELATION BETWEEN NEURAL AND PERCEPTUAL INTENSITY: A COMPARATIVE STUDY ON THE NEURAL AND PSYCHOPHYSICAL RESPONSE TO TASTE STIMULI. J. Physiol., Sept. 1967, 192(1), 13-20. (Otorhinolaryngology, Umeå University, Stockholm, Sweden).

Recording the summated electrical response from the human chorda tympani in the middle ear provides data for a quantitative study of the relation between the neural activity and the strength of the stimulus applied to the tongue which can be compared with the relation between the subjective estimation and the stimulus strength. Full comparative data obtained from two patients showed a very high correlation between the functions describing the subjective and the neural response in relation to the strength of citric acid and sucrose solutions applied to the tongue. In a third patient the same high correlation was obtained for NaCl and citric acid. The good agreement between the individual neurophysiological experiments and the psychophysical group experiment favours the view that a fundamental congruity is found between neural activity and perceptual intensity.
R 11

33,231
Westheimer, G. DEPENDENCE OF THE MAGNITUDE OF THE STILES-CRAWFORD EFFEC RETINAL LOCATION. J. Physiol., Sept. 1967, 192(2), 309-315. (Neurosensory Lab., Un... ..ty of California, Berkeley, Calif.).

The directional sensitivity (Stiles-Crawford effect) of retinal cones is supposed to be associated with their shape, but only extrafoveal cones have a cone-like shape; cones in the central fovea are elongated and look like rods. To determine whether the directional sensitivity of cones depends on their shape, the Stiles-Crawford effect was measured both in the central fovea and in the parafovea of the human eye. To ensure that the cone population tested was homogeneous, a small brief test flash, brought into the eye through the center of the pupil, was placed at threshold by varying the intensity of a large adapting field. The directional sensitivity of the cones was determined by finding the efficiency of light to act as an adapting background as a function of position of entry in the pupil. Central foveal cones have a less pronounced directional sensitivity than parafoveal cones and this lends support to the conclusion that the Stiles-Crawford effect is connected with the shape of the retinal receptors.
R 10

33,232
Campbell, F.W. & Gubisch, R.W. THE EFFECT OF CHROMATIC ABERRATION ON VISUAL ACUITY. J. Physiol., Sept. 1967, 192(2), 345-358. (Physiological Lab., University of Cambridge, Cambridge, England).

Differences of threshold contrast are predicted from optical theory for a grating acuity target in monochromatic and white light. The greatest differences, up to 65% are predicted for gratings of lower contrast and pitch than those normally used in measurements of visual acuity. Three subjects were measured for contrast thresholds with 1.5 and 2.5 mm diameter artificial pupils for natural and paralysed accommodation, using a tungsten lamp and wavelengths of 546 and 578 mm. Excellent agreement is obtained between predicted and measured differences. Results confirm that observed acuity and sensitivity differences between white and monochromatic lights are largely optical in origin, but involve at least two independent colour mechanisms as spectral weighting functions. Stiles's $\pi 4$ and $\pi 5$ sensitivities afford a much better fit to observed differences than the C.I.E. (Commission Internationale de l'Eclairage) visibility curve.
R 22

33,233
Lind, A.R. & McNicol, G.W. LOCAL AND CENTRAL CIRCULATORY RESPONSES TO SUSTAINED CONTRACTIONS AND THE EFFECT OF FREE OR RESTRICTED ARTERIAL INFLOW ON POST-EXERCISE HYPERAEMIA. J. Physiol., Oct. 1967, 192(3), 575-593. (National Coal Board, Medicine Dept., University of Edinburgh, Edinburgh, Scotland).

The cardiovascular responses to sustained contractions at tensions from 5 to 30% maximal voluntary contraction (MVC) have been examined. At 5 and 10% MVC blood pressure, heart rate and forearm blood flow all reached a steady state during the contraction; post-exercise hyperaemia did not show peak flows higher than those found during exercise. At tensions of 20 and 30% MVC, none of the measurements showed a steady state during the contractions, but increased steadily throughout the contraction; post-exercise hyperaemia characteristically showed peak flows in excess of any flow measured during contractions. The results obtained at a tension of 15% MVC did not show a steady-state during the contraction but the following hyperaemia showed a similar pattern to that seen at the lower tensions. Digital compression of the brachial artery after sustained handgrip contractions for periods of 3 or 6 min after the contraction ended resulted in only a small reduction, on average by 5-15%, of the post-exercise hyperaemia. Consideration of the evidence leads to the view that in physiological circumstances the post-exercise hyperaemia following sustained contractions bears a close relationship to the metabolism of the active muscles.
R 19

33,234
Lind, A.R. & McNicol, G.W. CIRCULATORY RESPONSES TO SUSTAINED HAND-GRIP CONTRACTIONS PERFORMED DURING OTHER EXERCISE, BOTH RHYTHMIC AND STATIC. J. Physiol., Oct. 1967, 192(3), 595-607. (National Coal Board, Medicine Dept., University of Edinburgh, Edinburgh, Scotland).

The cardiovascular responses to sustained hand-grip contractions at 20, 30 and 56% maximal voluntary contraction (MVC) were measured in subjects who were engaged in treadmill walking at three different rates with oxygen intakes of 1.1, 1.7 and 2.8 liters per minute. The increments in heart rate and blood pressure at tensions of 20 and 30% MVC were similar at all rates of walking, but the response to a contraction at 50% MVC was lower at the hardest work rate than at the two easier rates. When two or more muscle groups contracted at the same relative tension, the increments in heart rate and blood pressure were the same, whether they contracted separately or together. When two or more muscle groups contracted simultaneously at different relative tensions, the increments in heart rate and blood pressure were the same as when the muscle group, at the higher relative tension, contracted separately at that tension. The blood flow to a muscle engaged in sustained contraction was increased when a second muscle group contracted at a higher relative tension.
R 13

33,235
Pugh, L.G.C.E. ATHLETES AT ALTITUDE. J. Physiol., Oct. 1967, 192(3), 619-646. (Human Physiology Div., National Institute for Medical Research, Hampstead, London, England).

Six international middle-distance runners were investigated during four weeks in England and during a similar period in Mexico City (2270 meters (7450 feet)). In 3-mile (4828 meters) time trials at 2270 meters the increase in time taken by four subjects compared with sea level was 8.5% on the fourth day and 5.7% on the twenty-ninth day. There was thus a gain of 2.8% or twenty seconds in time associated with acclimatization. In 1-mile (1609 meters) time trials the times were increased by 3.6% in the first week at altitude and by 1.5% in the fourth week. The improvement amounted to 2.1%, or 4.9 seconds. In 5-minute maximum exercise on the ergometer maximum oxygen (O_2) intake for six subjects at altitude was reduced by 14.6% on the second day and 9.5% on the twenty-seventh. Only one subject showed no change in maximum oxygen intake ($\dot{V}_{O_2,max}$) with time spent at altitude. Although $\dot{V}_{O_2,max}$ was persistently reduced at altitude work rates finally exceeded sea-level values, owing to increased over-all efficiency. Forty-minute recovery O_2 intakes after 5-minute maximum exercise averaged 17.35 liters at sea level and 17.53 liters at altitude. Mean values from 40th to 50th minutes were within ± 7% of pre-exercise values. . .ial tests at increasing loads yielded a straight-line relation between O_2 intake and work rate over a wide range of work rates at sea level and at altitude. Heart rate and ventilation for given work intensity were maximal in the first 2-10 days at altitude and thereafter declined. Capillary HbO_2 saturation fell from 93% at rest to 67% in maximum exercise. The corresponding alveolar gas tensions were P_{A,O_2} (alveolar oxygen pressure) 89 mm (millimeter) Hg (mercury), P_{A,CO_2} (carbon dioxide) 24 mm Hg. About half the total unsaturationin maximum exercise was explained by the Bohr effect. In six of eight pairs of determinations $\dot{V}_{O_2,max}$ measured on the ergometer was within ±0.15 liters per minute of $\dot{V}_{O_2,max}$ measured on the running track. Nevertheless, it was not possible to predict running performance from the measurements. R 45

33,236
Ardill, B.L., Bannister, R.G., Fentem, P.H. & Greenfield, A.D.M. CIRCULATORY RESPONSES OF SUPINE SUBJECTS TO THE EXPOSURE OF PARTS OF THE BODY BELOW THE XIPHISTERNUM TO SUBATMOSPHERIC PRESSURE. J. Physiol., Nov. 1967, 193(1), 57-72. (Physiology Dept., St. Mary's Hospital Medical School, London, England).

Observations are reported on the effects of exposure of parts of the body below the level of the xiphisternum of supine subjects to a pressure 70 mm Hg below atmospheric for one min. The stress on the circulation was greater than when parts below the iliac crests were similarly exposed. Heart rate increased by 15-20 beats/min, there was a sustained fall in arterial blood pressure, and forearm blood flow fell profoundly and in some subjects was reduced to below 0.1 ml./100 ml. min. In arms that were sympathectomized, or had received an intra-arterial infusion of an adrenergic blocking drug, the fall in forearm blood flow was much less and could be related to the fall in arterial pressure. When the suction was released there was a brief overshoot of arterial blood pressure and brief cardiac slowing. Forearm blood flow rose to reach a peak some 15 sec after the release. In the sympathectomized forearm on release of suction there was an immediate rise in blood flow which was proportionately much greater than the rise in arterial blood pressure. This rise was not due to circulating vasodilator substances or to the activity of cholinergic vasodilator nerves. The possibility that it was the result of a change in the tone of the resistance vessels occurring in response to the sudden change in transmural pressure is discussed.
R 19

33,237
Meltzer, H. & Ludwig, D. AGE DIFFERENCES IN MEMORY OPTIMISM AND PESSIMISM IN WORKERS. J. genet. Psychol., March 1967, 110(First Half), 17-30. (Psychology Dept., Washington University, St. Louis, Mo.).

The present study concerns itself with the age factor in memory dynamics, which has been completely neglected in the literature on the subject. The questions raised in this study expressed in a form of general hypotheses are: a) when asked to recall outstanding experiences in their lives, workers will express more pleasant than unpleasant memories; b) younger workers will show a greater predominance of pleasant over unpleasant memories than will older workers; and c) younger workers will be differentiated from older workers by the nature of memories expressed. The subjects used were 143 workers ranging in age from 20 to over 60. For purposes of this study, they were divided into five age groups. For some specific purposes the group was divided into two sections, above and below age 40. Each group studied, as well as the group as a whole, expressed significantly more pleasant memories than unpleasant. When the group was divided into only two groups, before and after 40, I was the younger group that reported more pleasant memories and the older group that reported more unpleasant memories. When the means for all the groups were compared on memory optimism, the results obtained indicated a peak of predominance of pleasantness over unpleasantness at the age of 30-39. There are some significant differences in the nature of pleasantness between the younger and the older groups. With the passing of time, changes take place in memory dynamics.
R 20

33,238
Sainn, R.M. ANXIETY AS A DRIVE: RECALL OF PERCEPTUALLY APPROPRIATE AND INAPPROPRIATE ITEMS. J. genet. Psychol., March 1967, 110(First Half), 45-48. (Stanford Medical School, Palo Alto, Calif.).

The study attempted to test the hypothesis that anxiety interferes with performance on perceptual tasks when incorrect, competing responses are of higher strength than the correct responses. High anxious subjects did show poorer recall than low anxious subjects on items where the learned response was in conflict with common associational tendencies. No differences were found when the items were those for which the learned response matched common associations. Further analyses of the data suggested that the differences were related to the better recall of the low anxious subjects rather than to any interference effects of high drive.
R 6

33,239
Friedman, H. ACTION PATTERNS IN THE AGED. J. genet. Psychol., June 1967, 110(Second Half), 153-157. (US Veterans Administration Hospital, Syracuse, N.Y.).

Previous studies suggested that normal senescent perceptual and memory functioning were characterized by a retrogression that could be comprehended within the genetic conceptual framework of Werner. The present study attempted to determine whether another aspect of ego functioning, action patterns, would be in support of the previous findings. The hypothesis was that healthy aged subjects would exhibit less differentiation and hierarchic integration in their action patterns than would a comparable group of young adult subjects. From a previous investigation of the structural aspects of action patterns in schizophrenia, three of the five tasks devised to reflect various aspects of primitive action were selected. These tasks, together with the vocabulary, digit span, and digit symbol tests of the WAIS (Wechsler Adult Intelligence Scale), were administered to a pool of 23 healthy, active, aged (A) subjects and a pool of 22 young adult (Y) subjects. On paper maze and circuitous route tasks the two groups were significantly different, with the aged group responding in a more primitive fashion than the younger group. On a HOUSE-HORSE task (spelling of the word by operation of appropriate toggle switches controlling lighted letters) no significant task performance as a function of age was found.
R 4

33,240
Kastenbaum, R. THE IMPACT OF EXPERIENCE WITH THE AGED UPON THE TIME PERSPECTIVE OF YOUNG ADULTS. J. genet. Psychol., June 1967, 110(Second Half), 159-167. (Cushing Hospital, Framingham, Mass.).

This investigation found that intimate contact with elderly people can stimulate at least a temporary reorganization of personal time perspective in younger people. Forty-six student nurses were tested before and after six weeks of intensive experience with geriatric patients; a control group of 46 student nurses training in a nongeriatric hospital was tested under similar conditions. Upon retest, the experimental group, as compared with the control group, showed significantly greater changes in personal life view as exemplified by increased range of temporal thought, increased future extension, and increased identification with older and more complex individuals.
R 16

33,241
Taub, H.A. PAIRED ASSOCIATES LEARNING AS A FUNCTION OF AGE, RATE, AND INSTRUCTIONS. J. genet. Psychol., Sept. 1967, 111(First Half), 41-46. (US Veterans Administration Hospital, Psychology Service, Syracuse, N.Y.).

Although studies of learning as a function of aging have indicated that old subjects require more trials and make more errors than young subjects, studies of rate of presentation (or stimulus duration) have suggested that a large portion of the age-related deficit can be accounted for on the basis of the available time for a response. Performance, especially as reflected by omission errors, is poorest for aged subjects at fast rates and improves significantly as rate decreases. On the other hand, it has been further suggested that the large differences in omission errors at the fast rates may not only be a function of insufficient time to respond, but may also be related to the fact that old persons appear to be more reticent about responding than young persons. The purpose of the present experiment was to determine if the requirement and encouragement to respond would reduce omission errors and produce an improvement in performance of old subjects. An analysis of variance of the total number of omission errors indicated that the main effects of age, rate of presentation, and the interaction of age with rate were the only significant sources of variance. Tests of the simple main effects within the age X rate interaction indicated that the old subjects made significantly fewer errors with eight seconds than with four seconds, while there was no difference between these rates for the young subjects. Further, the simple effect comparisons across age groups indicated that the old subjects made significantly more omission errors than the young subjects at the four-second rate, but the difference between the two age groups was not significant at the eight-second rate. The analysis of variance of the commission errors indicated that the only significant sources of variance were the main effects of age and rate of presentation. As with omission errors, response instructions had no effect upon commission errors either alone or in combination with the other variables.
R 8

33,242
Livson, N. TOWARDS A DIFFERENTIATED CONSTRUCT OF CURIOSITY. J. genet. Psychol., Sept. 1967, 111(First Half), 73-84. (Human Development Institute, University of California, Berkeley, Calif.).

The intent of this essay has been to call attention to the considerable differentiation readily apparent in the realm of curiosity behavior. The definition of curiosity offered here and the discussion of some of its possible subcategories are to be taken as illustrative of the kind of analysis required to guide experimental work on this deceptively simple and familiar construct. An uncritical and usually only implicit assumption that all behaviors that fall within the ordinary definition of curiosity are interchangeable, one with the other, can only lead to theoretical muddles and wholly spurious "contradictions" between experimental outcomes. Psychology has often run the course of assuming generality for a construct only to discover, after many years of fruitless theoretical and empirical debate, that an improved clarity and differentiation of definition would have led to more meaningful confrontations and to more effective research efforts than have been possible with existing conditions. Perhaps the present analysis will help to head off such a detour in the case of curiosity.
R 30

33,343
Kopp, K.K. A COMPUTER PROGRAM FOR TIME STUDY ANALYSIS. J. Industr. Engng., Feb. 1967, 18 (2), 147-152. (Management Engineering Dept., Pennsylvania State University, University Park, Penn.).

The computational and summarizing operations applied to the industrial engineer's time study data ordinarily consume time which could be used to better advantage. By using a computer for these data handling operations, much of this time can be saved. The article describes the layout and use of a time study observation sheet on which data can be recorded in form suitable for key-punching and computer processing. By reducing the time required for, and the cost of, time studies, application of time study techniques to maintenance and other indirect labor activities is made more attractive.
R 1

33,344
Bigman, L.A PERT/LOB: LIFE-CYCLE TECHNIQUE. J. Industr. Engng., Feb. 1967, 18(2), 154-158. (USA Management Engineering Training Agency).

This is a discussion of Program Evaluation and Review Technique/Line of Balance (PERT/LOB), a single, integrated management planning and control system which can be employed from preliminary planning stages through production and delivery of a given quantity of items. Basic elements, phases, actions, and procedure of the technique; its advantages, level of detail of planning and control; and the integration of cost planning and control to the basic technique are discussed.
R 3

33,345
Mansoor, E.M. AN INVESTIGATION INTO CERTAIN ASPECTS OF RATING PRACTICE. J. Industr. Engng., Feb. 1967, 18(2), 184-190. (Industrial Engineering Dept., University of Melbourne, Melbourne, Australia).

This article discusses the variances of certain factors and the effects of these on the accuracy and consistency with which a standard time can be set for a particular operation. The factors studied include the pace of the operator, the sex of the operator, the Time Study Engineer's rating ability, and the company from which the Time Study Engineer comes as an influence on his concept of standard.
R 15

33,346
Smalley, H.E. ANOTHER LOOK AT WORK MEASUREMENT. J. Industr. Engng., March 1967, 18(3), 202-210. (Georgia Institute of Technology, Atlanta, Ga.).

This article describes the state of the art of work measurement. Attitudes toward work measurement and the status of work measurement practices, the substantive nature of human work, and an axiomatic approach to work measurement theory are discussed.
R 47

33,347
Thelwell, R.R. AN EVALUATION OF LINEAR PROGRAMMING AND MULTIPLE REGRESSION FOR ESTIMATING MANPOWER REQUIREMENTS. J. Industr. Engng., March 1967, 18(3), 227-236. (US Office of Management & Organization, Bureau of the Budget, Washington, D.C.).

This article describes an analysis of linear programming and multiple regression as alternative estimating techniques for manpower requirements. The applicability of the usual regression model's assumption concerning a constant variance when applied to a work measurement situation is discussed. An alternative linear programming formulation, which makes better use of the observations, and one which provides a better fit to models with a constant term are presented. The use of additional managerial information to supplement the traditional information on resources used and units completed is suggested for linear programming. Included is a discussion of the applicability of dummy variables to both techniques permitting the analysis of variables which can only be classified and not measured on a continuous scale.
R 13

33,348
Andrews, G.B. & Barnes, R.M. THE INFLUENCE OF THE DURATION OF OBSERVATION TIME ON PERFORMANCE RATING. J. Industr. Engng., April 1967, 18(4), 243-247. (University of California, Los Angeles, Calif.).

This article describes an experiment carried out to study the influence of the duration of observation time on the accuracy with which experienced industrial engineers can rate a simple, well-defined activity. The results are discussed in terms of their implications for work sampling studies which include performance rating.
R 8

33,249
Secor, H.W. & Kogovsek, C.P. PDS WORK MEASUREMENT. J. Industr. Engng., April 1967, 18(4), 254-258. (Harris-Seybold Company, Harris-Intertype Corporation, Brooklyn, N.Y. & Clark Control Div., A.O. Smith Corporation, Milwaukee, Wisc.).

This article discusses the development and application of statistical data for increasing productivity of standards application and expanding the scope of measurement programs. Specifically, the Population Deviation Standards (PDS) statistical technique, which involves entire job or part operation measurement, is explained. By statistical grouping of existing job standards, accurately bounded PDS can be determined. Standards for additional jobs can be established through selection of the appropriate PDS.
R 1

33,250
Galbraith, J.R. SOME MOTIVATIONAL DETERMINANTS OF JOB PERFORMANCE. J. Industr. Engng., April 1967, 18(4), 266-271. (Sloan School of Management, Massachusetts Institute of Technology, Cambridge, Mass.).

This article operationalizes Victor Vroom's model of human motivation for industrial Engineers to use as a basis for assessing the behavioral consequences of altered work roles. Lying somewhere between economic man and the psychologists' "complex man," this model represents a fairly complete explanation of the variables that influence the motivation to produce. Usefulness of the model stems from two sources--its ability to aid in the understanding of human responses to incentives (human motivation) and to use the variables making up the model as dependant variables in order to assess consequences of organizational changes upon performance.
R 10

33,251
Kanon, D. APPLICATION OF NONPARAMETRIC STATISTICS TO INDUSTRIAL ENGINEERING. J. Industr. Engng., April 1967, 18(4), 272-276. (Industrial Engineering & Operations Research Dept., New York University, New York, N.Y.).

This article discusses applications of nonparametric statistics to industrial Engineering. A general problem in work measurement is used as the example, and use of the following tests is illustrated: Kolomogorov-Smirnov Two-Sample test, One-Sample Runs test, and the Kruskal-Wallis One-Way Analysis of Variance. These tests are computationally efficient; that is, they can achieve a considerable power efficiency at a minimum computation effort, and their use can be valuable as decision-making tools to the Industrial Engineer. The article includes a discussion of the advantages and disadvantages of using nonparametric statistics.
R 3

33,252
Betke, R.L. APPLICATION OF BEHAVIORAL SCIENCES TO THE PRACTICE OF INDUSTRIAL ENGINEERING. J. Industr. Engng., May 1967, 18(5), 293-298. (Thompson Ramo Wooldridge, Inc., Cleveland, Ohio).

This article describes an experiment in applying concepts of behavioral science to the practice of Industrial Engineering to implement a work measurement program. The purpose of the program was to control manpower and reduce costs through the analysis and measurement of the activities of 700 people by using the appropriate engineering techniques such as MTM, work sampling, and time study, with the understanding that human considerations can mean the difference between success and failure. The Industrial Engineers were given training to help them develop a behavioral science approach. As intended, the Industrial Engineer became a "consultant/advisor" rather than a "fixer." Results of the experiment showed that when the Industrial Engineer understands and uses behavioral science concepts, the traditional reactions to his efforts are changed, resulting in significant benefits for this company.
R 8

33,253
Moore, J.M. WHICH TEST STATISTIC?--A SCRAMBLE BOOK APPROACH. J. Industr. Engng., May 1967, 18(5), 300-305. (Industrial Engineering Dept., Northeastern University, Boston, Mass.).

The scramble book approach of programmed learning is utilized to assist in selecting an appropriate test statistic for testing hypotheses. The reader progresses through the scramble book or flow chart responding to inquiries about his particular test until he uncovers the statistic which is most efficient for his circumstances.
R 9

33,254
Salem, M.D., Jr. MULTIPLE LINEAR REGRESSION ANALYSIS FOR WORK MEASUREMENT OF INDIRECT LABOR. J. Industr. Engng., May 1967, 18(5), 314-319. (Industrial Engineering Div., Eastman Kodak Company, Rochester, N.Y.).

The use of multiple linear regression in work measurement of indirect labor is shown for the example of packing a finished product for distribution. A model with variables of number of orders, number of cases packed, weight of product, and volume of cases is used in the example.
R 7

33,255
King, W.R. THE SYSTEMS CONCEPT IN MANAGEMENT. J. Industr. Engng., May 1967, 18(5), 320-323. (USAF Institute of Technology, Wright-Patterson AFB, Ohio).

This article discusses the role of the systems concept in management. The author defines systems and the systems concept and discusses the primary changes it has brought about in the planning and execution functions of management. The systems approach to planning may be viewed as a logically consistent method of reducing a large part of a complex problem to a simple output which can be used by the decision-maker in arriving at a "best" decision. In the systems approach to execution, there has evolved the project manager who can cut across traditional functional lines for implementing decisions. The author also discusses the implications of the systems concept and qualifications a modern manager should have.
R 4

33,256
Torgersen, P.E., Hayes, H.E. & Ahruzzi, A. INTRODUCING QUEUEING CONCEPTS: A SIMULATION APPROACH. J. Industr. Engng., May 1967, 18(5), 328-333. (Oklahoma State University, Stillwater, Okla.).

This article describes a simulation exercise (game) for use as a teaching aid to introduce the concept of a queueing system. The exercise utilizes both the participation and competition features of a management game but does not permit sequential decision-making, since each participant can make and observe the effects of only one decision. Nevertheless, the game can be easily learned, can be easily administered without expensive equipment or extensive preparation, and it can be played in the classroom or individually. The queueing game described is simple but instructive.
R 8

33,257
Fein, M. A RATIONAL BASIS FOR NORMAL IN WORK MEASUREMENT. J. Industr. Engng., June 1967, 18(6), 341-346.

The definition of normal is critical to the process of work measurement and the establishment of time standards. This article discusses prevailing concepts of normal and suggests an approach that meets measurement criteria. Included in the discussion are the role the engineer should perform and the role that management, or management and labor should perform.
R 6

33,258
Whitehurst, C.H., Jr. ADMINISTRATION AND TECHNICAL COMPETENCE. J. Industr. Engng., June 1967, 18(6), 348-352. (Industrial Management Dept., Clemson University, Clemson, S.C.).

This article discusses the past and present formal undergraduate education of industrial Managers and suggests some possibilities for the future. The need for both administrative qualities and technical competence is pointed out.
R 8

33,259
Fox, P.D. & Kriebel, C.H. AN EMPIRICAL STUDY OF SCHEDULING DECISION BEHAVIOR. J. Industr. Engng., June 1967, 18(6), 354-360. (Stanford Research Institute, Stanford, Calif. & Graduate School of Industrial Administration, Carnegie Institute of Technology, Pittsburgh, Penn.).

There is a discussion of schedule sequencing and development of a model which describes certain aspects of the decision-making behavior of a manager in a New England manufacturing firm. The production scheduling occurs daily and can be programmed in the form of a decision rule. The model provides a mechanism for interpreting the manager's behavior with reasonable accuracy. Scheduling decision performance is discussed in terms of optimal and consistent behavior under the decision rule.
R 14

33,260
White, D.J. SETTING MAINTENANCE INSPECTION INTERVALS USING DYNAMIC PROGRAMMING. J. Industr. Engng., June 1967, 18(6), 376-381. (Administration Dept., University of Strathclyde, Strathclyde, Scotland).

The use of dynamic programming to provide a feasible computational algorithm for a wide class of inspection and maintenance problems has been presented, based on Pritsker's work. In practice, an adaptive approach, allowing for learning about statistical characteristics of each new cycle, is likely to be more realistic and the general theory related to this is presented, although it remains to carry out empirical work in such areas. In Pritsker's work, the method of computation, even with a fixed inspection interval, can be impracticable, and the dynamic programming approach results in a useful algorithm. When the inspection interval is dependent on the condition of the system, dynamic programming provides the only feasible computational algorithm of which the author knows (although it becomes a problem in the calculus of variations area, it is one matter to formulate it and an entirely different one to get a solution). Calculations in the adaptive area have not been entered into, but sufficient foundation now exists for computable solutions to be obtained in such areas.
R 9

33,261
Konz, S. DESIGN OF WORK STATIONS. J. Industr. Engng., July 1967, 18(7), 413-423. (Industrial Engineering Dept., Kansas State University, Manhattan, Kan.).

The results of five experiments on design of work stations are discussed. The first two experiments investigated the effects of work surface height on performance, the third investigated eye-hand coordination at two heights and directions of movement, the fourth investigated both height and direction of movement, and the fifth studied the effect of angle and direction (in versus out) of movement. It was found that the optimum height is about one inch below the elbow. The effect of angle at a height is important; the best moves for a right-hand movement are at 45 degrees.
R 48

33,262
Pomeroy, R.W. ADAPTING METHODS-MEASUREMENT TECHNIQUES TO EXTREME FLUCTUATIONS IN WORKLOAD: A CASE STUDY. J. Industr. Engng., July 1967, 18(7), 424-427. (Arthur Young & Company, New York, N.Y.).

There is a discussion of adapting methods-measurement techniques to industry which has extreme fluctuations in workload for achieving labor cost control and reduction. The example used here is the mail order industry. Overcoming objections of line personnel, reducing training requirements and costs, simplifying short-term staffing requirements, and evaluating results of a cost reduction program are discussed.

33,263
Noetti, J.K. & Brumbaugh, P. INFORMATION CONCEPTS IN NETWORK PLANNING. J. Industr. Engng., July 1967, 18(7), 420-435. (McDonnell Company, McDonnell Aircraft Corporation, St. Louis, Mo. & Engineering & Applied Science School, Washington University, St. Louis, Mo.).

Network planning techniques, communication theory, and information theory are briefly reviewed. Information theory and network planning techniques, specifically PERT (Program Evaluation and Review Technique) and CPM (Critical Path Method), are then integrated and applied to communication. Uncertainty values are calculated and related to the criticality of paths in the planning network. A method is given for comparing slack and uncertainty. Critical paths are calculated, using uncertainty values, for planning networks for the GEMINI space capsule system.
R 14

33,264
Danby, D.C. MINIMUM DOWNTIME AS A FUNCTION OF RELIABILITY AND PRIORITY ASSIGNMENTS IN COMPONENT REPAIR. J. Industr. Engng., July 1967, 18(7), 436-439. (Statistics Dept., Virginia Polytechnic Institute, Blacksburg, Va.).

This article presents a technique to develop the most efficient method of troubleshooting for a system or assembly that fails when the cause of failure is not immediately obvious. The technique uses probabilities of failure or relative weights assigned to each suspected component of an assembly that has failed, in a procedure for calculating the sequence of analysis or examination that will minimize the downtime. Determining failure probabilities and development of the procedure are described.
R 3

33,265
Mandl, S.G. & Nair, K.P.K. QUALITY INCENTIVE TO AN OPERATOR BASED ON ACCEPTANCE SAMPLING BY ATTRIBUTES. J. Industr. Engng., July 1967, 18(7), 440-441. (Indian Institute of Technology, Bombay, India).

Acceptance sampling by attributes is widely used in industry and, hence, such situations can be examined for suitability of introduction of quality incentive. The quality incentive presented in this work directly motivates the operator for quality improvement. Quality incentive should be introduced only in those situations where quality is controlled by operator factors, and other factors can be controlled or eliminated. The economic advantage of quality incentive will be greater in cases where costs of inspection and rejection are high. Quality incentive would result in better management-labor relations. Further, operator participation in job learning will be obtained more readily.
R 1

33,266
Lipton, P.R. AN APPLICATION OF FACTORIAL EXPERIMENTATION TO THE WORK MEASUREMENT PROCESS. J. Industr. Engng., Aug. 1967, 18(8), 449-455. (Sinclair Oil Corporation, New York, N.Y.).

This article describes an application of factorial experimentation to the work measurement process. The purpose of the research was to determine the feasibility of measuring both the ability of the operator to perform a prescribed task and the ability of the industrial engineer to judge the operator's capabilities. The problem was to analyze the results of an assembly line balancing project; data were tabulated so that one could identify lots, stations, days, time of day, and operator. It was found that people and tasks are not freely transferable, thus, it is possible to reject the concept of the "normal operator." Statistical tests included analysis of variance, the Duncan's Multiple Range Test, and the Bartlett's Test of Homogeneity. This study was conducted at a non-union company.
R 5

33,267
Hill, L.S. TOWARDS AN IMPROVED BASIS OF ESTIMATING AND CONTROLLING R & D TASKS. J. Industr. Engng., Aug. 1967, 18(8), 482-488. (Cost Analysis Dept., Rand Corporation, Santa Monica, Calif.).

This article discusses a practical framework for more positive management control of exploratory development programs, advanced development programs not incorporating subsystem design activities, and certain applied research programs. Relatively little attention has been directed toward improving control techniques for research and early development projects, yet such programs provide essential building blocks for future systems. Techniques, such as tree diagrams, are suggested to encourage productivity in research by providing increased visibility for the establishment, pursuit, and accomplishments of research objectives.
R 9

33,268
Engelman, L., Roach, H.H. & Schick, G.J. A COMPUTER PROGRAM FOR THE EXACT CONFIDENCE INTERVALS. J. Industr. Engng., Aug. 1967, 18(8), 495-498. (University of Southern California, Los Angeles, Calif.).

The establishment of exact confidence limits was derived for N binomial parameters by Springer and Thompson. Schick and Prior used their findings and gave numerical examples in order to compare this method with other previously published techniques. It is the object of this note to discuss a computer program developed for solution by the method of Springer and Thompson. Limitations to this program are also discussed.
R 4

33,269
Joss, E.J. & Polk, E.J. INTEGRATED MANAGEMENT INFORMATION SYSTEM. J. Industr. Engng., Nov. 1967, 18(11), 625-630. (Ordnance Research Lab., Pennsylvania State University, University Park, Penn.).

This article describes the Integrated Management Information System developed for the Navy's Weapon System Torpedo Mk 48 Program. This system for technical program control utilizes PERT/Cost techniques (Program Evaluation and Review Technique) to supply program schedule, cost, and performance information. It enables program managers to balance the objectives of time, cost, and technical performance as the weapon system evolves from concept formulation through development.
R 5

33,270
Doxie, F.T. & Ulion, K.J. HUMAN FACTORS IN DESIGNING CONTROLLED AMBIENT SYSTEMS. J. Industr Engng., Nov. 1967, 18(11), 632-639. (Western Electric Company, New York, N.Y.).

The design of controlled ambient systems with full awareness of the job to be done and the associated human factors, is discussed. The use of full-scale mock-ups to study operator movements within the enclosures is described. The theory is presented that, by using mock-up in the design effort, expensive modification can be avoided, and the interrelationship of the man, task, and the enclosure can be fully realized.
R 1

33,271
Carroll, J M. A METHODOLOGY FOR INFORMATION SYSTEMS ANALYSIS. J. Industr. Engng., Nov. 1967, 18(11), 650-657. (Lehigh University, Bethlehem, Penn.).

This article describes an analytical technique for gathering, in machine-readable form, the essential facts concerning a complex information system and systematically manipulating these data to provide a network diagram and an information handling profile for convenient critical review of systems design and operation.
R 6

33,272
Kons, S.A., Dickey, O.L., McCutchen, C. & Koe, B. MANUFACTURING ASSEMBLY INSTRUCTIONS: PART III. ABSTRACTION, COMPLEXITY, AND INFORMATION THEORY. J. Industr. Engng., Nov. 1967, 18(11), 658-667. (Industrial Engineering Dept., Kansas State University, Manhattan, Kan.).

This article describes three experiments in a series being carried out at Kansas State University to investigate the advantages and disadvantages of different forms of communicating manufacturing assembly instructions. Experiment Eight describes the pacing effect of tape recorded instruction. Experiment Nine compares photographs and a physical model versus a typed list as instructional media. Experiment Ten demonstrates that pictorial slides and a physical model are equivalent instructional media. Information theory is used to equate task complexity and compare media.
R 14

33,273
Tuckman, B.W. GROUP COMPOSITION AND GROUP PERFORMANCE OF STRUCTURED AND UNSTRUCTURED TASKS. J. exp. Soc. Psychol., Jan. 1967, 3(1), 25-40. (Rutgers-The State University, New Brunswick, N.J.).

Twelve three-man groups performed on an unstructured problem-solving task and on a structured role-following task. Half of the groups contained more abstract members than concrete members, the other half the reverse. Some of the groups were homogeneous on both abstractness (Abs) and dominance (Dom), others were homogeneous on one and heterogeneous on the other, or heterogeneous on both. Groups of intermediate heterogeneity (homogeneous: Abs; heterogeneous: Dom) performed most poorly on the structured task and best on the unstructured task while displaying the least amount of group structuring on both. Groups in which abstract subjects predominated outperformed groups predominantly of concrete subjects on the unstructured task; no differences occurred on the structured task. It was concluded that the effects of group composition are both additive and interactive, and are mediated by task demands as well.
R 16

33,274
Wolster, B. & Aronson, E. EFFECT OF EXPECTANCY OF TASK DURATION ON THE EXPERIENCE OF FATIGUE. J. exp. Soc. Psychol., Jan. 1967, 3(1), 41-46. (University of Minnesota, Minneapolis, Minn. & University of Texas, Austin, Tex.).

If a person is performing a fatiguing task and firmly expects that he must continue for a great length of time, feelings of extreme fatigue will have unpleasant consequences: Either he will terminate the task, or he will be miserable while completing it. Consequently, in order to avoid unpleasantness, people will suppress feelings of fatigue until their task is virtually complete, when they should experience a sharp increase in fatigue--since such feelings are no longer troublesome. In an experiment, subjects performed a series of fatiguing tasks. After a given number of tasks, those individuals who were led to believe that their chore was virtually at an end reported a greater increase in fatigue than those who expected that they must continue for a longer period of time.
R 5

33,275
Daniels, V. COMMUNICATION, INCENTIVE, AND STRUCTURAL VARIABLES IN INTERPERSONAL EXCHANGE AND NEGOTIATIONS. J. exp. Soc. Psychol., Jan. 1967, 3(1), 47-74. (University of California, Los Angeles, Calif.).

An experimental game based on the exchange of chips having costs and values for the subjects was developed. Variations in incentive and in type of communication were studied, as were the effects of requiring vs. making optional an explicit bargain about each exchange. Absence of any communication beyond the simple exchange of chips led to very poor performance and to large differences between the outcomes of the two members of dyads. Transmission of almost any kind of information was helpful. Where subjects could make requests of one another, outcomes were highest and differences between the dyad-members were small. Provisions for either optional or required bargains about exchanges led to reasonably high outcomes, but the lack of such a requirement enabling the lower-scoring subject within a dyad to avoid consistent domination by his higher-scoring partner. Among all but the no-communication dyads, outcomes improved as interaction continued. And in general, high incentive (pay for performance) led to more effective behavior. It did not do so when the experimental procedure allowed subjects to alternately take advantage of one another.
R 22

33,276
Kogan, N. & Wallach, M.A. RISKY-SHIFT PHENOMENON IN SMALL DECISION-MAKING GROUPS: A TEST OF THE INFORMATION-EXCHANGE HYPOTHESIS. J. exp. Soc. Psychol., Jan. 1967, 3(1), 75-84. (Educational Testing Service, Princeton, N.J. & Duke University, Durham, N.C.).

To determine the relative contribution of group interaction and information exchange to the risky-shift effect, female undergraduates were assigned either to interacting or to listening groups. Tape recordings of discussions of risk dilemmas were derived from the interacting groups. These taped discussions constituted the stimulus material for the listening groups. Thus, information was held fairly constant for interacting-listening pairs. Individual levels of risk taking measured prior to and after group discussion were used to assess the magnitude of the risky-shift effect. Although both group types manifested significant risky shifts, the interacting groups significantly exceeded the listening groups in extent of shift. It was concluded that informational processes alone could not fully account for the risky-shift phenomenon.
R 11

33,277
Messick, D.M. & Thorngate, W.B. RELATIVE GAIN MAXIMIZATION IN EXPERIMENTAL GAMES. J. exp. Soc. Psychol., Jan. 1967, 3(1), 85-101. (University of California, Santa Barbara, Calif.).

Three experiments were conducted to demonstrate the role of relative gain (the difference between a subject's score and that of another subject) as opposed to individual gain maximization processes in experimental two-person, two-choice games. In addition to demonstrating that relative gain maximization is an important goal in such situations, it is also shown that the predominant component of this process is associated with the avoidance of outcomes in which the subject receives less than another subject.
R 16

33,278
Ring, K., Braginsky, Dorothea, Levine, L. & Braginsky, B. PERFORMANCE STYLES IN INTERPERSONAL BEHAVIOR: AN EXPERIMENTAL VALIDATION OF A TYPOLOGY. J. exp. Soc. Psychol., April 1967, 3(2), 140-159. (University of Connecticut, Storrs, Conn.).

An experiment was conducted primarily in order to test some hypotheses relating performance style to interpersonal behavior. Three performance styles were analytically distinguished; they were labelled, p, r, and c. In general, p's are conceived to be persons whose interpersonal behavior is inept and unpolished; r's are viewed as interpersonally skilled and poised; c's are persons whose behavior is conventional and conforming--in the manner of chameleons. Eighty-seven male subjects, whose performance styles had been determined by a paper-and-pencil test, participated individually in the experiment in which they were required to imagine that they were salesmen whose task it was to sell to another subject (actually an experimental confederate) a fictional encyclopedia. The subjects were given beforehand one of three communications to read concerning their product: a highly favorable one, a mildly favorable one, or an unfavorable one. They were to use this information in any way they wished in devising a sales pitch. After a private rehearsal, subjects actually interacted with the customer (confederate) in the role of a salesman. The major findings of the experiment were the following: a) On the basis both of self-ratings and of behavior ratings, r's were the most effective salesmen, c's were next, p's were poorest. b) r's felt most comfortable during the interaction, c's were next, p's felt least comfortable; this rank-ordering held even with effectiveness differences partialled out. The results were interpreted as supporting a conceptualization of individual differences in interpersonal behavior based on the construct of performance style.
R 9

33,279
Kiesler, C.A. & De Salvo, J. THE GROUP AS AN INFLUENCING AGENT IN A FORCED COMPLIANCE PARADIGM. J. exp. Soc. Psychol., April 1967, 3(2), 160-171. (Yale University, New Haven, Conn.).

The forced compliance paradigm was extrapolated to a group setting. Two theoretically relevant variables were manipulated: the attractiveness of the group, and whether the group induced the subject to comply with its wishes. In all cases the subject disagreed with the group on an important issue. The two hypotheses, derived from dissonance theory, were supported: a) when the subject knew only that the group disagreed with him, then the more attractive the group, the more the subject was influenced by it; b) when the subject was induced to comply with the group's wishes, then the more attractive the group the less the influence.
R 14

33,280
Sigall, H. & Aronson, E. OPINION CHANGE AND THE GAIN-LOSS MODEL OF INTERPERSONAL ATTRACTION. J. exp. Soc. Psychol., April 1967, 3(2), 178-188. (University of Texas, Austin, Tex.).

Aronson and Linder (Aronson, E. & Linder, D. GAIN AND LOSS OF ESTEEM AS DETERMINANTS OF INTERPERSONAL ATTRACTIVENESS. J. exp. Soc. Psychol., 1965, 1, 156-171.) demonstrated that a gain in esteem resulted in greater liking for an evaluator than did constant positive esteem. Similarly, a loss in esteem lead to less liking for the evaluator than did invariate negative esteem. The present experiment attempted to apply these findings to the area of opinion change. The hypothesis was that the greatest amount of agreement with the communicator would be produced by a communicator who had previously expressed a gain in esteem for the recipient. The extent of agreement would be next highest in the case of constant positive esteem, followed by invariate negative esteem, with loss in esteem producing the least agreement. The results supported the hypothesis.
R 12

33,281
Teger, A.I. & Pruitt, D.G. COMPONENTS OF GROUP RISK TAKING. J. exp. Soc. Psychol., Apr 1967, 3(2), 189-205. (State University of New York, Buffalo, N.Y.).

In a partial replication of an earlier study, group risk taking was examined under conditions of discussion and information exchange. Group size was also manipulated. Unlike the earlier findings, a risky shift occurred in the information exchange condition, where the subjects only revealed to one another the contents of their prior decisions. A stronger risky shift was found when discussion was permitted. Risky shift was more pronounced the larger the size of the group. The extent of risky shift on a decision problem was found to be positively related to the initial level of risk on that problem. The results appear to support Brown's "value of risk" theory (Brown, R. SOCIAL PSYCHOLOGY. 1965. The Free Press, New York, N.Y.) of group risk taking more closely than any other theory.
R 13

33,281
Steiner, I.D., Anderson, J. & Hays, Rosemary. IMMEDIATE AND DELAYED REACTIONS TO INTERPERSONAL DISAGREEMENTS: SOME EFFECTS OF THE TYPE OF ISSUE AND ORDER OF RESPONSE. J. exp. Soc. Psychol., April 1967, 3(2), 206-219. (University of Illinois, Urbana, Ill.).

Reactions of subjects who answered a series of questions before hearing an accomplice's replies are compared with reactions of subjects who answered after hearing the accomplice's judgments. In experimental sessions both groups conformed on a cluster of questions dealing with a single ideological issue, but only subjects who answered after the accomplice conformed on miscellaneous factual questions. In private sessions a week later both groups adhered to the accomplice's views on miscellaneous factual questions, but neither group conformed on the ideological cluster. During experimental sessions, subjects who answered before the accomplice manifested greater tendencies to reject the accomplice and to underestimate disagreements. A week later the two experimental groups resembled one another rather closely on both of these nonconforming responses. This pattern of findings is consistent with the contention that a) response order affects ability to conform on miscellaneous factual questions (but not on ideological questions); b) response order has little or no effect on motivation to conform; and c) rejection and underestimation of disagreements are nonconforming responses that alleviate the stress engendered by interpersonal disagreements.
R 5

33,283
Koslin, B.L., Stoops, J.W. & Loh, W.D. SOURCE CHARACTERISTICS AND COMMUNICATION DISCREPANCY AS DETERMINANTS OF ATTITUDE CHANGE AND CONFORMITY. J. exp. Soc. Psychol., July 1967, 3(3), 230-242. (Princeton University, Princeton, N.J.)

In a design with two levels of source credibility, two degrees of attitude stability, and four levels of communication discrepancy, unstable subjects changed opinions of verticality and were differentially affected by source credibility, whereas stable individuals changed less and showed no prestige effect. For the stable subjects there was no prestige by discrepancy interaction, and trend analyses showed that opinion change was a curvilinear function of discrepancy. In an extension of the design (over seven discrepancy levels) for the unstable subjects, there was no source prestige by discrepancy interaction but significant main effects for source prestige and communication discrepancy. The trend tests showed that the attitude change curves for the highly and mildly credible sources were curvilinear when the discrepancy dimension was adequately sampled. A procedure was introduced to test for genuine, as opposed to situationally dependent, conforming change. Neither the unstable nor the stable subjects showed significant signs of genuine cognitive change. However, both evidenced opinion conformity which persisted in a posttreatment for the unstable but not the stable subjects. The results support social judgment theory, but are not in accord with dissonance predictions.
R 31

33,284
Chu, G.C. PRIOR FAMILIARITY, PERCEIVED BIAS, AND ONE-SIDED VERSUS TWO-SIDED COMMUNICATION. J. exp. Soc. Psychol., July 1967, 3(3), 243-254. (Communications Research Institute, Stanford University, Stanford, Calif.).

The persuasive effects of one-sided versus two-sided communications were retested in a nonwestern cultural setting. Perceived bias in the communication was hypothesized to account for the differential effects of the two styles of arguments. The impact of prior familiarity with the issue on the persuasive effects of the communication was examined. Subjects were 273 high-school students in Taiwan. Among the initially unfavorable, the one-sided arguments were found more effective when the subjects were not familiar with the issue, while the two-sided arguments were found more effective when the subjects were familiar with the issue. No such interaction appeared among the initially favorable. Regardless of the style of the argument or initial attitudes, the effects of communication were an inverse function of detection of bias. When detection of bias was held constant, the interactive effects of the one-sided and two-sided communications all disappeared.
R 12

33,285
Johnson, H.H. & Torcivia, J.M. GROUP AND INDIVIDUAL PERFORMANCE ON A SINGLE-STAGE TASK AS A FUNCTION OF DISTRIBUTION OF INDIVIDUAL PERFORMANCE. J. exp. Soc. Psychol., July 1967, 3(3), 266-273. (Loyola University, Chicago, Ill.).

In a test of predictions from a single-stage model of group problem-solving which considers initial performance, 263 college students solved a simple mathematical puzzle. They then solved the puzzle again individually or in one of four pair-groups: a) two initially right subjects (RR), b) one initially right and one initially wrong subject (RW), c) two initially wrong subjects whose initial answers were the same (WWs), and d) two subjects who had different wrong answers initially (WWd). Major results indicate that a) neither WWs nor WWd pair-groups improved their performance relative to W subjects working independently; b) performance of RR subjects did not decrease, and c) the relative certainty of correctness of initial solution was an accurate predictor of performance in RW pair-groups.
R 7

33,286
Streufert, S., Driver, M.J. & Haun, K.W. COMPONENTS OF RESPONSE RATE IN COMPLEX DECISION-MAKING. J. exp. Soc. Psychol., July 1967, 3(3), 286-295. (Douglass College, Rutgers-The State University, New Brunswick, N.J.).

The effect of changes in information load on response rate and its components in complex decision-making was investigated. Data were collected in a simulated decision-making environment permitting both integrated and unintegrated decision-making responses. It was found that a) strategic integrated decision-making first increases, then decreases with increasing information load; b) general unintegrated decision-making first decreases, then increases with increasing information load; and c) simple retaliatory decision-making increases with increasing information load. Total decision-making response rate generally follows the ascending input-output rate curve which has been established for a number of information-processing organisms.
R 9

33,287
Brock, T.C. COMMUNICATION DISCREPANCY AND INTENT TO PERSUADE AS DETERMINANTS OF COUNTER-ARGUMENT PRODUCTION. J. exp. Soc. Psychol., July 1967, 3(3), 296-309. (Ohio State University, Columbus, Ohio).

What attributes of prospective p aganda affect amount of anticipatory counterargumentation? One hundred and sixty-one introductory psychology students were asked to list their thoughts before reading a communication advocating an increase in tuition at their university. The manipulated independent variables were communication discrepancy (amount of advocated increase in tuition), whether or not the authors of the forthcoming communication intended to persuade, and the inclusion or not of a "priming" counterargument illustration. The principal dependent variable was a counterargument score obtained from coding precommunication thoughts written in the ten-minute interval before the communication was presented. A second dependent variable was subsequent acceptance of the communication. Counterarguing was increased by communication discrepancy ($p < .001$), by the perceived intent of the communicators to persuade ($p < .10$), and by the inclusion of a "priming" counterargument ($p < .001$). None of the interactions approached reliability. Statistically large inverse within-cell correlations between counterarguing and measures of communication acceptance suggested that prior counterarguing increased resistance to the communication. Examination of others' results relating to communication discrepancy and forewarning led to the recommendation that working theoretical models of communication and persuasion be broadened to include registration of warning and active defensive coping as integral phases of all social influence processes.
R 24

33,288
Zdep, S.M. & Oakes, W.F. REINFORCEMENT OF LEADERSHIP BEHAVIOR IN GROUP DISCUSSION. J. exp. Soc. Psychol., July 1967, 3(3), 310-320. (University of Hawaii, Honolulu, Hawaii).

The purpose of the present study was to determine whether the use of a sociometric questionnaire about leadership in a group discussion situation influenced the effectiveness of reinforcement of leadership behavior in that situation. A procedure was used in which a target person (TP) was reinforced for leadership behavior but with only half the groups having an early sociometric questionnaire. The results indicated that a) The reinforcement lights exerted a significant effect on TP's proportion of talking time and his leadership status as perceived by other group members, whether or not an initial questionnaire was used. b) The reinforcement effect on TP's talking time and leadership status was greater during the reinforcement session than during the extinction session, but a significant effect remained in the extinction session. c) Presence or absence of the initial questionnaire exerted no significant main or interactive effect on TP's leadership status. d) The only significant effect of presence or absence of the initial questionnaire on TP's proportion of talking time was the survey by session interaction, with TP talking proportionately less in the extinction than in the reinforcement session for both reinforced and nonreinforced groups. e) A suggested interpretation of this effect of the survey was made, involving heightened motivation for participation by ascendant subjects in the no-survey groups in the extinction session, resulting from their just having had the questionnaire for the first time, which would at that time emphasize for them that the experimenter was interested in leadership.
R 6

33,289
Von Bekesy, G. MACH BAND TYPE LATERAL INHIBITION IN DIFFERENT SENSE ORGANS. J. gen. Physiol., Jan. 1967, 50(3), 519-532. (Sensory Science Lab., University of Hawaii, Honolulu, Hawaii).

Experiments were done on the skin with shearing forces, vibrations, and heat stimuli and on the tongue with taste stimuli to show that the well known Mach bands are not exclusively a visual phenomenon. On the contrary, it is not difficult to produce areas of a decreased sensation magnitude corresponding to the dark Mach bands in vision. It is shown on a geometrical model of nervous interaction that the appearance of Mach bands for certain patterns of stimulus distribution is correlated with nervous inhibition surrounding the area of sensation. This corroborates the earlier finding that surrounding every area transmitting sensation there is an area simultaneously transmitting inhibition.
R 11

33,290
Malajian, J.D. PHOTOMETRIC INVESTIGATIONS OF SIMULATED LUNAR SURFACES. J. Astronaut. Sci., Jan.-Feb. 1967, 14(1), 1-12. (Grumman Aircraft Engineering Corporation, Bethpage, N.Y.).

An experimental attempt is made to infer certain physical properties of the lunar surface from terrestrial specimens that reproduce the lunation curves of the Moon at all viewing angles. An improved photometer capable of examining areas about an order of magnitude larger than previously examined is used to measure the brightness-phase relationship of a number of granular, vesicular and dendritic specimens. Good agreement with the lunar photometric curves at 0°, 30° and 60° longitudes is obtained with fine powders, coarse volcanic cinders, furnace slags, scoriae, sea corals, meteorites, etc. The results confirm previous findings with regard to the low albedo and high porosity of the lunar surface but go beyond them in indicating that it is no longer necessary to postulate a layer or veneer of fine dust on the moon in order to account for the lunar photometric data. "Macrorough," cohesive specimens satisfy these data equally well when they are sufficiently dark and porous and are examined by a "large" photometer. The new photometric models are compatible with the apparently dust-free, "underdense-hard" surface revealed by Lunar and Surveyor close-up photographs of the moon.
R 25

33,291
Schussel, G. CHARACTERISTICS AND PROBLEMS OF AEROSPACE COMPANY MANAGEMENT. J. Astronaut. Sci., Jan.-Feb. 1967, 14(1), 27-34.

The primary purpose of this article has been to try to shed some light on those unique problems of management that executives encounter in the aerospace/defense industry. These unique characteristics are an outgrowth of the type of customer that the industry has and the resulting market place and requirements dictated by this customer. The products of the industry are certainly technologically unique and correspondingly, the type of personnel skills required to produce these products are unique because of their level of sophistication. While the aerospace/defense procurement system has major shortcomings and problems, it has successfully passed the most important test of all: success. An evaluation of U. S. technology and power can only result in the true claim that the U. S. is the most technologically advanced country in the world. This state of affairs is due in major part to the contributions made by the aerospace/defense industry. Many knowledgeable people feel that the status of the industry and its relationship with the government can only improve with time. Most experts do not consider the market for aerospace/defense products to be a growth market. These experts have been wrong in the past but even if the market for these products does not increase and remains relatively stable, the aerospace/defense industry will continue as the largest (by many criteria) industry in the U. S.
R 9

33,292
Myland, F.B. SOME OPERATIONAL CONSIDERATIONS OF AN ORBITING SPACE STATION. PART II. J. Astronaut. Sci., Jan.-Feb. 1967, 14(1), 35-46. (Rand Corporation, Santa Monica, Calif.).

The first part of this article (which appeared in the last issue of the Journal) was a discussion of a method for determining the payload availability for experimental purposes in a space station operating in low earth orbit. In this second and concluding portion, some of the support operations for a space station are discussed, e.g., navigation and tracking, communication coverage, short recovery operations, and the effects of deploying the space station in different orbits.
R 1

33,293
Leitmann, G. & Mon, G. SOME GEOMETRIC ASPECTS OF DIFFERENTIAL GAMES. J. Astronaut. Sci., March-April 1967, 14(2), 56-65. (University of California, Berkeley, Calif.).

This paper is an introduction to a theory of differential games, that is, two-person zero-sum games for which the rules of play are differential equations. Optimality is defined by the usual saddlepoint condition. It is shown that optimal trajectories in cost-augmented state space lie on surfaces which separate trajectories for which only one or the other player plays optimally. This separation property is utilized to derive necessary conditions for optimality for a restricted class of problems. A simple example is discussed.
R 15

33,294
Escobal, P.R. & Affatati, O.A. RISE AND SET TIME OF AN INTERPLANETARY SPACE VEHICLE. J. Astronaut. Sci., July-Aug. 1967, 14(4), 175-182. (TRW Systems, Thompson Ramo Wooldridge, Redondo Beach, Calif.).

The astrodynamic problem concerned with the visibility of a non-eclipsed interplanetary vehicle from an Earth ground station is undertaken in this paper. A geometric relationship, called the interplanetary rise-set function, is developed in order to provide a compact method of determining whether line of sight visibility is possible. The rise-set function is exact and includes the effects due to the geometric flattening of the Earth. It is shown that a negative value of the oscillatory rise-set function implies space vehicle visibility. The rise-set function accounts for the movement of the Earth about the Sun, the rotation of the Earth about its axis and the motion of the space vehicle. It is shown that an accurate solution to the rise-set function is possible in closed form via suitable assumptions. The approximate solution reduces the problem of determining the rise-set times to the solution of a quartic equation. If further refinement is desired, the quartic can be solved again to provide a high accuracy rise-set time. The quartic solution can also be used to provide an estimate of when the interrogation of the exact rise-set function should be made in the future. Due to the construction of the rise-set function, it can be used to determine the relative visibility of any celestial object moving in a heliocentric orbit. Some numerical results are included.
R 6

33,295
Seitz, R.L. FUTURE MANNED PLANETARY MISSIONS. J. Astronaut. Sci., Sept.-Oct. 1967. 14(5), 200-211. (TRW Systems, Thompson Ramo Wooldridge, Redondo Beach, Calif.).

Potential manned planetary missions are discussed in the context of extension of the present space exploration program. Missions discussed include early flybys and eventual manned landings. Possible mission modes and vehicles are described, and critical areas of technology are identified.
R 3

33,296
Soffen, G.A. & Sloan, R.K. LIFE DETECTION BY VISUAL IMAGING. J. Astronaut. Sci., Sept.-Oct. 1967, 14(5), 218-224. (Jet Propulsion Laboratory, Pasadena, Calif.).

A discussion is presented of the possible use of visual techniques for scientific investigations on Mars. For early missions, the data capability is one of the strongest limitations in performing visual experiments. The optics, use of telemetry, photometric techniques, and microscopy that will be employed are currently being developed. Interpretation of optical phenomenon is highly subjective and depends upon terrestrial analogues of geological and biological models. Variants from these might be unrecognizable. Macroscopic observation requires selection of spatial and angular coverage, horizon profile coverage, and depth. Spectral filtration could reveal color and spectral reflectivity changes, interpretation of landscape, and possible biological presence. In the immediate vicinity of the spacecraft, higher resolution is possible. It is conceivable to lower a device onto the surface, such as a very low power microscope. For examination of particles of 1-1,000 microns, it is necessary to obtain a sample for processing and selection for the microscope. A variety of illumination techniques, wavelength variation, and optics are possible, but the major problem is the processing, discrimination, and interpretation of the data. A simple abbreviated one and a more complex flying spot automated microscope have been developed and are discussed. Special related ideas, such as detection of motion, and microspectrophotometric techniques in the ultraviolet and infrared ranges, are mentioned.

33,297
Brabets, R.I., Marsh, C.K. & Klein, M.J. OZONE MEASUREMENT SURVEY IN COMMERCIAL JET AIRCRAFT. J. Aircraft, Jan.-Feb. 1967, 4(1), 59-64. (IIT Research Institute, Chicago, Ill.).

The purpose of this survey was a) to measure accurately ozone concentration in commercial jet aircraft cabins and/or flight crew compartments on flights above 25,000 ft in order to obtain a 12-month statistical evaluation with emphasis on seasonal and meteorological correlations, and b) to locate and chart the ozone-enriched air masses in order to obtain further meteorological correlations and to establish any abnormal conditions that result in exposure to large ozone concentrations. The ozone concentration in aircraft was measured during 285 commercial jet flights between September 1, 1962 and August 31, 1963. These flights ranged over all segments of the United States and included sections of Canada and the North Atlantic. All fleet of commercial jet aircraft currently employed by air carriers were monitored. The ozone measurements recorded on each flight were evaluated, and the data were correlated graphically to show seasonal variations. The maximum continuous ozone exposure encountered on a domestic flight was 20 or more parts per hundred million (pphm) by volume for 140 min; the maximum on a northern flight was between 20 and 30 pphm for 4 hr; the highest concentration encountered was 35 to 40 pphm for 20 min. The most significant finding was that little or no ozone was detected on flights below the tropopause. At or above the tropopause, the internal concentration was usually above 5pphm; in most cases it was above 10 pphm.
R 17

33,298
Heffner, J.W. [illegible]. RADIATION DOSE RATES IN THE EARTH'S ATMOSPHERE. J. Aircraft, Jan.-Feb. 1967, 4(1), 65-72 (North American Aviation, Inc., Downey, Calif.).

This paper presents a calculation of nuclear radiation dose rates within the earth's atmosphere due to natural space radiation. Two conditions are considered--active sun and quiet sun. The active sun environment includes depressed galactic (cosmic) radiation fluxes and solar flare radiation based upon a model similar to the Bailey model event. The quiet sun environment includes only the nondepressed galactic radiation. The spectra for both environments were truncated at the geomagnetic cutoff energy for the undisturbed field. Atmospheric attenuation was taken into account by using simple range-energy relations. Asymptotic nuclear reaction cross sections were used to calculate cascade and evaporation secondary fluxes. Gibson's flux-to-rad-dose conversion function and Rossi's RBE-LET (relative biological effectiveness-linear energy transfer) relationship were used to yield rad and rem dose rates. In this way, dose rates as a function of altitude (10,000-100,000 ft) and geomagnetic latitude (0-90°) for both active and quiet sun conditions were obtained. The significance of the dose rates obtained for passengers and crew members of the Supersonic Transport (SST) is discussed.
R 28

33,299
Gehan, R.A. & Sicilioni, F.A. LANDING TASK AND PILOT ACCEPTANCE OF DISPLAYS. J. Aircraft, March-April 1967, 4(2), 141-145. (Serendipity Associates, Chatsworth, Calif.).

The results of an analytical study of the landing task and an empirical study of pilot preferences of displays for landing in reduced weather minima suggest the following criteria for display evaluation. The information content of the display should allow one to initiate the final approach; to achieve departure and to know of departure from the glide angle; to maintain angle of attack, sink rate, roll attitude, and course; to determine crab angle, when to initiate flare, and heading during rollout. The presentation should be a compensatory display, a simple pictorial indication of the landing situation, and should be on the windscreen. The display should provide redundant but independent information, require a minimum of user-supplied information, utilize a maximum of gain, provide for removal of a malfunctioning element, and be useful in other phases of landing. Alignment and other adjustment prior to use should be simple to accomplish and should be followed by a simple, foolproof checkout procedure.
R 11

33,300
Durar T.S. & Wesicko, R.J. FACTORS INFLUENCING GLIDE PATH CONTROL IN CARRIER LANDING. J. Aircraft, March-April 1967, 4(2), 146-158. (Systems Technology Inc., Hawthorne, Calif.).

The carrier landing process involves the interaction of ship motions, the optical landing system, the pilot/aircraft combination, air wake disturbances, and the Landing Signal Officer. Mathematical models for these elements are discussed, and methods are presented for determining operational performance indices from terminal landing error dispersion data. A new concept is described for stabilizing the optical landing system against carrier deck motions, which represent one of the most significant obstacles to safe aircraft recovery. Termed "compensated-meatball stabilization," this technique considers the dynamics of the carrier landing system elements and optimizes the Fresnel lens logic scheme for increased landing performance. Simulator experiments were performed to determine the potential accident rate reduction with this stabilization method, and the major results are presented. A significant interaction exists between an aircraft design parameter, related to the lift curve slope, and the optical landing system stabilization. The fundamental factors limiting terminal performance are described and several basic solutions to the problem are presented.
R 18

33,301
Bjaevenes, K. & Schoal, T. MASKING OF SPEECH BY "WHITE" AND "PINK" WIDE-BAND NOISE. J. Auditory Res., Jan. 1967, 7(1), 31-34. (Institute of Physics, University of Oslo, Oslo, Norway & Audiological Lab., Ullevål sykehus, Oslo, Norway).

Twelve normal-hearing adults were given Norwegian monosyllable intelligibility tests in quiet, and with both white (equal power/cycle) and "pink" (equal power/octave) noise at three levels, 45, 65, and 85 db as measured in a 6-cc coupler on the "A" scale of a sound level meter. Neither noise changes the shape of the speech perception curve, but the masking effect of "pink" noise is 1—4 db greater, and yields the same slope of the speech perception curve as the quiet condition; furthermore, the increase in masking with increased noise intensity is linear with "pink" noise. For these reasons, "pink" noise seems to be preferable as a masker of speech.
R 1

33,302
Jauhiainen, T., Häkkinen, V., Lindroos, R. & Raij, K. ON PITCH AND LOUDNESS INTERACTION. J. Auditory Res., Jan. 1967, 7(1), 41-46. (Institute of Physiology, University of Helsinki, Helsinki, Finland).

Pitch and loudness interaction was studied in 18 normal-hearing young adults over the frequency range 0.5—4 kc/s. An additive type of interaction is shown to increase with increasing frequency range. The assumption is presented that additive interaction is associated with a place theory of frequency coding on the cochlear partition.
R 16

33,303
Jauhiainen, T., Häkkinen, V., Lindroos, R. & Raij, K. CHANGES IN AUDITORY DISCRIMINATION CAUSED BY HYPNOTICALLY INDUCED MUSCULAR TENSION. J. Auditory Res., Jan. 1967, 7(1), 47-52. (Institute of Physiology, University of Helsinki, Helsinki, Finland).

Measurements of pitch and loudness discrimination were conducted with 20 young adults in various states of cerebral arousal. Hypnotic suggestions of muscular tonus, and of relaxation, were used to induce changes in arousal. Under muscle tonus, improvements in pitch discrimination, but not in loudness discrimination, were obtained. The effect was hypothesized to take place by way of certain inhibitory mechanisms involved in sharpening frequency response in the auditory neural pathways.
R 26

33,304
Macro, J.A. & Chyatte, C. AUDITORY-TACTUAL RIVALRY: VERIFICATION OF A GRADIENT PREDICTED THROUGH BRAIN BLOOD-SHIFT THEORY. J. Auditory Res., Jan. 1967, 7(1), 53-57. (Psychology Dept., DePaul University, Chicago, Ill.).

Twenty-six adults were examined for auditory acuity at 500 c/s, with and without electric shock applied to various parts of the body. Shock intensity was varied to keep the aversive quality approximately constant. The results tend to confirm a brain blood-shift theory: stimulation of one part of the brain will draw blood from other parts and elevate sensory thresholds. In this study relatively intense tactual stimulation (electric shock) interfered with auditory function, deterioration in auditory acuity tending to vary in keeping with the cephalocaudal arrangement of the somatosensory cortex.
R 14

33,305
Martin, F.N. A SIMPLIFIED METHOD FOR CLINICAL MASKING. J. Auditory Res., Jan. 1967, 7(1), 59-62. (Speech & Hearing Center, Brooklyn College of the City University, Brooklyn, N.Y.).

The operations of audiometric masking, whether with AC, BC, or SRT, can be made significantly simpler once a preliminary calibration of the masking unit in terms of effective masking is carried out.
R 4

33,306
Nickling, S. HEARING TEST PATTERNS IN NOISE INDUCED TEMPORARY HEARING LOSS. J. Auditory Res., Jan. 1967, 7(1), 63-76. (Otago University Medical School, Dunedin, New Zealand).

A battery of supplementary pure-tone hearing tests was applied at 4 kc/s to 14 ears before and after noise exposure to induce temporary threshold shift (TTS). The only test which after exposure gave constantly positive results, sufficient to be of clinical significance, was that for recruitment, which was, on the average, of a straight-line type and apparently complete about the 85-db hearing level. The standard SISI (Short Increment Sensitivity Index) test at 20 db above threshold was Negative in all post-exposure ears, except for one Questionable ear, but applied at 60 db above threshold it gave a high proportion of Positive scores. Small changes from pre-exposure to post-exposure were apparent at experimental level in tests for: a) adaptation, b) narrowing of the fixed-frequency Békésy C trace, and c) depression of the sweep-frequency Békésy C relative to the I trace. There was a strong correlation between the results of these three tests, with adaptation probably the common linking factor. In all tests except that for recruitment, the post-exposure findings appeared to be an exaggeration of a property already present in the normal ear, the degree of exaggeration being related to the size of the shift induced. The possibility is suggested that only loudness recruitment and perhaps some reduction in intensity difference limen stem from hair cell malfunction and those small changes apparently related to auditory adaptation may originate in some more central lesion responsible for a fraction of the total loss.
R 10

33,307
Hollien, H. & Thompson, C.L. A GROUP SCREENING TEST OF HEARING. J. Auditory Res., Jan. 1967, 7(1), 85-92. (Communication Sciences Lab, University of Florida, Gainesville, Fla.).

A pulse-tone group screening test using conventional audiometric equipment was given manually to 234 college students in groups of up to twenty. The pulse-groups descended from 45-15 db Hearing Level (HL) (re A.S.A. 1951) at 0.5, 1, 2, 4, and 8 kc/s. No known cases of hearing loss were missed by group screening, and only four cases of "false-fail" appeared. A shortened and simplified form using the frequencies 0.5, 1, and 4 kc/s at 35, 25, 20 twenty HL was given to 1546 students (grades 3-12). The test took 16 min. Only the third grade pupils had trouble following directions, which included a large cardboard replica of the answer sheet and a flashed "Listen" light. High validity was found on a comparison of the results of 152 children given individual audiometry. On 526 children a retest showed that over 95% of all ears scored within ± 5 db, using the 20-35 db restricted range. In one group of 1020 children, a second group test for those who failed a first, reduced the false-fail rate from 6.6 to 1%.
R 5

33,308
McClellan, M.E. AIDS' SPEECH DISCRIMINATION IN NOISE WITH VENTED AND UNVENTED EARMOLDS. J. Auditory Res., J. '1967, 7(1), 93-99. (US Veterans Administration Center, Ft. Snelling, St. Paul, Minn.).

This study tested the prediction that persons with primarily high frequency hearing loss can discriminate better in noise when wearing a hearing aid with a vented earmold than when wearing an unvented earmold. Five male subjects with near-normal hearing from 0.25 to 1 and 35 db or more loss at 2 kc/s (ISO 1964) listened to PB (phonetically balanced) words delivered at 65 db SPL (sound pressure level) re 0.0002 µbar in the sound-field against a background of "speech noise" (+ 10 db S/N (signal-to-noise ratio)) while wearing a hearing aid with both vented and unvented earmolds. Subjects showed a mean gain in discrimination of practical significance (from 70.8 to 86.4) when wearing the vented earmold relative to their mean unaided discrimination score in noise. No gain in discrimination was observed when the unvented earmold was worn. The gain in discrimination effected by the vented earmold was explained as an improvement in S/N at the aided ear primarily as a result of changes in acoustic impedance. The small sample size dictates cautious generalizatio these findings.
R 3

Siegert, Ellen. Perceptual judgments of octave pure tones. J. Auditory Res., Jan. 1967, 7(1), 101-105. (Ohio State University, Columbus, Ohio).

Twenty-four college music students judged the tonal height of seven octave pure tones, from A_2 through A_7 where A_6 = 440 c/s, all of equal loudness. The largest number of errors occurred for the middle tones; thus, the greater accuracy occurred for the extreme tones. The largest percentage of errors (58.5%) were one-octave misses; two-octave errors were 10.7% of the total. A 2-sec burst of white noise between stimulus tones increased errors. Knowledge of the correct response for the preceding tone decreased error in judgment of the following tone. Errors of tonal height were more often higher than the true height with "no knowledge" than with "knowledge" of the true height of the previous tone.
R 14

33,311
Steiner, Sylvia. HAND PREFERENCE AS A VARIABLE IN BÉKÉSY AUDIOMETRY. J. Auditory Res., April 1967, 7(2), 129-132. (US Veterans Administration Hospital, Minneapolis, Minn.).

Fixed-frequency Bekesy tracings for interrupted and continuous stimuli at 0.5, 2, and 8 kc/s were obtained from 50 selected, hospitalized males who displayed no psychiatric, neurological, or hand-arm impairment. Ten patients were included in each of five decade age ranges between 30 and 80 years; each produced two series of Békésy tracings, one with his preferred hand and one with his non-preferred hand. Hand sequence was counter-balanced for each age group and one ear was tested for each patient. There were no differences between thresholds or between excursion widths produced with the preferred and non-preferred hands in any of the five age groups. Hand order was also found to be a non-significant variable.
R 2

33,312
Fletcher, J.L. & Loeb, M. THE EFFECT OF PULSE DURATION ON TTS PRODUCED BY IMPULSE NOISE. J. Auditory Res., April 1967, 7(2), 153-167. (USA Medical Research Lab., Fort Knox, Ky.).

Enlisted volunteers with normal hearing through 8 kc/s were given pre- and post-exposure Békésy audiometry through 18 kc/s. A Benson and Associates spark-gap generator produced two durations (36 and 92 μsec) of impulses at 166 db SPL (sound pressure level) as measured by a specially constructed microphone flat to 500 kc/s. On successive days, each subject was exposed to additional numbers of impulses until a PTS (permanent threshold shift) of 20 db was achieved. Duration was a significant parameter: 10-25 impulses at 92 μsec had about the same effect as 75-100 impulses at 36 μsec duration. With the longer duration there is more TTS (temporary threshold shift) at the lower frequencies, but for both durations a very broad frequency range is affected.
R 6

33,313
Butler, R.A., Keffler, S.K. & Naunton, R.F. THE ROLE OF STIMULUS FREQUENCY IN THE LOCALIZATION OF SOUND IN SPACE. J. Auditory Res., April 1967, 7(2), 169-180. (Surgery Dept., University of Chicago, Chicago, Ill.).

Listeners were required to locate tone-bursts and differently filtered noise-bursts on the horizontal plane. Stimulus frequencies within the range of 2 — 4 kc/s appeared further toward the median plane than tones either higher or lower in frequency. The amount of displacement was also dependent on the azimuthal position of the sound source, being greater for those sounds originating more peripherally. Even a noise-burst appeared displaced toward the center if its frequency composition was restricted to a range of 2 to 4 kc/s. In one substudy, sound pressure levels inside the ear canal were measured. The data suggested that when a tone appears displaced toward the median plane, the interaural intensity difference provided by this stimulus is nearly the same as that provided by the same tone when it does indeed originate near the median plane.
R 4

33,314
Altshuler, M.W. NEGLIGIBLE EFFECTS ON RESPIRATION OF DELAYED AUDITORY FEEDBACK OF BREATHING NOISE. J. Auditory Res., April 1967, 7(2), 181-185. (US Veterans Administration Outpatient Clinic, Philadelphia, Penn.).

The effects of delayed auditory feedback of respiration noises on breathing patterns were studied on two groups of ten normal-hearing males. One group received binaurally their own breathing noises delayed 0.18 seconds and the other group received binaurally a white noise. Both presentation levels were the same. A wet respirometer was used to record the breathing patterns before and after presentation of the stimulus. In both groups there were significant changes in the patterns in the form of increased amplitude of the breathing cycles. Changes observed in both groups were similar; thus noise level, not delay, induced the changes.
R 10

33,315
Van Houten, Patricia L. & Zenhausern, R. MEPROBAMATE AND ABSOLUTE AUDITORY THRESHOLDS. J. Auditory Res., July 1967, 7(3), 353-357. (St. John's University, Jamaica, N.Y.).

Ten young adult males were given 800, 1200, or 1600 mg of meprobamate, or placebo, in a double-blind study exploring both short-term (4 hrs) and long-term (1 wk) effects. Subjects yielded noise-masked thresholds at 1 kc/s by a yes-no procedure. Acute administration gave improvement (1.1—7.9 db S/N (signal-to-noise ratio)) in five subjects as compared with placebo, and decrement (1.1—5.05 db S/N) in five subjects. Chronic administration (800 mg/day for 3 wks) improved S/N by .1—5.17 db in five subjects as compared to a single dose.
R 9

33,316
Weber, B.A. & Milburn, Wm. O. THE EFFECTS OF A RHYTHMICALLY MOVING AUDITORY STIMULUS ON EYE MOVEMENTS IN NORMAL YOUNG ADULTS. J. Auditory Res., July 1967, 7(3), 259-266. (Speech Clinic, University of Michigan, Ann Arbor, Mich.).

When ten normal young adults were presented a 30-db pulsed 1-kc/s pure tone which appeared to move from ear to ear, they demonstrated lateral eye movements which could be distinguished from eye movements when no tone was presented. These differences could be noted both when the subjects were naive as to the purpose of the study and when they consciously attempted to keep their eyes from moving.
R 8

33,317
Stover, W.R. ELECTRONIC SPEECH PROCESSING METHODS FOR THE HEARING IMPAIRED. J. Auditory Res., July 1967, 7(3), 313-325. (Behavioristics Lab., HRB-Singer, Inc., State College, Penn.).

This paper briefly describes the effect of several electronic signal processing methods on the spectral characteristics of speech. The processing methods of spectrum filtering, frequency translation, and frequency-domain bandwidth compression are contrasted with that of time-domain bandwidth compression. These techniques are discussed from the viewpoint of a recent change in the conceptual approach to the correction of auditory deficiencies, based on the concept of utilizing fully the individual's residual hearing capability rather than attempting to compensate by selective amplification for frequency regions of low auditory sensitivity.
R 7

33,318
Archer, M., Rinzler, S. & Christakis, G. SOCIAL FACTORS AFFECTING PARTICIPATION IN A STUDY OF DIET AND CORONARY HEART DISEASE. J. Health soc. Behav., March 1967, 8(1), 22-31. (Department of Health, New York, N.Y.).

In a long-term prospective study of the effects of dietary modification on the incidence of coronary heart disease, the characteristics of the subjects were examined to determine whether differences existed between those who remained in the study and those who dropped out. Statistically significant differences were elucidated between these two groups in terms of a cosmopolitan-parochial orientation, some demographic characteristics and how the subjects viewed the study and their role in the research aims. The implications of these findings for future research and public health application of the overall study findings are discussed.
R Many

33,319
Simmel, Marianne. THE BODY PERCEPT IN PHYSICAL MEDICINE AND REHABILITATION. J. Health soc. Behav., March 1967, 8(1), 60-64. (Brandeis University, Waltham, Mass.).

The phantom limb of the amputee is a puzzling experience to the patients and is looked upon with suspicion by their families. A better understanding of the phenomenon and greater dissemination of information about it should facilitate post-operative adjustment. The phantom is a normal experience following amputation or sudden denervation of any structure having previously given rise to tactile-proprioceptive sensations. It is absent for congenitally missing limbs and those lacking sensation from birth. Its incidence rises with increasing age at amputation in childhood and reaches 100% at eight years. Gradual digital absorption in leprosy does not produce phantoms.
R 8

33,320
Knutson, A.L. FRAMES OF REFERENCE IN PUBLIC HEALTH COMMUNICATIONS. J. Health soc. Behav., June 1967, 8(2), 107-115. (University of California, Berkeley, Calif.).

Established frames of reference employing health-relevant content with public health professionals as subjects yield effects consistent with laboratory research. Studies illustrate the interplay of field structured and internally structured sets under varying experimental conditions. As one observes the ways frames of reference influence judgments of professional subjects regarding familiar content, the significance of the concept to health action becomes more apparent. Primary factors underlying the acceptance or rejection of established frames of reference were found to be the meaning given by the respondent to the communication, its personal or professional relevance, and the soundness or validity assigned to it.
R 11

33,321
Sweetser, D.A. ATTITUDINAL AND SOCIAL FACTORS ASSOCIATED WITH USE OF SEAT BELTS. J. Health soc. Behav., June 1967, 8(2), 116-125. (Boston University School of Nursing, Boston, Mass.).

To identify attitudes related to use of automobile seat belts which would be relevant to educational campaigns to increase use, three attitude scales were constructed. These were found to differ significantly between "high use" drivers, "low use" drivers, and those without seat belts. Correlation of these scales with use indicated that men found the "Seat belts are good equipment" theme the most relevant to whether to use seat belts; that women found the "Seat belts are safe to use" theme relevant, while men did not; and that mothers with children at home and a car to drive found the "Seat belts give peace of mind" theme the most relevant to seat belt use. Data are also reported on the effect on use of different kinds of passengers and different kinds of trips.
R 7

33,322
Safford, E.S. "THAT MAN MAY UNDERSTAND MORE FULLY AND LIVE MORE EFFECTIVELY": THE NATIONAL CENTER OF COMMUNICATION ARTS AND SCIENCES. J. Communication, March 1967, 17(1), 4-12. (Cahners Publishing Company, Denver, Colo.).

In this article the problems of coordinating and appropriately using the emerging technologies in communication are considered. The main functions of the newly-formed National Center of Communication Arts and Sciences are summarized: a) Provide the means to collect, coordinate and disseminate information about communication and knowledge transfer. b) Provide the means for undertaking or encouraging significant research in communications techniques and arts, and in the sciences of information transfer. c) Provide opportunity for improved and expanded interinstitutional, inter-governmental and inter-organizational efforts in communication research and application. d) Provide a center where scholars, students, and practitioners can meet for penetrating explorations of theories and concepts to utilize controlled communications environments. e) Provide a facility where advanced communication theory may be translated into effective, practical applications for use by the professions, business and industry, education and religion and governments.

33,323
Dance, F.E.X. SPEECH COMMUNICATION THEORY AND PAVLOV'S SECOND SIGNAL SYSTEM. J. Communication, March 1967, 17(1), 13-24. (Speech Communication Center, University of Wisconsin, Milwaukee, Wisc.).

This essay's purpose was to suggest an inductive process of total theory construction utilizing Pavlovian IISS (Second Signal System) theory as an example. The formation of a theory grid can be implemented by contributions from any and all fields which bear on speech communication behavior in the individual and in society.
R 17

33,324
Lundy, R.M., Simonson, N.R. & Landers, Audrey D. CONFORMITY, PERSUASIBILITY, AND IRRELEVANT FEAR. J. Communication, March 1967, 17(1), 39-54. (Pennsylvania State University, University Park, Penn.).

The effect of irrelevant fear on persuasibility and conformity was studied in two experiments. While irrelevant fear seems to facilitate the acceptance of persuasive messages, it does not increase the probability of yielding responses in a conformity situation. The relationship between conformity and persuasibility is discussed with respect to these results.
R 17

33,325
King, T.R. PROGRAMMED TEXTBOOKS IN COMMUNICATION. J. Communication, March 1967, 17(1), 55-62. (Florida State University, Tallahassee, Fla.).

This reviewer wrote to publishers who were known to have programmed materials in communications and asked them to submit any programs they would like to have reviewed in The Journal of Communication. This article describes these programs submitted by the publishers, indicating the populations for which they were designed, the programming techniques employed, and a brief statement of their content. The only proper method to use in evaluating a program is to test subjects who have worked the program. Since this technique was impossible, the reviewer gives his own estimate of the strengths and weaknesses of the various programs.
R 22

33,326
Bayless, O.L. AN ALTERNATE PATTERN FOR PROBLEM SOLVING DISCUSSION. J. Communication, Sept. 1967, 17(3), 188-197. (University of Denver, Boulder, Colo.).

This study examined the effect of three different patterns upon the outcome of problem-solving discussions. Twenty-four small groups, representing a total of 192 subjects discussed two policy problems, one more familiar, the other less familiar to the subjects. The results indicated that the pattern followed by the group had no significant relationship to the quality of the groups' "final" product. Significantly more ideas and more "good" ideas were produced during the middle stage of the discussion for the more familiar problem by groups utilizing an ideation-criteria (brain storming) pattern, while groups following a criteria-ideation (reflective thinking) pattern produced significantly more ideas and more "good" ideas for the less familiar problem. The subjects who discussed the more familiar problem indicated they were significantly more satisfied with their groups' decisions, revealed they communicated significantly better with other members of their groups, felt the procedure used by their groups had a significant bearing in assisting their groups reach a solution, and indicated that the pattern employed would be a significant aid for any group in accomplishing its tasks. Members of groups which used a criteria-ideation (reflective thinking) pattern felt the leadership in their groups was significantly more effective than did the subjects in other groups.
R 12

33,327
Browne, D.R. PROBLEMS IN INTERNATIONAL TELEVISION. J. Communication, Sept. 1967, 17(3), 198-210. (University of Minnesota, Minneapolis, Minn.).

This paper discusses the four major barriers to international communication via television: technical, economic, legal, and sociological-psychological.
R 12

33,329
Orr, D.B. & Friedman, H.L. THE EFFECT OF LISTENING AIDS ON THE COMPREHENSION OF TIME-COMPRESSED SPEECH. J. Communication, Sept. 1967, 17(3), 223-227. (American Institutes for Research, Washington, D.C.).

This paper has emphasized the importance of technology in today's educational practice and argued that time-compressed speech has a potentially highly significant place in our new technology of education. A brief experiment failed to confirm the effectiveness of listening aids in improving comprehension but did reconfirm the high degree of comprehensibility of compressed speech and its amenability to simple practice.
R 7

33,330
Gruner, C.R. EFFECT OF HUMOR ON SPEAKER ETHOS AND AUDIENCE INFORMATION GAIN. J. Communication, Sept. 1967, 17(3), 228-233. (University of Nebraska, Lincoln, Neb.).

The present study was designed to investigate further the effect of humor in informative discourse on audience information retention and speaker ethos. Four groups of 32 male upperclassmen served as subjects. The "serious" speech in this study was that on "listening" used by Kibler, except that part of the introduction, which might have been perceived as funny, was deleted. The speech had been validated by a panel of experts as an effective speech to inform, and was "highly readable" according to the Flesch formula. The same speech, with humor added, served as the "humorous" speech. A highly skilled speaker recorded each speech separately. The speaker and speech were evaluated by semantic differential technique in terms of authoritativeness, interest, character and seriousness. Information retention was measured by a multiple-choice test. Analyses of variance were used to compare the scores from the serious and humorous groups. Some tentative conclusions can be drawn from these data. Apparently the serious speech in this experiment was perceived as more serious than was the humorous speech. This difference seems clearly attributable to the inclusion of humor in the latter. The failure of the humor to produce greater or less information retention in the present study agrees with the findings of Taylor and Kilpela, but conflicts with those of Gibb. It is apparent that more research is needed on this point. The fact that the humorous speech received no higher interest ngness rating than the serious one should not be surprising; it was already a highly "readable" and interesting speech, so that humor could add little. The assumption is supported that a speaker who uses apt humor in informative discourse is more likely to be perceived by his audience as high in attributes of "character" than he would be if he does not.
R 15

33,331
Ruesch, J. THE SOCIAL CONTROL OF SYMBOLIC SYSTEMS. J. Communication, Dec. 1967, 17(4), 276-301. (University of California School of Medicine, San Francisco, Calif.).

Man created symbols in order to communicate. To make the process more efficient he organized a variety of institutions and charged them with the task of controlling symbolic systems used by individuals and groups. Among the systems used, speech, gesture, mannerisms, and attire are symbolic expressions of a more individual nature, while interior and industrial design, architecture, and fashion are examples of symbolic expressions of a more collective nature. But both individual and collective expressions have to be steered, directed, censored, and controlled if people are to understand one another.
R 62

33,332
Holder, H.D. & Ehling, W.P. CONSTRUCTION AND SIMULATION OF AN INFORMATION-DECISION MODEL. J. Communication, Dec. 1967, 17(4), 302-315. (Syracuse University, Syracuse, N.Y. & Baylor University, Waco, Tex.).

One of the critical assumptions made in this paper is that real human communication in a dynamic social-interaction system behaves in a Markov-like manner. The critical argument in this paper, then, is that the Markovian model requires one to focus directly on the mathematical properties and relationships inherent in a real communication system. Further, this paper directs attention onto the essential unity which can be found in communication theory, information theory, certain aspects of statistical mechanics, feedback control theory, and cybernetics when utilizing the general theory of the Markov process. Through computer simulation, it was possible in this project to specify in formal, mathematical terms a set of attributes and relations about information-decision process which matches closely what one intuitively may suspect to be the case, namely, that: a) The earlier a decision-maker encounters an information input which reinforces a particular alternative, the more impact (or "influence") this input will have on the decision process. b) The smaller the probability of any alternative the more this probability is weakened if it is challenged. c) The more the decision vector converges to an absorbing state (that is, the stronger the preference for a particular alternative) the harder it is for information which challenges this preference to check this convergence. d) The influence or impact of any one information input is related to the number of other inputs which reinforce the same alternative over a series of reconsiderations. e) Drastic changes in the transitional matrix and extreme shifts of preference do not occur through the influence of one or two information inputs. Rather, change is gradual and without sudden jumps. f) One communication contact which eventually pushes the transitional matrix into an absorbing state actually makes very little change in the probabilities of the matrix.
R 40

33,333
Geier, J.G. A TRAIT APPROACH TO THE STUDY OF LEADERSHIP IN SMALL GROUPS. J. Communication, Dec. 1967, 17(4), 316-323. (University of Minnesota, Minneapolis, Minn.).

On the basis of this study, it can be concluded that leadership emergence in small leaderless groups is a complex process, involving many factors. Several of those contributing factors that both affect and effect emerging leadership have been identified, but additional determinants of the role have yet to be discovered and reported. There is value in using a functional definition of the leadership role, a definition in which the leader is perceived as that individual member who most frequently assumes leadership function. This definition permits a more constructive study than does that which regards a "leader" as any member who initiates, encourages, or facilitates group ideas. At the same time, this study recognizes that there is no single leadership type of personality. One member might achieve leadership status because he has superior intellectual endowments which, in turn, place him considerably above his fellow members and make them depend on him. Another member might achieve leadership because he takes an interest in his fellow members and has a helpful attitude. This research acknowledges that leadership resides not exclusively in the individual, but in his functional relationship with fellow members and the goal accomplishment. This factor probably contributes to the discovery that members of small leaderless groups perceive both phasic development of leaders and negative factors. It is also important to note, however, that it was possible to classify certain factors that may be thought of as perceived traits that tend to result in leader rejection. In this sense, a trait approach to leadership may still have some merit in explaining the phenomenon of leader emergence in leaderless groups.
R 4

33,334
Ronco, P.G., et al. HUMAN FACTORS ENGINEERING BIBLIOGRAPHY. 1965 LITERATURE. VOLUME 3. Contract DA 18 001 AMC 1004(x), May 1967, 543pp. USA Human Engineering Labs., Aberdeen Proving Ground, Md. (Institute for Psychological Research, Tufts University, Medford, Mass.).

This bibliography is the third in a planned series of bibliographies of literature pertinent to the field of human factors engineering. It covers literature of 1965. This bibliography consists primarily of: a) an index to the human factors literature, and b) the annotated bibliography.

33,335
Miller, G.R. & Lobe, J. OPINIONATED LANGUAGE, OPEN- AND CLOSED-MINDEDNESS AND RESPONSE TO PERSUASIVE COMMUNICATIONS. J. Communication, Dec. 1967, 17(4), 333-341. (Michigan State University, East Lansing, Mich.).

The findings of this study generally indicate that, given a highly credible source, opinionated language has a greater persuasive impact than non-opinionated language, regardless of the relative open- or closed-mindedness of the message receiver. Apparently, added information about the source's attitude toward those who agree or disagree with his position on the message issue facilitates persuasion, rather than impeding it. In the case of closed-minded receivers, this result is consistent with theoretic predictions. Their greater reliance on authority and their greater concern with the rewards and punishments meted out by authority figures should lead closed-minded receivers to adjust their behavior to conform more closely with what they perceive to be the expectations of the highly credible source. The fact that opinionated language is also more effective for open-minded receivers is at odds with our original expectations. While it was originally assumed that remarks indicating the source's intolerance for those disagreeing with him on the issue might adversely affect open-minded receivers' perceptions of him, this was not the case. Rather, as with closed-minded receivers, these particular cues enhanced the effectiveness of the message. Perhaps the most parsimonious explanation of the results is that these explicit cues underscore the rewards to be derived by the receiver in return for accepting influence. Regardless of one's open- or closed-mindedness, such social reinforcers are likely to have a strong motivational component. The findings of this study support the use of opinionated language by highly credible sources.
R 7

33,336
DeVito, J.A. LEVELS OF ABSTRACTION IN SPOKEN AND WRITTEN LANGUAGE. J. Communication, Dec. 1967, 17(4), 354-361. (Hunter College, City University of New York, New York, N.Y.).

Samples of 8,000 words of oral and 8,000 words of written discourse, obtained from speech professors who had written extensively, were analyzed for the relative levels of abstraction. Oral language was found to be significantly less abstract and contained more finite verbs and less nouns of abstraction than written language. This study represents a beginning. Further research needs to be directed to exploring other approaches to the definition and measurement of abstraction level, utilizing other informants and forms of genres of discourse. Researchers will then be in a better position to formulate generalizations concerning abstraction level in language as well as generalizations about the processes of speaking and writing.
R 33

33,337
Feules, D. THE RELATION OF COMMUNICATOR SKILL TO THE ABILITY TO ELICIT AND INTERPRET FEEDBACK UNDER FOUR CONDITIONS. J. Communication, Dec. 1967, 17(4), 362-371. (Speech Dept., Ohio University, Athens, Ohio).

The purpose of this study was to explore two basic assumptions regarding interpersonal feedback: a) the good communicator is able to perceive and interpret reactions to his message by analysis of visual and auditory cues, and b) the good communicator can elicit interpretable visual and auditory cues from his audience. The major hypotheses were examined by: a) determining an interviewer's ability to predict the attitude of a group of interviewees under four conditions of stimuli: all cues available, visual cues only, auditory cues only, written material only and b) expert evaluation of his ability to ask questions that were in accordance with good interviewing technique. Sixteen interviewers and 48 interviewees were selected as subjects. The variable that had the most influence upon the accuracy of prediction was that of the topic upon which attitude was predicted. The feedback conditions under which the predictions of attitude were made produced no significant statistical difference in regard to accuracy. Also, the greater the need for social approval, the larger the discrepancy score for the interviewer, which corroborates other evidence that a lack of social involvement is a necessary prerequisite for making accurate judgements. There was no significant superiority for males or females as to their ability to predict the attitude of others in this study. There is no strong statistical evidence to indicate that there is a relationship between a person's ability to ask questions and his accuracy of prediction. There is a significant statistical relationship between communicator ability and the ability to ask questions; however, this is dependent upon the topic of the interview or speech. There is no significant statistical relationship between the ability to ask questions and the need for social approval. On the average, therefore, the good communicator is more capable of interpreting and eliciting feedback than the average to poor communicator.
R 4

33,338
Lynch, M.D. & Swink, Eleanor. SOME EFFECTS OF PRIMING, INCUBATION AND CREATIVE APTITUDE ON JOURNALISM PERFORMANCE. J. Communication, Dec. 1967, 17(4), 372-382. (University of Missouri School of Journalism, Columbia, Mo.).

The results in this study show that the performances of creative persons in communication writing tasks may be facilitated by general forms of priming and time for incubation. Evidence suggests that general forms of priming function in terms of structural rather than content combinations, but comparison of general and specific associative priming is needed. The pretask time interval was shown to enhance performance while in the Mednicks' study (J. Abnorm. soc. Psychol., July 1964, 69, 84-88) it did not; hence, time relationships and incubation need to be further explored.
A 21

33,339
Illuminating Engineering. IMPROVED HIGHWAY SIGNING FOR SAFER DRIVING. Illum. Engng., May 1967, 62(5), 298-304.

The illuminated sign began by someone's putting some light over a message. Development of fluorescent sources and plastics saw the lamps placed behind a translucent message. Improvements made over the years have been rather generally based on experience gained from a trial-and-error approach, since there have never been any established standards to follow. Now, however, a new development in the illuminated sign has come along, based on the application of the principles of illuminating engineering. Successful because it caters to the human eye, allowing for the way it sees best under varying conditions, it might be a starting point for establishing those much-needed standards.

33,340
Illuminating Engineering Society. CHOOSING LIGHT SOURCES FOR GENERAL LIGHTING. Illum. Engng., May 1967, 62(5), 319-323.

Some of the conclusions that can be drawn from a comparison of the characteristics of these light sources are obvious. For example, where initial cost is important, but the operating hours may be short and therefore the operating cost less important, where the degree of light control necessary is high, and the color acceptability is important, the incandescent lamp or the tungsten halogen lamp should be considered. Where long hours of operation are involved, where the initial cost is not a major consideration but can be amortized over the long life of the system, and where light of high color acceptability is needed the fluorescent lamp is a fine answer. For a combination of modest initial cost, long life and fair efficacy, the mercury lamp in the phosphor or plain version provides a lighting system that needs little maintenance over a long period of time. It offers some choice of color quality through the selection of the proper phosphor-coated type. There has been no mention of the comparative cost of lighting with these various sources and this is deliberate for two reasons: a) The number of assumptions that would have to be made to permit such a comparison would be so great as to make the resulting information almost totally useless, and b) Such cost comparisons are not within the province of the Illuminating Engineering Society. All that can be said is that the cost of light, per footcandle, drops as the source's lumen output, efficacy, life and maintenance increase, and rises as these values decrease.

33,341
Crouch, C.L. & Kaufman, J.E. PORTABLE LAMPS FOR HOME STUDY--A COMPARISON. Illum. Engng., Aug. 1967, 62(8), 475-481. (Illuminating Engineering Society, New York, N.Y.).

As a result of analyzing the photometric data, the photographs and the table, it appears that of the four lamps (BLBS, High-intensity, gooseneck, and metal-shade) and their positions (A--bulb centered over test plane and B--bulb located at side of test plane to avoid reflections) studied, only the BLBS lamp meets all performance requirements and would be suitable for use as a Table Study Lamp. The High-intensity lamp does not provide sufficient illumination either in footcandle level or distribution. Its shade is too dark, but the bulb is well shielded. Not enough light output is distributed upward to give a lighted room effect. Shadows are harsh and, in position A, shade the task at the left hand side. Veiling reflections are high in position A as shown by the bright images which hide the material to be read. The Gooseneck lamp, using a 40-watt bulb gives almost the same results as the High-intensity unit except shadows are not as dense due to the physically larger bulb and shade. The Metal-Shade unit provides proper lamp top shielding and diffusion on the work plane but fails in the other requirements.
R 3

33,342
Illuminating Engineering Society. IES GUIDE TO DESIGN OF LIGHT CONTROL. PART III--MATERIALS USED IN LIGHT CONTROL. Illum. Engng., Aug. 1967, 62(8), 483-510.

The materials most commonly used in light control are discussed in this part of the Guide. They are glass, plastics, metals, and applied finishes and coatings. Each is briefly described and its classifications or types given. Comments are made on manufacturing processes and on fabrication techniques. Uses in lighting and appropriate characteristics are indicated. Data are not comprehensive, but are intended as general information to aid designers and others who may become involved in the selection or appraisal of light control materials. For specific applications the material manufacturers' data should always be obtained.
R 29

33,343
Illuminating Engineering. ABSTRACTS OF 1967 IES CONFERENCE PAPERS. Illum. Engng., Sept. 1967, 62(9), 519-551.

The abstracts of these conference papers are grouped under the following session topics: light sources, color rendition, vision research, indoor lighting, research and photometry, and roadway lighting. (HEIAS)

33,344
Williams, H.G. DESIGNING GENERAL AND SUPPLEMENTARY LIGHTING SYSTEMS FOR AUDIOVISUAL USE. Illum. Engng., Oct. 1967, 62(10), 599-603. (General Electric Company, Cleveland, Ohio).

Today, visual aids are integrated into school curricula to such an extent that provision for their use needs to be included in any school lighting design. The report of the Illuminating Engineering Society (IES) Subcommittee on Lighting for Audiovisual Aids of the School and College Committee, "Guide for Lighting Audiovisual Areas in Schools," provides a broad base of information for the lighting designer and sets forth the requirements for such areas. A logical next step is the formulation of a specific procedure for the designer to use in meeting these requirements--one that includes methods for predetermining luminances of vertical surfaces. This paper offers such a procedure. Only electric lighting is considered here--it is assumed that provisions for excluding daylight are available for the room. This illumination calculation procedure will permit the design of lighting that is compatible with the new visual aids and the new educational techniques. To a greater extent visual aids are not just relegated to a special room, but are being used in every classroom. They then should become a tool that the teacher can use as briefly or as extensively as desired.
R 3

33,345
Ronco, P.G., et al. HUMAN FACTORS ENGINEERING BIBLIOGRAPHY. 1966 LITERATURE. VOLUME 4. Contract DA 18 001 AMC 1004(x), Dec. 1967, 619pp. USA Human Engineering Labs., Aberdeen Proving Ground, Md. (Institute for Psychological Research, Tufts University, Medford, Mass.).

This bibliography is the fourth in a planned series of bibliographies of literature pertinent to the field of human factors engineering. It covers literature of 1966. This bibliography consists primarily of: a) an index to the human factors literature, and b) the annotated bibliography.