Rowland & Company

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Project No. 7X95-01-001

Final Report
Phase Two

ATTITUDES OF TROOPS IN THE TROPICS

Volume Two

Methodological Implications

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SUMMARY

The study of U. S. troops in the tropics reported herein had two principal objectives: (1) to develop new and more effective means for measuring attitudes, and (2) to apply these techniques to the measurement of tropical troops' attitudes towards selected items of Quartermaster issue. These dual objectives were pursued in a two-year research effort.

At the first increment of the project, an exhaustive survey of the literature on the theory and practice of attitude measurement was carried out. Awareness of a striking degree of theoretical incoherence resulted from this effort and prompted the development of a new theoretical model for attitudes. Implications of this model guided the execution of the remainder of the project. Attitudes were characterized as multidimensional constructs and behavioral predispositions. The principal theoretical mandate which emerged from the model was that the measurement of attitudes had to be approached phenomonologically. Therefore, the research team was constrained to identify salient attitudinal topics and situational variables, as a first step in the measurement process. Concurrent with this process the research team undertook the systematic comparison of the efficacy of alternate attitude measurement systems.

These dual objectives were accomplished by means of three data collection trips during the first year of the project. 300 U. S. troops stationed in Panama and 50 U. S. troops at Fort Lee, Virginia participated in this phase.

Phase I data analysis indicated the superiority of attitude measurement scales of the Osgood type over the Likert type. Also, a clear-cut

requirement for the incorporation of minimally structured projective techniques in the battery emerged. These projective techniques had a threefold purpose: (1) to assess the saliency of items included in each generation of questionnaire, (2) to identify salient items not previously recognized as such by the experimenters, and (3) to aid in interpreting the objective data findings.

Based on these Phase I results and further interviews with troops recently returned from tropical service, a final instrument was developed during the early part of the second year. This instrument was administered to 2160 U. S. troops stationed in Panama, Hawaii and Okinawa.

Two types of information resulted from analysis of this data. First, attitudes towards specific items of Quartermaster issue such as the poncho, jungle boots and canteen resulted and are reported in Volume One. Interaction effects among population elements and situational variables are also detailed. This data is presented in such a manner as to be of guidance value to equipment designers. The second type of information, reported herein in Volume Two, is methodological in nature. The experimental results of comparisons among the methodologies and self-checking features of the final instrument are fully explored. Recommendations of guidance value to future attitude researchers are systematically presented. Volume Three displays the psychometric instruments comprising the attitude assessment battery developed and used by the research team in this project.

READERS' GUIDE

This report has been divided into three volumes in order to facilitate the acquisition of specific types of information by readers with differing interests. It is envisioned that there will be at least three principal classes of readers: (1) those interested in the specific attitudinal findings and the methodological developments of the research program; (2) those interested only in the attitudinal findings; and (3) those interested only in the methodological developments. By making Volume I and Volume II each focus on one of these areas and by making them independent of one another, the reader with a circumscribed area of interest will be able to find the information he is interested in with a minimum of effort.

It is believed that this approach is congruent with the Army's general policy of stimulating the scientific community at large by making available data resulting from unclassified research projects. In particular, there will very probably be considerable interest in the methodological aspects of this research program among academic circles. Such users will, however, have no particular interest in the specific content of such items as the way troops feel about combat boots in the jungle. Therefore, copies of Volumes II and III will suffice for such readers.

It is recognized that the three-volume approach with Volumes I and II being independent of one another, necessitates some repetition. This repetition is necessary to make the two volumes independent and will be beneficial to the reader who is not interested in both kinds of data. The

annoyance value of the repeated information to the careful reader should be nominal since all such information will be introductory in nature and will be easily recognized for what it is.

A brief schematic presentation of the best way to derive various types of information from the report is set forth on the following page.

If you want:	Then you should:
The general idea	Read the summaries of Volume I and Volume II and skim Volume III
To understand how the troops feel about items of QM issue	Read Volume I in its entirety - Chapter IV contains hard core results and recommendations
To examine theoretical conceptualizations	Read Volume II in its entirety and skim Volume III for examples
To critically evaluate the entire study	Carefully examine the contents of all three volumes

Figure 1. Readers' Guide

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ACKNOWLEDGEMENTS

Research designed to measure the attitudes of troops in the tropics towards items of Quartermaster issue has been carried out under the sponsorship and technical direction of the U. S. Army Natick Laboratories. While many of the techniques employed in this study have been generated within ROWLAND & COMPANY, a great deal of sound technical guidance and assistance has been offered by Natick scientists. Further, previous attitudinal research conducted by Natick has proved valuable to ROWLAND & COMPANY in both the development of methodologies and in the making of choices concerning the mechanical execution of the program. Special appreciation is expressed to the following Natick personnel for their assistance in this program:

Dr. John Kobrick
Dr. E. Ralph Dusek
Mr. John L. McCoy
Dr. David R. Peryam
Major James M. Chaffin

In addition to the overall guidance furnished by Natick personnel, other persons and organizations contributing significantly to the successful execution of this project included:

Col. Robert D. Larson
Commanding Officer
U. S. Army Research and Development Office
Fort Clayton, Canal Zone

Dr. D. A. Dobbins
Behavioral Sciences Coordinator
U. S. Army Research and Development Office
Fort Clayton, Canal Zone

Howard W. Hembree
Scientific Director
Field Evaluation Agency
Quartermaster Research & Development Command
Fort Lee, Virginia

Administration personnel at USARPAC Headquarters

Without the aid rendered by the foregoing persons and organizations, the data collection phases of this project could not have been accomplished. For this aid, ROWLAND & COMPANY expresses its thanks to them.

RECOMMENDATIONS

During the research conducted in Phase I and Phase II of the present project a series of hypotheses, both general and specific, have been tested. A series of conclusions have been drawn and some recommendations have been made pertaining to the cumulative research of both phases of the project.

The following recommendations are those which have methodological implications and their derivations are contained within the text of this volume.

Recommendation 1

Where possible, all attitudinal data collection techniques should routinely include a means for identifying respondents who are either unwilling to or incapable of cooperating with the investigator.

Recommendation 2

Criteria for differentiation of Cooperative and Uncooperative respondents should be mathematically and empirically derived so as to provide the optimal cut off point.

Recommendation 3

In view of the explanatory values found therein considerable effort should be exerted to identify the salient topical dimensions, their levels, and their inter-relationships whenever an objective scaling technique is used.

Recommendation 4

A methodology for the identification, level categorization, and analysis of salient topical dimensions should be developed.

Recommendation 5

In a complex measurement setting, as is typically the case in attitude measurement, a combination of highly structured, semi structured, and unstructured techniques should be employed to effectively collect and analyze the data.

Recommendation 6

A methodology should be developed to guide the construction of attitudinal assessment instruments composed of a variety of structured and unstructured techniques.

Recommendation 7

To enhance the probability of accurately interpreting equipment related attitudinal data, the respondents' world view should be assessed by the collection and analysis of additional attitudinal data which relate to situational variables such as weather, entertainment, family life, etc.

Recommendation 8

When attitude assessment instruments are to be developed for a particular population it is recommended that a phenomenological, iterative, developmental process be instituted. A pilot study, or as many pilot studies as are practical should be conducted in order to refine the investigator's original notions through respondent feedback. Through such a series of successive approximations the critical topics and their dimensions will have been identified.

Recommendation 9

A methodology should be developed for the categorization, classification, content analysis, and tonal analysis of data collected via unstructured techniques.

Recommendation 10

The appropriate uses of thematic stimuli in various attitudinal research situations should be empirically derived.

Recommendation 11

Further investigation should be made of color correlates of attitudes in situations which do not allow the reality variable to impinge so heavily on the situation. Such a study might be comprised of associating colors with adjectives which are used to describe some psychological object.

Recommendation 12

For most purposes, attitudinal data collection efforts in which objective questionnaires are used should consist of some form of Osgood's Semantic Differential Scaling Technique as opposed to the agree/disagree version of Likert's method of Summated Ratings.

Recommendation 13

The use of optical scan data processing cards for response collection and scoring, incorporated in reusable booklets with graduated pages, is strongly recommended for a wide variety of data collection/processing situations.

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CHAPTER ONE

INTRODUCTION

A. PHASE I REVIEW

1. PHASE I OBJECTIVES

This report is the Phase II (final) report on Contract No. DA19-129-QM-2076(N), Attitudes of Troops in the Tropics. It will set forth the attitudinal results of this study in Volume I and the methodological findings in Volume II. Since this research program has been conducted and reported in two phases, the reader is herein provided with a summary account of the objectives, research procedures and principal findings of Phase I. If a more detailed understanding of Phase I is desired, ROWLAND & COMPANY Report No. 63-29, Attitudes of Troops in the Tropics, dated 12 July 1963, is available.

The objectives of the overall program were as follows:

a. Explore and devise ways and means to measure attitudes;

b. To systematically test the methods derived;

c. To use the successful techniques to obtain, summarize and suggest uses for normative information on such attitudes in order to bring about more effective military operations.

Essentially, Phase I focused on the execution of objective a. and part of objective b. The balance of the research has been completed in Phase II. A chronological presentation of the Phase I research program follows.

2. REVIEW OF THE LITERATURE

At the inception of the project, ROWLAND & COMPANY research personnel immediately began to systematically go through the literature to become abreast of the most current theory and practice in the field of attitude measurement. As time passed, a substantial annotated bibliography was amassed concerning both attitudinal theory and attitude assessment techniques.

The assumption had been made that such a study of the literature would serve to identify alternative techniques suitable for use in assessing the attitudes of troops in the tropics towards items of Quartermaster issue. Also, it was assumed that diligent study would disclose a more or less unified theoretical model justifying at least some of the currently practiced attitude assessment techniques. The deeper into the literature the research team dug, the more apparent it became that this second assumption was unfounded. While it was possible to identify techniques which allegedly "measured attitudes," it was not possible to find a unifying theoretical explanation of why these techniques worked. Indeed, it was found that there was not even consensus on the meaning of the concept attitude or on many related concepts such as belief, value, opinion, etc.

Another insight gained by this careful look at the literature was that most attitude assessment techniques were developed using college sophomores as subjects. While this is not a problem in and of itself, the fact that investigators working with other sorts of populations seemed to have uncritically accepted these techniques as valid, did bother the research team. This was a reasonable concern since the differences between college sophomores and Special

Forces personnel sweating it out in the jungles of Viet Nam would appear to be considerable, at least from a phenomenological viewpoint.

Therefore, since prevailing attitude assessment techniques appeared to have weak or non-existent theoretical foundations, and also since available techniques were of questionable validity for use on a military population, it was decided to start from scratch and develop some sort of unifying theoretical model. Once this was accomplished, it would be possible to examine available assessment techniques and develop new techniques in a technically sound manner.

3. ATTITUDINAL MODEL CONSTRUCTION

The description of the process of model construction is difficult in that there was no prescribed procedure to follow. The approach of the ROWLAND & COMPANY research team was to intensify the survey of the literature so that assurance would be gained that all prevailing viewpoints and theoretical formulations would be considered. Once this was accomplished, it was necessary to selectively draw together all the theoretical propositions which seemed useful and give them coherence in the framework of the model.

Obviously, great hazards exist in the selection process since no one is either omniscient or bias free. Though every effort was made to evaluate all theories on their relative merits, it is only fair to warn the reader that some bias towards a phenomenological viewpoint may be present in the model since most of the research team members share this common outlook.

Essentially, the model relates attitudes to belief-value matrices and the subjects' informational fields in a time domain context. A detailed

understanding of this model can best be gained by reading Chapter Two of the Phase I, ROWLAND & COMPANY report, Report No. 63-29.

4. ASSESSMENT TECHNIQUES DEVELOPMENT

Concurrent with the later stages of model development, a portion of the research team turned its attention to the development of tentative instruments for assessing the attitudes of troops towards items of Quartermaster issue. This effort was cyclic in that first a tentative instrument was developed, then administered and then refined and readministered. This evolutionary research procedure will be more fully treated in the subsequent text.

a. Site Selection and Salient Topic Identification

The first step in the instrument development process actually involved the solution of two problems. First, sites or locations where U. S. troops served under tropical conditions and where troops would be available for testing had to be identified. Also, since it is obvious that all items of Quartermaster equipment could not be probed by the study, a means of identifying the topics which are most important (salient) to the troops had to be devised. Therefore, the first ROWLAND & COMPANY measuring instrument was designed with the objective of obtaining saliency data and getting a practical "feel" for the way U. S. troops would react to various psychometric devices when used on an exploratory basis.

In coping with the first problem area, ROWLAND & COMPANY was advised that American troops stationed in Panama experienced all the many characteristics of the jungle within a closely circumscribed geographical

area and that samples of these troops could be made available to ROWLAND & COMPANY. Other areas did not meet those requirements at that time. Having tentatively found a suitable location, the research team focused its attention on the development of an instrument which would elicit information from the troops as to which items of Quartermaster issue were of greatest concern to troops serving in the tropics. A tentative instrument relying largely on open-ended questions was devised for this purpose.

While this instrument was being developed, arrangements were made to obtain access to the troops in Panama. This administration was considered as Pilot Study No. 1. It served as a good opportunity, not only to obtain the necessary data, but to get the lay of the land insofar as the suitability of Panama as a testing location went. Both objectives of Pilot Study 1 were fulfilled; Panama was deemed suitable as a site for subsequent extensive tropical troop attitude testing and specific items of Quartermaster issue were identifiable as being attitudinal objects of concern to these troops.

b. Development of Attitude Assessment Instrument

(1) Initial Consideration

As a result of Pilot Study No. 1 and the maturation of the theoretical model which was undergoing concurrent development, the ROWLAND & COMPANY research staff had available sufficient data to begin the construction of questionnaires designed to elicit information on the attitudes of tropical troops towards salient items of Quartermaster issue. Pilot Study No. 1 served to identify these salient topics. The influence of the theoretical model was felt in a requirement to also elicit information identifying the subjects'

perceptions of the military environment and, to a certain extent, the subjects' world view. Therefore, the development objective sought was the creation of assessment techniques which would probe specific attitudinal areas and those which would probe areas of fundamental outlook and world view. To these ends a variety of objective, written projective, and picture projective techniques were developed.

(2) Pilot Study No. 2

The new attitude assessment battery was tried out on a small sample at Fort Lee, Virginia. This administration, Pilot Study No. 2, had a dual purpose. First, to provide the investigators with information and prior experience concerning the administration of the battery of assessment techniques; and secondly to provide an opportunity to detect and correct any major problems which might have been caused by the instrument or procedures as they then existed.

Analysis of the data obtained in Pilot Study No. 2 yielded the following conclusions:

a. The objective type questionnaires were generally effective in that most of the items were understood and appeared to be discriminative. Some simplification in language was required for some of the items;

b. Trends were noted which justified further consideration of the techniques used to identify certain kinds of invalid data;

c. The written projective technique elicited a good range of responses, but there were too many items and some of the items

required simplification;

d. The projective pictures seemed practical, but there were too many.

Based on this and other information inferred from Pilot Study No. 2, refinements, additions, deletions and corrections were made to the assessment battery. Arrangements were made during this period for access to 200 U. S. troops stationed in Panama for the Phase I major data collection effort.

5. MAJOR DATA COLLECTION

a. Data Collection Procedure

The major data collection was carried out over a two-week period. The primary data were gathered in the first week by a two-man team. Supplemental interview information was obtained during the second week by one of these men.

b. Major Data Collection Objectives

Due to the developmental nature of this phase of the study, the comparison and evaluation of techniques was the primary concern. In order to provide comparisons which would account for possible differential transfer, four counterbalanced conditions were established. Included among the comparisons made were:

1. Objective scaling concept - Osgood booklet vs. Likert booklet;
2. Projective scaling format - Written Projective Form A vs. Written Projective Form B;
3. Opportunity to volunteer comments - Object booklets with "Your Comments" cards vs. Osgood and Likert booklets without cards;

4. Order of administration - Written Projective administered before Objective booklets vs. Written Projective administered after Objective booklets.

The interviews conducted during the second week had two principal foci of concern. First, the researchers wanted to know the troops' reactions to the instrument. Ambiguities, unclear wording, irrelevancies, etc., all were to be identified by the subjects. It was also desired to identify the salient topics pertinent to U. S. troops stationed in the tropics. Both of the objectives were met and permitted the following primary conclusions to be reached at the conclusion of Phase I.

6. CONCLUSIONS

a. Methodological Conclusions

As has been previously indicated, the major emphasis in Phase I was on the development and comparison of alternative attitude assessment techniques. A complementary methodological concern was the development of a technique for the detection of valid and invalid data samples. A concomitant of the methodological goals of Phase I was the acquisition of further information on the troops' reactions to the saliency of various topics and data as to their attitudes towards the specific items probed in Phase I.

Without delving into the specifics of the data analysis, the following broad conclusions were reached.

1. The Osgood technique is superior to the Likert technique of attitude assessment;

2. Written projectives were found to be valuable in eliciting attitudinal saliency information as guides to item preparation, and generally aiding the interpretation of the objective responses;

3. There was not found to be a significant difference between Written Projective Forms A and B, however, individual items on both forms were identified which consistently elicited useful data;

4. Use of the "Your Comments" cards was found to be valuable. Among other advantages, subjects who received "Your Comments" cards had fewer inconsistent responses;

5. It was found advantageous to administer Written Projectives prior to the Objective booklets;

6. Whenever possible in attitudinal studies, steps should be taken to assess the data for response consistency and to categorize and treat the data in accordance with its consistency;

7. The dimensionalization of questions probing attitudinal objects of concern is more fruitful than merely asking global assessment questions under most circumstances;

8. A workable means of identifying inconsistent responses in objective attitude measuring techniques was developed;

9. Soldier respondents are willing to give at least overt cooperation when asked to participate in fairly bizarre assessment techniques;

10. Picture projectives seemed to have promise in the assessment of attitudes since they appeared to directly tap emotional responses.

b. Topical Conclusions

In addition to these methodological findings, the following topical conclusions were reached:

1. Snakes did not appear to be a major problem to seasoned troops in the Panama area;
2. Jungle boots had not been issued to troops in the sample population. They had but little definitive information upon which to formulate an opinion regarding the item;
3. The shelter-half, tents, raincoats, ponchos, and packs were rarely used by the sample population in the Panama area. This may have been attributable to the mission of the particular sample (Airborne Infantry) and may not be applicable to other types of troops;
4. The sample population was not generally issued water purification tablets and would not drink untreated water. A majority considered water in the jungle as particularly dangerous and did not seem interested in trying water purification by tablets to be carried individually. A small but sizeable minority seemed to desire to have them issued to be carried as part of their standard stock;
5. The combat boot was considered unacceptable as a jungle item by the sample population;
6. Health was a topic of considerable concern to the sample population;
7. Most of the discomfort experienced by the men when they were on field exercises was attributed to heat and to insects, in that order;

8. Two interdependent factors, "too many alerts" and "no time off" accounted for the majority of the complaints made concerning duty in Panama.

These conclusions, both methodological and topical, were used to sharpen and tighten the measuring instruments for Phase II. Problem areas were identified in a more definitive manner such that items could be written to ensure adequate coverage of critical topics and their dimensions. The measuring instruments and their inter-relationships were improved so as to provide a more valid approach to the collection of attitudinal data.

B. PHASE II OBJECTIVES

The present study was originally conceived and eventually supported by sponsors with different but compatible points of view. One view was hardware oriented and required an end product which could be used in equipment evaluation. The other view was more theoretical in nature and encouraged a rather heavy investment of time and effort in establishing methodological inroads which would improve the state of the art in general. Whereas Phase I (Report No. AD 417 796) of this two-phased research stressed the development of attitudinal assessment techniques, Phase II has consisted largely of the collection, analysis, and interpretation of attitudinal data, as regards equipment evaluation. In addition, hypotheses formulated as a result of Phase I data were tested and additional information gathered relative to the methodological aspects of the study. Consequently, both phases have contained a methodological and attitudinal mix insofar as objectives have been concerned. The treatise herein relates primarily though not exclusively to methodology.

I. METHODOLOGICAL OBJECTIVES

Several concepts were developed in Phase I which were employed for data collection and analysis in Phase II. The present authors propose that some of the concepts could very well have far reaching implications in the science of attitude measurement and possibly also have general applicability in the field of psychometrics. There are five of these major concepts and they are dealt with herein in the following order: Respondent Cooperation, Topic Dimensionality, Projective Techniques, Osgood-type Objective Scales, and Data Collection-Processing Techniques.

a. Respondent Cooperation

Attitudinal research has led to the development of a wide variety of techniques in an attempt to accurately assess attitudes. Although the psychometric instruments differ radically in some instances, the desired end product seems to be shared by all investigators; that is, that responses will be obtained which represent the subject's "actual" position on some specified psychological continuum. The present authors propose that a response which fulfills this requirement should be thought of as a valid response, and that the construct of "response validity" be utilized to represent this desired end product.

There is a subtle but significant distinction which should be made between the more commonly used constructs of item or test validity and the present authors' proposed construct, response validity. Although repeated reference is made to item validity, as if it were the ultimate objective of the

investigator, in the present authors' opinions, item or test validity is merely a partial contributor to valid or invalid responses. On the other hand, response validity is here suggested to be the ultimate objective in any psychometric instrument and is a function of not only item validity but of respondent cooperation as well.

For purposes of clarification the constructs critical to the present discussion are defined below:

Response Validity

A valid response is one which represents the subjects' "actual" position on a psychological continuum where the continuum is one which is shared by respondent and investigator alike and means the same to each.

Item Validity

A valid item is one which, assuming cooperation from respondent, elicits evaluations of the referent prescribed by the investigator.

Respondent Cooperation

A cooperative respondent is one who, assuming item validity, attends to the referent prescribed by the investigator in the manner prescribed by the investigator.

In order to assess Respondent Cooperation, a measuring technique amenable to use with objective instruments such as the Osgood or Likert scaling techniques has been developed and has been included in this study. This technique is referred to as the Respondent Consistency Check.

Although a great deal of attention has been paid to item validity and a number of techniques developed to measure and insure it, the notion of respondent cooperation appears to have been relatively unexplored. Some personality and interest inventories have included "lie scales" which have been inferential in nature, but for the most part respondent cooperation has been an assumption. A major objective of this research has been to demonstrate that a significant number of respondents yield inconsistent responses, which signifies a lack of cooperation, and that their data differ sufficiently significantly from the data of the rest of the sample as to make the inclusion of their data suspect for certain applications.

b. Topic Dimensionality

Although a crude measure of soldier acceptance is obtained with the use of global items such as "do you or do you not like your fatigues," it has been recognized for some time that information derived in this manner is insufficient if remedial action is to be taken to correct equipment deficiencies. In an attempt to acquire information which answers questions about why the troops feel the way they do concerning their equipment the dimensional approach came into being. Although the dimensionalization problem seems to have been bothering psychologists for some time, as is evidenced by work done by Hembree (1952) and Barker (1955), little seems to have been done since then to more fully develop their theoretical notions or to apply their ideas to the attitudinal data collection situation. The present research has been an attempt to exploit both of these areas. A rather detailed theoretical treatment has been given the notion of dimensionalization to the extent that some new constructs

have been developed. Also, salient features of equipment have been identified such as "Comfort," "Durability," and "Protection", and incorporated into the instruments thereby providing a dimensional approach to the measurement of attitudes.

The influence of the theoretical model developed by the authors during Phase I (Lucier) of this project prompted the recognition of levels of dimensions. When the various attitudinal parameters of a given topic are examined it becomes apparent that there are levels of dimensions which are arranged in hierarchal order on a generality-specificity continuum. For example, attitudes relating to the topic of fatigues may be evaluated in the following manner: level one, which is the most general in nature, deals with the soldiers' overall acceptance or rejection of fatigues, level two consists of dimensions such as "Comfort," "Protection," and "Durability"; and level three relates to dimensions subsumed by the dimensions within level two such as "Rotting," "Tearing," and "Stitching" relate to "Durability", or underbrush protection, insect protection, and protection from the sun relate to the "Protection" dimension.

It has been the authors' intent to explore the relationships among the different levels of dimensions thereby providing more accurate and definitive attitudinal assessments.

c. Projective Techniques

Highly structured techniques (objective) lend themselves to easier, bias-free scoring procedures. However, they restrict the respondents to an artificial limit of responses which have been prescribed by the surveyor.

On the other hand, "unstructured" (projective) techniques are far more difficult to score but allow the subjects more freedom of response. The "unstructured" techniques are often the only methods which will work, for example:

1. Situations in which one wishes to discover something regarding attitudes from the respondent without providing cues to the respondent as to what the examiner is really interested in.
2. Situations in which explicitly naming the alternatives from which the respondent is to select his answer would "give away" the answer.
3. Situations in which the surveyor is desirous of obtaining information concerning saliency and doesn't wish to establish sets in the respondents.
4. Situations which are unavailable to verbal transmission.
5. Situations in which the surveyor knows the topic of interest to himself but either cannot (or does not choose to) set up a suitable scale of response, (usually because he does not know what or how to use his alternatives).

Several unstructured techniques were developed during Phase I and it was planned that at the conclusion of Phase II the utility of these approaches would be determined and identification made of the approaches most likely to succeed in the assessment of attitudes.

d. Objective Scales

Techniques defined as objective techniques usually have highly structured administrative procedures and highly structured manners of responding. Structural differences between objective questionnaires for gathering opinion data are due primarily to the different types of scaling procedures employed. A particular version of the method of summated ratings, herein referred to as the Likert scale, was considered at the outset for this study because it had undergone a number of years of both research and applied use and seemed to offer an optimal solution to scale construction problems. However, after this research group had accomplished considerable work with the Likert scale a few questionable characteristics were identified which raised some doubt as to its validity, which in turn led to the adoption and further development of a form of the Semantic Differential technique, referred to in subsequent discussion as the Osgood scale. A complete description of each of the two scales is found in Chapter Three, Section A, of this volume.

At the conclusion of Phase I the data were interpreted to indicate the probability that the Osgood scale seemed to be a more valid approach to attitude assessment than the Likert technique. One of the objectives of Phase II was to provide the necessary data to substantiate or repudiate this notion.

e. Data Collection - Processing Techniques

Not unlike most research jobs the cost-accuracy tradeoff has been a practical and a necessary consideration, and consequently, has received special attention in the present study. Data collection techniques were designed which were expected to reduce over-all costs and increase accuracy by requiring a

minimal amount of manual data handling. The "systems" approach employed in the instrument design forced design considerations of data processing techniques early in the developmental stages, which was to provide a much more compatible, efficient data-collection processing system.

During Phase I a system was developed which came close to accomplishing the desired ends through the incorporation of mark sense cards inserted in "pop in" and "pop out" pages of the test booklet. There were some rather serious flaws in the system, however, one of which was the inability of the mark sense reader to accommodate the data as it was necessarily displayed on the mark sense cards.

One of the objectives of Phase II was to implement the necessary changes which would allow the data collection processing procedures to function properly.

2. ATTITUDINAL OBJECTIVES

Only a finite number of topics could be considered for attitudinal assessment in this study. The topics included were systematically selected as a result of the data gathered and analyzed during Phase I. There are two classes of topics, equipment and situational. The equipment related topics investigated were fatigues, poncho, poncho liner, combat boots, jungle boots, canteen, meals, pack, rucksack, "tiger suit" (a multi-colored, camouflaged fatigue uniform), and hammock. The situational topics included for study were: weather, water, bugs, entertainment, family, and officers.

It was intended that an accurate assessment of the troops' attitudes toward the eleven equipment related topics would be obtained in Phase II. Inclusion of the six situational topics into the study were primarily to collect data which would expedite the analysis and interpretation of the equipment related data.

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CHAPTER TWO

DESCRIPTION OF SAMPLE

In any behavioral science research it is necessary to fully delineate the nature of the sample from which data is obtained before it is possible to establish the degree of generality which may be attached to the results. If a sample is either small or biased in some manner, it is obvious that conclusions based on such data must be narrowed in accordance with these considerations.

The primary objective of this project has been to study the attitudes of troops in the tropics towards items of Quartermaster issue. Early investigations indicated that Panama, Hawaii and Okinawa are the main tropical regions in which U. S. Army troops train. It was also recognized that Viet Nam provided an area in which Army personnel are actually engaged in combat under tropical conditions at the time this report was in preparation. The original experimental design proposed by the investigators suggested drawing subjects from Panama, Hawaii and Viet Nam. This design included two of the three major non-combatant tropical areas in which Army personnel are trained, plus a combatant area. Policy considerations precluded the collection of data in Viet Nam so Okinawa was chosen instead. The non-combatant-combatant contrast was still possible since Okinawa is a major staging area for Viet Nam. Therefore it was possible to obtain data at Okinawa from large numbers of troops who had been to Viet Nam.

Having thus assured a wide enough data base from a geographical standpoint to permit generalizations concerning troops in the tropics,

arrangements were made for obtaining sufficient numbers of subjects in each location. These arrangements resulted in the administration of a total of 2160 attitude assessment batteries, with the following breakdown: 1130 in Panama, 560 in Hawaii and 470 in Okinawa. Also, prior to data collection, efforts were made to stratify the sample in accordance with the branch representation in each area.

In order to be able to characterize the sample adequately, each respondent was probed concerning 13 demographic variables. These variables were: age, formal education, marital status, dependents, rank, time in service, branch, time in combat, battle stars, time in jungle training area, reason for entering active duty, season most time spent in tropics, and region most time spent in tropics (answered only by those having been to Viet Nam). The percentage distributions of each major subpopulation as well as the total cooperative and uncooperative populations (see Chapter Four, Section A for a detailed treatment of this complex concept) for each response category to each of these questions are displayed in Table 1. The data derived from each of these demographic items is treated briefly in the following text.

A. DEMOGRAPHICAL ANALYSIS

Age

By far the greatest percentage of all respondents is in the 20 - 24 year age bracket. This bracket includes approximately one-half of the total sample. It is also observable that the Okinawa sample is more heavily weighted with personnel in the 30 and over (20.3 per cent) age category as contrasted with the populations from Hawaii (11.9 per cent) and Panama (16.1 per cent).

TABLE I

PERCENTAGE DISTRIBUTIONS OF DEMOGRAPHIC ITEMS FOR TOTAL RESPONDENT POPULATION

Descriptors	Cooperative Population				Uncooperative Population
	Panama	Hawaii	Okinawa	Total	Total
Age in Years:					
35 and over	5.5	4.7	8.4	6.0	9.8
30 to 34	10.6	7.2	11.9	9.9	7.1
25 to 29	19.9	12.0	19.1	17.4	9.8
20 to 24	46.9	58.2	49.0	50.7	49.3
Less than 20	17.1	17.9	11.6	16.0	24.0
Formal Education Completed:					
College	3.9	2.1	3.4	3.3	2.2
Some College	18.0	14.0	28.0	19.3	11.4
All 12 grades	54.8	46.8	53.4	52.2	50.0
9 to 11	18.0	26.8	13.0	19.3	25.9
6 to 8	4.7	8.9	1.7	5.2	6.6
5 or less	0.3	0.6	0	0.3	1.7
None	0.3	0.8	0.5	0.4	2.2
Marital Status:					
Single	55.0	60.3	55.9	56.8	62.4
Married	39.6	37.3	38.7	38.7	33.2
Separated or Divorced	5.1	1.8	4.9	4.1	3.1
Widower	0.3	0.6	0.5	0.4	1.3

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TABLE 1 (Continued)

Descriptors	Cooperative Population				Uncooperative Population
	Panama	Hawaii	Okinawa	Total	Total
Dependents:					
4 or more	13.1	10.0	11.6	11.9	11.8
3	11.5	8.9	12.1	10.9	9.2
2	12.5	12.6	13.1	12.7	12.3
1	19.7	23.6	14.4	19.5	23.3
None	43.2	44.9	48.8	45.0	43.4
Rank:					
Commissioned Officer	3.1	2.1	4.9	3.2	0.9
Sgt. Major	0.4	0	0	0.2	0.9
M/Sgt.	1.4	0.2	2.0	1.2	0
SFC	2.6	1.0	8.3	3.6	2.7
SSG	6.4	4.8	10.7	7.0	8.0
Sgt.	11.0	10.8	21.5	13.5	12.9
Cpl.	22.8	22.4	17.6	21.4	23.1
PFC	39.6	36.3	26.9	35.6	38.2
Pvt.	12.7	22.4	8.1	14.3	13.3
Time in Service: (months)					
36 or more	35.0	26.3	45.4	35.0	34.2
18 to 35	27.8	27.8	28.1	27.9	24.9
12 to 17	15.7	13.3	12.9	14.4	18.2
6 to 11	17.6	21.3	12.4	17.4	17.4
Less than 6	3.9	11.3	1.2	5.3	5.3

(Table continued on next page)

TABLE 1 (Continued)

Descriptors	Cooperative Population				Uncooperative Population
	Panama	Hawaii	Okinawa	Total	Total
Branch:					
Infantry	32.4	54.6	0.7	30.6	34.0
Airborne	17.5	1.3	42.2	19.2	23.7
Mechanized	14.9	12.5	0.7	10.6	9.3
Special Forces	11.3	1.1	35.6	14.6	11.6
Other	23.9	30.5	20.7	25.0	21.4
Time in Combat: (months)					
12 or more	7.6	6.1	17.0	9.4	10.0
6 to 11	3.9	2.3	8.8	4.7	8.7
1 to 5	2.5	4.6	2.2	3.1	3.1
Less than 1	6.1	0.8	2.2	3.6	5.2
None	79.9	86.2	69.8	79.2	73.0
Battle Stars Awarded:					
More than 3	3.7	3.5	8.2	4.7	6.7
3	2.7	1.5	2.3	2.3	2.2
2	1.6	1.9	1.5	1.7	3.8
1	1.8	1.9	2.5	2.0	0.9
None	90.2	91.2	85.5	89.3	86.4

(Table continued on next page)

TABLE 1 (Continued)

Descriptors	Cooperative Population				Uncooperative Population
	Panama	Hawaii	Okinawa	Total	Total
Amount of Jungle Training: (months)					
24 or more	25.9	24.1	12.6	22.1	20.3
12 to 23	31.8	21.2	27.9	27.8	25.7
6 to 11	18.8	22.1	22.7	20.7	27.9
3 to 5	13.7	17.2	17.8	15.7	11.7
Less than 3	9.8	15.4	19.0	13.7	14.4
Reason for Entering Active Duty:					
Drafted	33.1	40.3	15.5	30.6	34.7
To avoid draft	19.9	16.6	22.2	19.6	17.6
Without concern of draft	37.7	36.4	55.5	41.9	39.2
Activated from Reserves	3.2	2.0	1.0	2.3	3.5
Other	6.1	4.7	5.8	5.6	5.0
Season Most Time Spent in Tropics:					
Rainy	25.9	28.0	16.1	24.1	25.6
Dry	4.5	2.7	12.6	5.9	6.7
Equally divided	69.6	69.3	71.2	70.0	67.7

(Table continued on next page)

TABLE 1 (Continued)

Descriptors	Cooperative Population				Uncooperative Population
	Panama	Hawaii	Okinawa	Total	Total
Region Most Time Spent in Tropics:					
Delta	21.0	16.6	11.0	15.8	11.2
Plateau	16.2	5.9	17.3	13.5	18.3
Mountain	12.4	37.3	34.7	28.4	32.4
Equally divided	50.4	40.2	37.0	42.3	38.1

Formal Education

Apparently there is a hierarchy among the three populations with respect to amount of education. The Okinawa group ranks first in this respect, Panama second and Hawaii third. This conclusion is supported at both ends of the educational spectrum since in Okinawa 31.4 per cent, in Panama 21.9 per cent, and in Hawaii 16.1 per cent of the populations had some college or more while Hawaii had 10.3 per cent with eight or less grades completed, Panama 5.3 per cent and Okinawa only 2.2 per cent in this category.

Marital Status

Overall, it was found that about 60 per cent of the total population was single, 35 per cent married, 4 per cent separated or divorced and 1 per cent widowed. Hawaii was found to have more single personnel proportionately than the other two populations. This is congruent with the fact that the Hawaii group has younger troops than do the other locations. There is a slight reversal of this trend noticed between Panama and Okinawa. The Panama group has 64 per cent of its population 24 or less while Okinawa has 60.6 per cent in this category. However, slightly more troops from Okinawa (55.9 per cent) are single as contrasted with troops from Panama (55.0 per cent).

Another interesting feature of this data is that there seems to be a markedly lower ratio of separated or divorced to married in the Hawaii group than in either of the other populations. It is also interesting to note that a 5.6 per cent difference exists between the cooperative and uncooperative groups with respect to the proportion of single personnel in the population. The uncooperative group has the larger percentage. Likewise, a difference of 5.5 per cent in the marriage category favoring the cooperative respondents

seems to support the idea that married men, taken as a whole, are more responsible than are single men.

Dependents

It was found that U. S. troops in Panama had the greatest number of dependents, those in Hawaii being second and those in Okinawa third.

Rank

The sample from U. S. troops in Okinawa has a strikingly larger percentage of higher ranking enlisted personnel. 21.0 per cent of the Okinawa sample, 10.8 per cent of the Panama sample and 6.0 per cent of the Hawaii sample held grades E-6 through E-9. At the other end of the enlisted rank continuum, 58.7 per cent were Privates and PFC's in Hawaii, 52.3 per cent in Panama and 35 per cent in Okinawa.

Time in Service

As might be predicated on the basis of the data on rank, groups in Okinawa have more experienced personnel than do Panama and Hawaii. 45.4 per cent of the Okinawa population has been in the service for three years or more as contrasted with 35.0 per cent and 26.3 per cent for Panama and Hawaii, respectively. In the eleven months or less of service category the percentages of the populations for Hawaii, Panama, and Okinawa are 32.6 per cent, 21.5 per cent and 13.6 per cent respectively.

Branch

Though the investigators attempted to arrange for a rigorously stratified sample with respect to branch of service, the complexities of field research are such that compromises had to be made. As it turned out, a fairly

good representation of U. S. Army branches found in the tropics was obtained. As can be seen from Table I, groups in Panama and Hawaii were largely made up of infantry and "other" personnel. The "other" category being comprised of relatively small groups with the following specialties: missile, medics, artillery, support and aviation. Airborne and Special Forces were the largest groups on Okinawa.

Time in Combat

Seventeen per cent of the U. S. troop sample taken on Okinawa has had a year or more of combat experience in contrast with less than half that percentage for each of the other populations. It is interesting to note that a difference of 6.2 per cent between the cooperative and the uncooperative groups existed relative to combat experience with the uncooperative group having the greater percentage. Nearly 80 per cent of the total sample had no time in combat, however.

Battle Stars

Due to the fact that the Okirawa population had much more combat experience than did the other two populations, there were more battle stars possessed by Okinawa troops than by any other group. 14.5 per cent of the Okinawa troops as opposed to 9.8 per cent of the Panama troops and 8.8 per cent of the Hawaii troops had earned battle stars. Also, a difference of 2.9 per cent exists between the cooperative and uncooperative groups with respect to battle stars won, favoring the uncooperative groups. Though this difference is not great it suggests the possibility that perhaps some of the uncooperative subjects may have been uncooperative to the extent of falsifying some demographic data.

Time in Jungle Training Area

The question regarding time in jungle training area was intended to ascertain the total amount of jungle training and/or jungle combat experience possessed by each subject. In retrospect it was realized by the item writers that the wording of the question was such that the subjects might differentiate between jungle training and actual jungle combat. Apparently, this was done since the troops in Okinawa who had the greatest amount of combat experience had the lowest percentage of personnel with a year or more of time in a jungle training area, 40.5 per cent, as contrasted with 57.7 per cent for the troops in Panama and 45.3 per cent for the troops in Hawaii. Similarly, 19 per cent of the Okinawa population, 15.4 per cent of the Hawaii population and 9.8 per cent of the Panama population had less than three months in a jungle training area. Although the item was intended to assess the amount of jungle experience obtained by the troops, it becomes obvious that the amount of time spent in a jungle training area does not necessarily reflect this. For example, it would seem that the Special Forces who lived for six months, 24 hours a day, in the jungle in Viet Nam received a great deal more jungle experience than the soldiers in Panama who went out in the field once a week; and yet the item used certainly does not indicate this.

Reason for Entering Active Duty

In both Panama and Hawaii a larger number of persons entered active duty either because they were drafted or to avoid being drafted than for any other reason. On Okinawa, this was not true since 37.7 per cent of this population was either drafted or motivated to join up by the draft in contrast to 55.5 per cent who joined without concern of the draft. This fact seems to be

congruent with the general picture which emerges of the Okinawa group as older, higher ranking personnel with more combat experience. In short it appears that there are more professional, career soldiers on Okinawa than in either of the other two locations.

Season Most Time Spent in Tropics

It was recognized by the researchers that evaluations of certain items of Quartermaster equipment might vary as a function of the tropical season in which the item had been most used by the respondents. The data shows that 70.0 per cent of the respondents had spent equal time in the rainy and dry seasons. The remaining portion of the population was split between those who had spent the majority of their time in the rainy and dry seasons. Taken as a whole, it would appear that the population is familiar enough with both seasons to be able to identify any deficiencies of Quartermaster issue equipment which are peculiar to one or the other season.

Region Most Time Spent in Tropics (Viet Nam)

Since, at the time of this report, Viet Nam is the only tropical area in which the United States is involved in conflict, it was deemed useful to find out both how many respondents had been to Viet Nam and, for those who had been there, what geographical regions or region had they served in. The geographical question was included as a result of some interviews conducted at Fort Bragg during Phase I. The interviewees indicated that there were three clearly defined geographical locations which varied a great deal with respect to topographical conditions. Consequently, the item was included so that this particular variable could be accounted for if, in fact, it seemed to be related to

attitudes. A total of 405 respondents had been to Viet Nam or roughly 19 per cent of the total sample. Of these personnel approximately 40 per cent had their time equally divided among delta, plateau and mountain regions. Troops from Hawaii and Okinawa had also spent a lot of time in the mountain regions while the troops from Panama who did not have equally divided time in the various regions had spent more time in the delta region. Overall, a good representation of troops experienced in all of the geographical regions was available.

B. POPULATION COMPARISONS

The foregoing analysis has been based on gross differences in response frequencies observed among the five population classifications displayed in Table 1. Five of the demographic variables which were viewed by the analysts as being most salient in defining the characteristics of the population to whom the battery was administered were selected for more intensive analysis. The variables chosen were: age, education, rank, time in Army and combat experience. A contingency calculation (chi-square) was run between the total cooperative and total uncooperative populations, between the Panama and Hawaii, Panama and Okinawa and Hawaii and Okinawa cooperative populations on each of these variables.

The significance levels achieved by these comparisons are shown in Table 2.

1. COOPERATIVE VS. UNCOOPERATIVE COMPARISONS

For the cooperative vs. uncooperative populations age and education were found to be significant variables. For age it was found that the

TABLE 2

CHI-SQUARE SIGNIFICANCE LEVELS BETWEEN POPULATIONS FOR SELECTED DEMOGRAPHIC VARIABLES

Demographic Variables	Consistent vs Inconsistent	Populations: Panama vs Hawaii	Panama vs Okinawa	Hawaii vs Okinawa
Age	.001	.001	.05	.001
Education	.001	.001	.001	.001
Rank	Not significant	.001	.001	.001
Time in Army	Not significant	.001	.001	.001
Combat Experience	Not significant	.001	.001	.001

cooperative respondents tended to be clustered in the middle age brackets (20 - 34) whereas the uncooperative respondents were found more often in the extreme age categories of less than 20 and more than 35. Examination of the cells in the contingency table showed that the cooperative respondents are better educated than the uncooperative respondents. There are more observed than expected subjects in the "finished 12 grades" and above cells for the cooperative respondents and less observed than expected in all lower cells. For the uncooperative population, exactly the opposite is true, with observed frequencies exceeding expected frequencies for all cells less than "finished 12 grades," and expected frequencies exceeding observed frequencies for all higher educational categories. Though it is recognized that there is not necessarily a linear, positive relationship between education and intelligence, this data tends to support the idea that one of the major factors causing poor respondent cooperation is simply lack of ability. It is obvious that some linguistic proficiency is required before a subject can successfully cope with the objective instrument. Evidently, some of the subjects did not reach this ability threshold.

2. PANAMA VS. HAWAII COMPARISONS

The chi-square values computed for all five variables; age, education, rank, time in Army and combat experience were all significant at the .001 level. Therefore, there are very clear cut differences between the two populations with regard to the variables probed. The Panamanian population is older, better educated (i.e. those completing 12 grades and more), higher ranking (more E-6 - E-9 proportionately), has more time in the Army and more combat experience. Therefore a well defined difference between populations exists showing the Panama group to be more experienced, older, better educated, and

higher ranking personnel.

3. PANAMA VS. OKINAWA COMPARISONS

The Panama vs. Okinawa contingency calculations for the five selected variables were all significant at the .001 level except for age which was significant at the .05 level. As in the Panama versus Hawaii comparisons, there is a clear cut trend in the data showing the Okinawa troops to be older, better educated, higher ranking, and more experienced in military life than their counterparts from Panama.

4. HAWAII VS. OKINAWA COMPARISONS

As would be predicted from the results already reported, the Okinawa population was distinctly older, better educated, higher ranking, had greater time in the Army and had greater combat experience than did the Hawaii population.

C. OVERALL SAMPLE CHARACTERISTICS

Contrary to the investigators' expectations, the sample obtained in the three tropical regions studied do differ substantially in demographic characteristics. Though it is not altogether clear why this is so, there is a hierarchy among the three populations with respect to age, education, rank, time in Army and combat experience. The Okinawa population is first in this hierarchy with the oldest, best educated, etc., personnel, Panama is second and Hawaii third. There are no reversals in this trend so it is apparent that a bona-fide phenomenon exists.

The data discussed earlier on reason for entering the services and battle stars awarded both support the view that the Okinawa population is made up of a greater proportion of professional soldiers. Nearly twice as many battle stars have been awarded to the Okinawa troops than to either of the other populations. Also, far more soldiers on Okinawa initially entered active duty without concern for the draft than in either of the other populations. Though this phenomenon leaves the research team with some problems in assigning causality to attitudinal differences between populations, it does demonstrate that taken together, the total population is not biased with respect to the variables studied.

The items concerning duration of tropical services, seasonal experience in the tropics and geographical regions experienced in Viet Nam had distributions which indicated no heavy biases in the over-all population. There was also a reasonable distribution of branch specialties in the population. The items on marital status and number of dependents showed no useful trends.

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CHAPTER THREE

DESCRIPTION OF INSTRUMENTS

The data collection instruments employed during Phase II of this project are of two types and may be classed as Attitude Assessment techniques and Supportive Data Collection techniques. The latter exists largely to assist data interpretation. Complete copies of the final instruments are contained in Volume III for the reader's reference.

A. ATTITUDE ASSESSMENT TECHNIQUES

1. OBJECTIVE QUESTIONNAIRES

The procedure for collecting attitudinal information by objective questionnaires in Phase II was to use questionnaire booklets with Osgood-type scales for the major instrument, and questionnaire booklets with Likert-type scales as the minor instrument. Osgood-type and Likert-type scales are described later. The decision to use Osgood-type scales instead of Likert-type scales was based on results of a study in Phase I to compare the relative merits of the two types of scales for gathering attitude information in the context of the present project. The Likert scales were employed in the second phase to replicate the comparative study of the two scales in Phase I.

a. Booklet Versions

Three types of questionnaire booklets were used in Phase II: 1) Osgood-type questionnaire for soldiers then in Okinawa who had previously served in Viet Nam (Combatant Osgood); 2) Osgood-type questionnaire for soldiers stationed in Hawaii and in Panama (Non-combatant Osgood); and 3) Likert-type questionnaire

identical to 2), except for the scale (Non-combatant Likert). The Combatant Osgood had 83 items covering 13 topics; the Non-combatant Osgood and its matching Non-combatant Likert had 94 items covering 15 topics. A "topic" in the present context consists of an individual area of interest for which a family of related questions were generated. These questions appeared as items in the booklets.

All booklets have nine common topics which are touched upon by a total of 57 individual items. There are additional items in each booklet type which are specific to the populations to be tested -- Combatant or Non-combatant Troops. The nine topics common to all booklets are: 1) "Fatigues;" 2) "Poncho" in the U. S.; 3) "Jungle Boots;" 4) "Combat Boots" in the U.S.; 5) "Canteen;" 6) "Poncho" in present setting; 7) "Weather;" 8) "Insects" and 9) "Water." The six population-specific topics in the Non-combatant booklets are: 10) "Food;" 11) "Combat Boots" in present setting; 12) "Packs;" 13) "Officers;" 14) "Entertainment;" and 15) "Family." The four population-specific topics in the Combatant booklets are: 10) "Tiger Suit;" 11) "Hammock;" 12) "Poncho Liner" and 13) "Rucksack." The Non-combatant Likert corresponds to the Non-Combatant Osgood in content and structure. There are 37 items in the population-specific topics of the Non-combatant booklets, thus making a total of 94 items. There are 26 items in the population-specific topics of the Combatant booklets, thus making a total of 83 items for this type.

Although there would be some merit in presenting all items relating to a topic together, for the most part this was not done. Scale direction was alternately reversed for the 57 common items listed in original structured

sequence. Then the items were ordered randomly by a table of random numbers, thus simultaneously randomizing both sequence of items and sequence of direction of scale. The only deviations from this procedure of randomization was to maintain RCC items (Respondent Consistency Check [RCC] items are described fully in Chapter Four, Section A) six or seven items away from their identical (but reversed) original item, and for the items contained in the Combatant booklet which were too few to randomize successfully. The present authors paid considerable attention to reversing the scales because scaling procedures which do not control for set are: 1) more conducive to errors due to inattention; and 2) less likely to average out errors due to positive and negative respondent biases.

b. Likert-type Scales

In the present study, the Likert-type questionnaire consists of statements which are presented to the subject with instructions that he is to indicate his level of agreement or disagreement with each statement. The subject does so by marking one of seven places on a vertical scale ranging from "I agree completely" to "I disagree completely." For example:*

10. For this climate and terrain jungle boots are very poor.

I agree completely ------ ( )
I agree quite a bit ------ ( )
I agree slightly ------ ( )
I neither agree nor disagree ------ ( )
I disagree slightly ------ ( )
I disagree quite a bit ------ ( )
I disagree completely ------ ( )

The subject's level of agreement or disagreement with a statement is assumed to be his reactions to the referent of the statement in scale terms.

*All examples used in the present section are taken from booklets used in Phase II.

c. Osgood-type Scales

Items developed for the Osgood-type questionnaires are composed of two-part statements, the first part of which contains substantive elements, and the second (evaluative) part is represented by two polar adjectives or descriptive phrases on a seven point vertical scale. For example:

10. For this climate and terrain jungle boots are:

Very poor ------ ( )
------ ( )
------ ( )
------ ( )
------ ( )
------ ( )
Excellent ------ ( )

Note that the subject rates a referent on a seven point scale between two polar concepts. The polar concepts are usually represented by single adjectives (poor and excellent, as indicated in the sample above, or similar adjectives or descriptive phrases). Note also that each of the items above is designed to elicit attitude information on the same referent, but with different scale theory. That is, the former example illustrates the Likert-type scale, whereas the latter example illustrates the Osgood-type scale.

In order to quantify the scales, the most unfavorable choice of a scale has been assigned a value of one, and the most favorable choice a value of seven, with values increasing from one to seven corresponding to the choice position. The selection of a procedure whereby greater numerical notation corresponds with increased approval of the referent is congruous with the popular norm, and thus facilitates comprehension of the data.

d. Osgood and Likert Scales Compared

Structural differences between objective questionnaires for gathering opinion data are due primarily to the different types of scaling procedures employed. A large factor in the selection of the scaling procedures is the apparent effectiveness of a particular scale-type in the past. The agree/disagree version of the Likert-type scale was considered at the outset for this study because it has undergone a number of years of research and seemed to offer an optimal solution to scale construction problems. The Likert-type scale has been very popular for attitude research since it was first published by Rensis Likert early in the 30's. Its popularity was due primarily to the ease and simplicity of construction while at the same time retaining most of the advantages of the more costly, time consuming scales, such as the Thurstone scale and the Gutman scale. Most of the attitude work done by and for the military in recent years has been through data collected in response to Likert-type scales. It appears as if many researchers accepted the Likert-type scale unquestionably as the one type of scale for all and any attitude research, and seemed not to consider the possibility of new techniques which might replace it. Development and adaptation of the Likert-type scale to the content of the present study brought rise to many questions and resulted in consideration of some form of the Osgood-type scale early in Phase I. Both Likert and Osgood-type scales are dealt with in the following discussion because both were used for data collection, and because the decision to use the Osgood-type scale for the objective questionnaire grew out of the preliminary attempts with the Likert-type scale.

Careful consideration of the two scaling procedures raised an issue which might have very serious theoretical and practical implications; namely, the possibility that responses to the Osgood-type scales might be more valid than responses to the Likert-type scales. In order to consider this possibility systematically, two separate booklets were constructed during Phase I such that a one group - two condition experimental design could be implemented to compare the two scales. One booklet consisted of concepts structured for Likert-type scales, whereas the other booklet contained identically the same concepts structured for Osgood-type scales. Two hundred soldiers (one group) were administered both booklets (two condition) such that any differences between responses to booklets could be attributed to the difference in scaling techniques. Analysis of the data led to the conclusion that the Osgood-type scale was superior to the Likert-type scale for the type of attitude survey required for the present study. A replication of the study of the comparison between two scales was conducted in Phase II, the results of which are discussed in Chapter Six.

There are at least two logical explanations why the Osgood-type scale appears to be superior. The two explanations will be referred to as the "semantic leap" and the 'whip antenna" effect.

(1) The "Semantic Leap" Assumption

Suppose one takes as his first example item 69 of the Likert - type questionnaire in the study:

69. The meals served in the local mess hall here are excellent.

I agree completely ------ ( )
I agree quite a bit ------ ( )
I agree slightly ------ ( )
I neither agree nor disagree ------ ( )
I disagree slightly ------ ( )
I disagree quite a bit ------ ( )
I disagree completely ------ ( )

In this item it is assumed that the scale expresses seven degrees of opinion concerning the excellence of the meals. This is a typical item for a conventional military attitude survey. Unidimensionality is assumed on each Likert item so that "disagree" for a positive item is interpreted implicitly (by the item constructor) as the opposite end of the basic concept stated in the item. If the respondent agrees with the statement, one is probably safe in assuming that the respondent believes the referent "Meals" to have a relative degree of merit corresponding to the positive choice he makes. But what is the referent when the respondent checks the extreme negative of this item? Is it not possible that he has reacted something like the following: "The meals here are not excellent, they are only fair, therefore this statement is wrong. Thus I will check that I disagree completely with the statement that the meals are excellent." It is not possible to tell from the subject's response whether he is evaluating a referent (which may be a referent only to the experimenter), or whether he is evaluating a statement as a statement. It is highly probable that in many instances the respondent himself is not conscious of whether he is responding to a Likert-type statement as a statement, or whether he is responding to the referent so readily accepted by the surveyor. In the Likert-type items the surveyor makes the "semantic leap" that the respondent is responding to the surveyor's referent as his own referent, a leap which probably is frequently not justified.

Now consider item 69 which is the Osgood-type counterpart of the same numbered item of the Likert booklet, and reads as follows:

69. The meals served here in the mess halls are:

Excellent ------ ( )
------ ( )
------ ( )
------ ( )
------ ( )
------ ( )
Lousy ------ ( )

In this instance the referent "Meals" is explicitly pointed out, and the task of assigning a value ranging between two extremes is also explicitly indicated. This research team respectfully suggests that there is considerably less likelihood that the respondent is responding to the statement as a statement in this approach than in the Likert approach described earlier. In all probability, there is greater likelihood that our subject is responding to the referent "Meals" which is also the referent of the surveyor. There will always be a difference between a response to the word "Meals" and the edible objects which are placed before the respondents in the mess hall, but at least the surveyor has eliminated one possible uncontrolled level of abstraction from his referent by use of the Osgood-type approach.

(2) The "Whip Antenna" Effect

Consider the Likert-type item: "Officers here are industrious" with the choice of seven alternates between "I agree completely" and "I disagree completely." Again one is reasonably safe in assuming the respondent's meaning if he checks the positive alternative. But what does he mean if he chooses a negative alternative? For this discussion, it is assumed that the respondent has successfully made the semantic leap and that he is responding to the concept of

"industriousness" of officers. Does his negative response mean that he believes that referent "officers" work hard but are unproductive, or does it mean that they do not exert themselves - in other words, that they are lazy? Or does he have still some other interpretation in mind as he enters a negative evaluation? One has here an item which is anchored on one end ("industrious") but has no anchor at the other end. Thus the item corresponds conceptually to the mechanics of a whip antenna on an automobile radio, where one end of an antenna is anchored to the automobile and the other end is free and indeterminant. The Osgood approach of using the phrase "Officers here are ..." with officers to be rated in seven degrees between "industrious" and "lazy" anchors both ends of the continuum, thus achieving unidimensionality to the degree that the polar concepts are unidimensiontal.

2. PROJECTIVE INSTRUMENTS

While the objective questionnaires are thought of as being highly structured, the projective instruments are characterized by very little structure. Theoretically, as the respondent "structures" the materials by way of his response, he projects his "true" attitudes into the situation. The various "unstructured" techniques employed during Phase II were: 1) Listing; 2) Sentence Completion; 3) Projective Pictures (written response); 4) Projective Pictures (color response); and 5) "Your Comments" cards.

a. Listing

The Listing technique consists of items which request the respondents to list three characteristics, attributes, items, conditions, etc., which they

like, dislike, want, etc., concerning some topic (item of equipment or condition). For example:

> Three changes which would make combat boots better for this climate and terrain are:
>
> 1. _____
>
> 2. _____
>
> 3. _____

This approach to attitude assessment provides an opportunity to obtain data relating to subject matter which the surveyor assumed to be relevant to the respondents, and at the same time to obtain data about things which the respondents considered relevant but which the surveyor had not perceived as such.

b. Sentence Completion

Each item consists of a word or phrase of a partial sentence which the respondent is asked to complete. It is possible to construct the sentence stems such that they will partially determine the content of the sentence completion leaving emotional value or tone unstructured, determine the tone of the sentence completion leaving content unstructured; or leave both content and tone unstructured. The following items illustrate these three alternatives respectively:

My jungle boots _____

_____

_____

The miserable _____

_____

_____

Since I've been in the tropics _____

_____

_____

Quantification of written projective item responses was accomplished by two trained raters. Each item response was classified as to content (dimension identification) and then rated for tone. For example, a response to the item stem "My combat boots ... " might relate to the boots in general, or more specifically to the dimensions "Comfort," "Durability," "Protection," etc. Once the response was categorized it was rated for attitudinal tone.

The responses were rated on a scale of seven with tonal values assigned as indicated below:

Extremely favorable	7
Favorable	6
Slightly favorable	5
Neutral	4
Slightly unfavorable	3
Unfavorable	2
Extremely unfavorable	1

Rating responses on a seven point scale provided inter-scale compatibility for purposes of comparison and analysis with the Objective instrument.

c. Picture Projectives

Projective approaches to personality assessment which incorporate the use of pictures allow the respondent to ascribe verbalizations (or otherwise

express himself) to "other" persons represented in the scenes without fear of reproach. Two such techniques were used which are both thematic in nature but differ from one another with respect to type of responses elicited.

(1) Written Response

Scenes which depict life in the tropics both from a military and an off-duty point of view were presented to the respondents. The content of most of the ten scenes were selected so as to correspond with the topical content of the objective scaling techniques. In each scene one or more individuals are engaged in some kind of activity such as talking, walking or just sitting (thinking). Empty cartoon-like balloons are provided for the respondents to write what they think the individuals might be saying or thinking. In some of the pictures the stimuli are provided by the scene depicted in conjunction with a comment by one or more of the figures, and in some cases this is augmented by other written material. In other cases there are no comments, hence the initiating stimuli are produced by the scenes alone.

There were eighteen pictures included in the battery during the pilot study of Phase I. Careful analysis of Phase I data resulted in the deletion of several scenes in that they did not elicit a wide enough range of classifiable responses. Consequently, ten scenes were included in the test battery of Phase II. The same procedures for establishing content categories and rating tone were followed here as were used in coding sentence completion responses.

(2) Color Response

A half dozen pictures similar to the ones discussed immediately above

were presented to the respondents. Some of the same pictures employed in the "Written Response" approach were included, as well as others which were different. There were two major differences between this technique and the written response approach: 1) none of the pictures contained writing or balloons; and 2) each subject was given a box of ordinary wax crayons containing eight colors and was asked to color the scenes in any way he desired.

d. "Your Comments" Cards

A page with a card entitled "Your Comments" inserted in it was placed a quarter of the way, midway, and three quarters of the way through each objective questionnaire. During the instruction period, the respondents were encouraged to make any comments on the "Your Comments" card about any subject they desired, such that the item was completely unstructured, or open-ended.

B. SUPPORTIVE DATA COLLECTION TECHNIQUES

Supportive data consists of data which describes the respondents in terms of non-attitudinal dimensions such as intelligence scores, age, rank, education, etc. Supportive data such as intelligence scores were not collected for the entire sample, but were collected for approximately 300 soldiers. The supportive data collection techniques which were selected for Phase II research were:

1. The Lowy-Lucier Reasoning Test Combination
2. Biographical data from respondents.

1. THE LOWRY-LUCIER REASONING TEST COMBINATION

The Lowry-Lucier Reasoning Test Combination is administered in two parts, the Lowry-Lucier Reasoning Test (A) and the Lowry-Lucier Reasoning Test (B). Test (A) requires the subject to solve various problems presented in verbal form and, on the other hand, Test (B) calls for the solution of problems presented in the form of spatial relations. Both forms incorporate the progressive difficulty techniques, e.g., in each test the earlier problems are so simple that a child could solve them while the concluding problems are so difficult that sophisticated adults find them challenging. Both tests are timed, fifteen minutes being allowed for the Lowry-Lucier Reasoning Test (A) and twenty minutes for the Lowry-Lucier Reasoning Test (B).

2. BIOGRAPHICAL DATA

The demographic items which appear in the back of the "objective" booklets deal with biographical information such as age, education, marital status, dependents, rank, service time, combat time, specialty, battle star awards, time in jungle, motivation for entering Army, type of season experienced most while in tropics, type of jungle terrain most experienced while in tropics.

CHAPTER FOUR

HYPOTHESIS GENERATION

A. RESPONDENT COOPERATION

1. RATIONALE

Attitude questionnaires used in research in the United States have been designed almost exclusively without means for assessing respondent cooperation of the subjects to whom the techniques are administered. On the other hand, constructors of personality techniques and interest inventories design means of detecting respondent cooperation into their instruments as routine procedure. These detection devices are called "Lie-scales" in the case of the MMPI and "Verification-scales" in the Kuder Preference Record. This is probably no mistake on the part of the designers in either case, but rather an expression of their implied but nevertheless strong assumptions. Most attitude questionnaires which have been reported in the technical literature have been developed for research purposes as opposed to data gathering purposes and apparently are designed with the intent that they are to be used on college sophomores. Furthermore, these sophomores are usually psychology students, and it is a well-known fact that college students will extend their best efforts in full sincerity and cooperation in compliance with the request of a professor or a senior graduate student. Constructors of personality tests and interest inventories, on the other hand, design their instruments to be used on "outside world", heterogeneous populations. The behaviors of constructors of personality and interest techniques in designing some kinds of respondent cooperation checks into their instruments indicate that they are operating on the assumption that at least some of their subjects will be

providing invalid responses at least some of the time in the future. Most attitude researchers, by failing to consider the question of respondent cooperation, imply that they design their instruments solely for use with college populations, i.e., for conscientious, cooperative, capable subjects. But articles are beginning to appear in the literature which indicate that some individual researchers are concerned with the question of respondent cooperation. Isherwood (1962) used the MMPI (lie) scale as part of his instrument for collecting opinion information on adolescents (ages 14 - 15). He employed the Likert scale for the bulk of the items of his instrument. Husak and Wiltrock (1962) seem to have some question about respondent cooperation even of their college student subjects: "...the attitude of the students (majors in teacher education) toward public school teachers was in general extremely positive... Perhaps this is true because of the attitude structure of the students or perhaps it is true because the students were in an education class." Husak and Wiltrock used Osgood-type scales in their attitude study. Paul (1960) developed an ad hoc procedure for assessing respondent cooperation in a study to derive scales to collect opinions of soldiers about items of their equipment. The author indicated that he considered this particular study to be of relatively high importance because the results were to provide the basic approach to many applied studies in the future and concluded that: "It is considered desirable to eliminate subjects who did not properly rate the individual statements...to identify respondents who either guessed at the ratings or misunderstood the instructions." The procedures "eliminated approximately 15 per cent of the total sample," who were soldiers. This study used the Thurstone scale approach.

While there appears to be an increasing uneasiness on the part of some researchers in the attitude fields concerning the question of respondent cooperation, as indicated in the previous three citations, there has as yet been no clear, concise, unequivocal discussion of the topic in the literature. The present authors have reason to believe that all individuals of even supposedly homogeneous groups do not respond to questionnaires with the same degree of veracity, interest, and capability; that in many instances respondents will attempt to confound the surveyor. It is further believed that even when professors administer questionnaires to sophomores in psychology classes, some respondents will react in ways other than intended by the project designers. As stated earlier, constructors of personality assessments or interest inventories appear to accept the probability of some uncooperative respondents and prepare detection measures as a matter of course, even though "attitude researchers" do not. If there is a real question regarding respondent cooperation in connection with all types of questionnaires, and the present authors are convinced there is, then procedures for dealing with this matter should be initiated immediately. The present authors hold as <u>axiomatic</u> that respondent non-cooperation is a probability in all instances where questionnaires are employed as data gathering instruments. Three general conclusions follow from this axiom:

a. The problem of respondent cooperation is fundamental to any research project where questionnaires are to be used;

b. All social scientists who use questionnaires in their research should be conscious of the problem of respondent cooperation; and

c. Action leading to solution of the problem of respondent cooperation in connection with questionnaires should be initiated.

2. DEFINITIONS

a. Cooperative Respondent

A respondent who is: 1) capable of comprehending the questionnaire content and the instructions, and does, in fact, understand them; 2) interested in the questionnaire situation to the degree that he will conscientiously direct his attention to completing the tasks assigned him in the experimental context.

b. Non-Cooperative Respondent

A respondent who is: 1) not capable of comprehending either the instruction and/or the contents of a questionnaire; 2) not interested in the experimental situation to the extent that he will not direct his attention to completing the tasks assigned him, whether it be from the start of the administration or develop as the session proceeds toward its conclusion. In many instances a subject may actually attempt to mislead the experimenter by his purposely incorrect responses.

It is taken for granted that not all types of uncooperative respondents can be detected by a simple technique, nor can one type of detection approach be equally usable with all types of questionnaires. Furthermore, if a bright, attentive, determined individual sets out to record misinformation about "what he thinks," there is probably no devisable technique by which this type of behavior can be detected. Perhaps the most effective way to diminish this type of unreliable behavior is to establish administrator-subject rapport.

c. Respondent Consistency Check (RCC)

Some types of questionnaires, such as the Likert scales and the Osgood scales lend themselves to simple, accurate, mechanical means of detecting some types of respondent inconsistency from which respondent non-cooperation can be inferred. Consequently, a mechanical detection device herein called Respondent Consistency Checks (RCC) has been developed for the Likert and Osgood-type scales and the detection approach has been studied experimentally. Although both of these scales have been used extensively in the past, there are no indications that the detection approach has been used to date, or that it has even been considered from a general point of view.

The procedure followed is to have the subject respond twice to the same item, or basic item content, with reversed direction of the scales on the two response situations. An RCC unit consists of an original item and a repetition item.

An RCC unit for an Osgood Booklet consists of an original item and its exact repetition, except for reversal of scale direction. For example, an Osgood RCC unit consists of the following original items (using booklet numbers):

23. The rain in this area is:

no problem ----- ( )
----- ( )
----- ( )
----- ( )
----- ( )
----- ( )
a major problem ----- ( )

and the following repetition item:

54. The rain in this area is:

a major problem ----- ( )
----- ( )
----- ( )
----- ( )
----- ( )
----- ( )
no problem ----- ( )

The reversal of the scale for the Likert booklet is managed by language. The stem of an original item and its repetition as an RCC unit in the Likert booklet is the same as the stem of its corresponding Osgood RCC unit. The sentence of each stem is completed by taking the upper pole of the corresponding Osgood item. Thus, the Likert RCC unit corresponding to the Osgood example has as its original item: "23. The rain in this area is no problem" followed by a seven point agreement to disagreement scale; and as its repetition item: "54. The rain in this area is a major problem" followed by a seven point agreement to disagreement scale. There are 13 RCC units in the booklet, one for each of the topics represented.

Any subject who has more than two scale points difference between an original item and its repetition item of an RCC unit is considered to have made a Respondent Consistency Error (RCE). For example, if a respondent checks item 23 as a five and item 54 as a two, he has one RCE. When a subject has three or more RCE's out of the possible 13 RCE's, his data are placed in the "invalid" data category. The data for those who make two or less RCE's are placed in the valid data category. It is conceded that this criterion is debatable. Our only comment is that three RCE's out of 13 possible is about 25 per cent and, if one could infer that the same kind of treatment has been given to all the other items in the instrument, about one fourth of the data is untrustworthy. To us, that seems sufficiently bad as to suggest the desirability of either removing (or heavily discounting) the answers given by that particular subject (unless, of course, study of this kind of deviant behavior is the prime purpose of the study).

Another type of response behavior which might be used to infer non-cooperation and which is not detected by the RCC becomes apparent. In some instances the subjects mark the middle or neutral response position on entire blocks of items. In other cases, the respondents do not mark any of the choices on several items. These two types of response behaviors were referred to in Phase I as Undifferentiated Profiles and Incomplete Information, respectively. Due to the fact that these patterns of responses occurred relatively infrequently and perhaps more importantly, could also be interpreted to indicate that the respondents, in fact, did not have attitudes towards the referents, no systematic techniques were employed for detection of these response patterns.

3. HYPOTHESES

Having defined the cooperative respondent in terms of capability and interest and assuming that these characteristics can be assessed by the consistency check technique, the following hypotheses have been generated:

a. A significant proportion (10 - 20 per cent) of the total sample will commit three or more RCE's.

b. When responses of matched Osgood and Likert items are correlated, respondents classed as non-cooperative will obtain a lower coefficient of correlation than respondents classed as cooperative.

In view of the fact that Okinawa served as a staging area for Viet Nam, it is assumed that the Okinawa group had the most recent and most

intense combat involvement. Panama, while not considered a combat area when this report was written, had been subjected to some conditions similar to those found in combat just prior to data collection there. Consequently, the Panama group is considered less combat involved than the Okinawa group, but more combat involved than the Hawaii group.

Based on the assumption that interest is a function of combat involvement, there result the following hypotheses:

a. Fewer combat experienced respondents (1st Special Forces on Okinawa will make three or more RCE's than troops in Panama or Hawaii.

b. Troops stationed in Panama will make fewer RCE's than troops in Hawaii.

B. TOPIC DIMENSIONALITY

1. RATIONALE

The empirical research conducted by and under the direction of Natick Laboratories, in which major dimensions of soldier equipment acceptance were identified, was used as a base for further exploitation of the dimensionality notion. It was hoped that during the time domain of the present contract the construct of dimensionality could be examined more thoroughly from a theoretical point of view as well as applying the notion in the context of tropic equipment usage. As was intended, contributions have been made to the concept of dimensionality in both of these areas.

As explained in their theoretical discussion of attitudes (Lucier, et al) the present authors view attitudes to be based upon complex interactions of

beliefs and values directly and/or indirectly associated with the attitudinal object. An attitude toward some object such as an item of equipment is a resultant of the beliefs and values about specific attributes of the item. Again, each belief of an attribute of an item is based upon beliefs about more specific characteristics of the attributes.

In short, each item of equipment or attitudinal object should be examined not only in terms of its different dimensions, but also in terms of its different levels of dimensions in order to provide adequate analytical evaluations.

2. DEFINITIONS

The items pertaining to each topic are designed to represent different levels of dimensions. Each topic has either two levels or three levels of items in these instruments, referring to them as levels one through three, going from the general to the specific. The levels of dimensions for each topic are represented in Tables 3, 4 and 5. The first level of each topic contains only one item and is of a global nature. It usually expresses the degree of satisfaction with the topic in question. The second level contains the major dimensions which are assumed to cortribute to the first level. For example, for Topic 1. "Fatigues," the first item (level one, "Global") seeks to determine felt adequacy of this object. The next three items, level two, (on the structured series, not the series found in the booklets) deal with a) "Comfort," b) "Durability," and c) "Protection." The second level dimension of protection was chosen to expand into the three items on level three. These level three items cover: a) "Camouflage," b) "Insects," and c) "Underbrush." It

TABLE 3

STRUCTURE OF TOPICS INTO LEVELS OF DIMENSIONS
FOR THE NINE COMMON TOPICS

Topic	Dimension	Level
Fatigues	Global	1
	Comfort	2
	Durability	2
	Protection	2
	Camouflage	3
	Insects	3
	Underbrush	3
Poncho (s)	Global	1
	Durability	2
	Protection	2
	Comfort	2
Jungle Boots	Global	1
	Comfort	2
	Traction	2
	Durability	2
	Cracking	3
	Rotting	3
	Stitching	3
Combat Boots	Global	1
	Traction	2
	Protection	2
	Durability	2
	Cracking	3
	Rotting	3
	Stitching	3

TABLE 3 (Continued)

Topic	Dimension	Level
Canteen	Global	1
	Portability	2
	Durability	2
	Capacity	2
Poncho (t)	Global	1
	Durability	2
	Protection	2
	Comfort	2
	Fit	3
	Movement	3
	Temperature	3
Weather	Global	1
	Temperature	2
	Humidity	2
	Rainfall	2
Insects	Global	1
	Quantity	2
	Danger	2
	Annoyance	2
Water	Global	1
	Availability	2
	Healthfulness	2
	Taste	2

TABLE 4

STRUCTURE OF TOPICS INTO LEVELS OF DIMENSIONS
FOR THE SIX NON-COMBATANT SPECIFIC TOPICS

Topic	Dimension	Level
Meals	Global	1
	Variety	2
	Quantity	2
	Quality	2
	Taste	3
	Greasiness	3
	Preparation	3
Combat Boots	Global	1
	Traction	2
	Protection	2
	Durability	2
	Cracking	3
	Rotting	3
	Stitching	3
Pack	Global	1
	Durability	2
	Capacity	2
	Comfort	2
	Weight	3
	Fit	3
	Movement	3

TABLE 4 (Continued)

STRUCTURE OF TOPICS INTO LEVELS OF DIMENSIONS
FOR THE SIX NON-COMBATANT SPECIFIC TOPICS

Topic	Dimension	Level
Officers	Global	1
	Experience	2
	Common sense	2
	Understanding	2
Entertainment	Global	1
	Quantity	2
	On-base	2
	Off-base	2
Family	Global	1
	Authorization	2
	Quarters	2
	Acclimation	2

TABLE 5

STRUCTURE OF TOPICS INTO LEVELS OF DIMENSIONS
FOR THE FOUR COMBATANT SPECIFIC TOPICS

Topic	Dimension	Level
Tiger Suit	Global	1
	Comfort	2
	Durability	2
	Protection	2
	Camouflage	3
	Insects	3
	Underbrush	3
Hammock	Global	1
	Portability	2
	Protection	2
	Durability	2
Poncho Liner	Global	1
	Portability	2
	Durability	2
	Protection	2
Rucksack	Global	1
	Durability	2
	Capacity	2
	Comfort	2
	Weight	3
	Fit	3
	Movement	3

should be noted here that the three second level dimensions of "Comfort", "Durability", and "Protection" seem to predominate this level for most military clothing objects. All three levels are used with four of the common topics, one dimension of level two being selected to expand into level three (or most specific level). It would have been desirable to have expanded all topics to three levels, but practical administrative limitations would not permit this.

3. HYPOTHESES

a. The mean of level three responses for a topic will correlate significantly with its parent second level response.

b. The mean of level two responses for a topic will correlate significantly with its parent first level response.

C. INTER-TECHNIQUE COMPARISONS

1. RATIONALE

Thirteen equipment and situational topics were identified in Phase I as critical areas of attitudinal inquiry. In Phase II, Objective items were constructed representing each topic and its several salient dimensions. Sentence Completion items were written for most of the 13 topics and also for some additional topics not included in the Objective instruments.

On the assumption that attitudes are characterized by some degree of stability, Objective responses and Sentence Completion responses were to be compared by topics as a measure of validity, with each technique serving as the external criterion for the other.

Comparison of Objective Likert with Objective Osgood forms was done on a small scale in order to verify the findings of Phase I. The two major findings of Phase I were: 1) responses to matched items of Osgood and Likert questionnaires were significantly correlated; and 2) Osgood items were attended to significantly better than were the Likert items.

2. HYPOTHESES

a. Sentence Completion responses will correlate statistically significantly with corresponding responses to objective items.

b. Responses to matched items of the Osgood and Likert questionnaires will correlate at an .01 level of significance or greater.

c. Respondents will make fewer inconsistent responses on the Osgood scales than on the Likert scales, as measured by Respondent Consistency Check (RCC).

CHAPTER FIVE

DATA REDUCTION

A. OBJECTIVE TECHNIQUES

Respondents marked their choice positions on Univac Optical Scan Cards which were included in the Objective questionnaires as answer sheets. The Optical Scan Cards were read by the Remington Rand 5340 Optical Scanning Punch which is a machine that reads marks on standard cards and transforms these marks into punched holes. Once all of the cards were punched they were run through the International Business Machine 7044 Computer and all of the information was stored on tape. The necessary programs were written to permit statistical computations by the 7044.

This data collection - processing system allowed the data to pass from the respondent directly to the computer with no intermediate manual data manipulations. This capability resulted in a great savings in time and effort, with increased accuracy. However, the system was not developed without some difficulty. The largest single obstacle which had to be overcome was the development of an answer sheet (card) format which would accommodate the types of items to be used and that could be read by the Optical Scanner. A special optical scan card layout was developed for the job and then plug boards were wired to allow the 5340 Optical Scanning Punch to read and punch 90 degrees off the usual mode of operation.

Some difficulties were incurred with the initial batch of data which had been collected in Panama. Erasures were being punched as well as actual marks of respondents, which resulted in a series of double punches, thereby

confounding the data. Two measures were successfully taken to rectify the situation. The sensitivity of the 5340 Optical Scanning Punch was adjusted such that erasures would not be detected and counted as marks, and the optical scan cards themselves were cleaned up inasmuch as the respondents were sometimes quite careless, in spite of repeated warnings of the administrators.

B. PROJECTIVE TECHNIQUES

Two major criticisms of using projective techniques for data collection, especially in taking data from groups, were that data reduction and analysis is too time consuming and too subjective. The present authors concur that data reduction and analysis are difficult and that there is a certain amount of subjectivity inherent in the approach, but would further assert that subjectivity characterizes the "objective" techniques as well, only at a different stage of the process. With the projective techniques the investigator projects his own idiosyncrasies into the system by way of his perceptual processes as he attempts to structure the unstructured responses. With the "objective" techniques the investigator projects himself into the system when he structures the questionnaire to which the subjects are to respond. Consequently, subjectivity must be dealt with in either case. A systematic approach to the problem, be it structuring items and response categories for a questionnaire or structuring responses once they have been elicited, must be carefully developed.

A systematic technique for coping with projective data has been developed and incorporated into the present research. Although several projective techniques have been employed the data collected with each have been reduced in approximately the same manner.

1. SENTENCE COMPLETION

The data acquired by way of the Sentence Completion technique were reduced as described below. The raters normally worked independently so as to avoid rater - rater bias. In the initial step each rater went through the data of a group of respondents independently, listing all of the possible categories of responses they could envision for a particular topic. At this point the two raters and the project director would confer to discuss the categories, combining appropriate categories, deleting some and adding some which seemed necessary. Using a finite number of categories each rater went back to the data with which he had been working in an attempt to place every response in one of the then existing categories. After each rater had coded the same responses, the trio again conferred and the ratings were examined subject by subject, and all diferences were discussed so as to allow the raters to adopt the same rating criteria. At this point the data from a different group of subjects were coded and another discussion ensued. The purpose of the final rating discussion session was to insure that the categories in use were not group specific and that the raters were maintaining whatever convergent thinking they had attained in earlier discussions.

Once the categories were tentatively established, the same iterating procedures were followed in rating the responses for tone that were used for determining categories. By and large the raters were able to attain a high level of agreement the results of which are presented in Chapter Six.

2. LISTING

The Listing data was reduced to the form of Saliency Scores. Saliency

Scores are weighted scores and were calculated by assigning different values to the three choice positions, calculating the frequency with which a topic was listed within each choice position, multiplying frequency times choice position values, and then summing the choice position scores. The topics were then rank ordered according to Saliency Scores.

3. PICTURE PROJECTIVES - WRITTEN RESPONSES

As with the Sentence Completion technique, an iterative approach was used. Raters worked independently, listing all of the categories of responses for a particular picture in order to classify for content. After a discussion of the categories established by each rater, a finite number of categories were selected for further exploration and each rater returned to the data which he had previously worked. These ratings were then compared and the categories were modified in number and kind where it was deemed necessary. New groups of responses were then rated using the updated categories. As will be explained in Chapter Six, this was as far as the data reduction was carried for the Picture Projective - Written Response technique.

4. PICTURE PROJECTIVES - COLOR RESPONSES

The employment of data collection techniques based on the assumption that there are color correlates of attitudes was, needless to say, exploratory. The novel nature of the work certainly did not lend itself to any immediate, clearly defined, tried and proved procedures which could be easily instituted for reducing and making sense of the data. Rather, the investigators were faced with an enormous amount of data and insufficient time to fully investigate the many courses of action which could have been followed in developing

techniques which would provide optimal information. What was attempted, however, was reduction of the color response data in the most objective manner possible in hopes that such a reduction would then provide meaningful approaches to data analysis.

Each picture was divided into three categories for purposes of reduction and analysis: foreground, background, and extra detail. Foreground constituted those elements of each picture which the investigators wished to emphasize. It was hoped that the subjects would respond freely and more frequently to these elements than to the rest of the picture. The background included those necessary parts of a scene which help to provide the context in which themajor stimuli are couched. Extra detail consisted of those responses in which the respondents added detail to the picture through structure rather than merely coloring the already present stimuli.

Each major category of each picture was rated for completeness, and each picture was rated for emphasis, reality, neatness and stroke density. Color usage frequency was determined for each major detail in every picture across all subjects who were administered the Picture Projective - Color Response technique. The number of colors used per person was determined.

It was hoped that the data could be reduced in such a manner as to provide the following kinds of information:

a. The kinds and frequencies of colors used for each major detail in each picture.
b. Identification of those pictures and elements of pictures which elicited color responses.

c. The extent to which the pictures elicited reality vs. unreality responses.

An attempt was made to reduce the data in such a way as to be useful for nomothetic or ideographic investigation, although the former was expected to be of primary concern in this project.

The iterative practice technique was used in training the raters such that even though most of the parameters were unique and heretofore unmeasured, agreement was reached on rating criteria. Wherever possible the measures were broken down in such a way as to require but simple counting procedures, thereby objectifying the measures.

5. "YOUR COMMENTS" CARDS

Due to the completely unstructured nature of the "Your Comments" cards technique, a large variety of responses was anticipated. An attempt was made to identify the most frequently mentioned topics first of all, paying little or no attention to the way in which the topics were presented. After identifying the most frequently mentioned topics it became apparent that the responses could be grouped into several categories: 1) suggested modifications to equipment/situations/practices; 2) dissatisfaction with specific aspects of equipment/situations/practices; 3) general dissatisfaction with military life. Response categorization in the above manner seemed to provide an arrangement of the data which would be extremely helpful in data analysis and interpretation.

CHAPTER SIX

RESULTS AND DISCUSSION

A. HYPOTHESES TESTED

Hypothesis 1

A significant proportion (10 to 20 per cent) of the total sample will commit three or more "Respondent Consistency Errors" (RCE's).

Results: Supported by the data. 12 per cent of the total sample committed three or more RCE's.

Hypothesis 2

When responses of matched Osgood and Likert items are correlated, respondents classed as "uncooperative" will obtain a lower coefficient of correlation than respondents classed as "cooperative."

Results: There were insufficient "uncooperative" responses for computation.

Hypothesis 3

Fewer combat experienced respondents (1st Special Forces Group on Okinawa) will make three or more RCE's than troops in Panama or Hawaii.

Results: Not supported by the data. The percentages of respondents of the three major groups who made three or more RCE's are as follows: Panama 14 per cent, Hawaii 12 per cent, and Okinawa Special Forces 11 per cent. While these percentages are in the predicted direction the differences between them are not statistically significant at the .05 confidence level.

Hypothesis 4

Troops stationed in Panama will make fewer RCE's than troops in Hawaii.

Results: Not supported by the data.

Hypothesis 5

The mean of third level dimensional responses for a given topic will correlate significantly with the mean of its parent second dimensional level response.

Results: Supported by the data. Of four correlation coefficients computed, all were well beyond the .01 level of confidence.

Hypothesis 6

The mean of second level dimensional responses for a given topic will correlate significantly with the mean of its parent first dimensional level response.

Results: Supported by the data. Of nine correlation coefficients computed, all were well beyond the .01 level of confidence.

Hypothesis 7

Sentence Completion responses will correlate statistically significantly with responses to corresponding objective items.

Results: Supported by the data. Sentence Completion and Osgood responses for five different groups were computed and four of the five correlations were significant at the .05 level of confidence, or greater.

Hypothesis 8

Responses to matched items of the Osgood - Likert questionnaires will correlate at a .01 level of confidence or greater.

Results: Supported by the data. Only one of twelve correlations run was significant at less than .01.

Hypothesis 9

Respondents will make fewer inconsistent responses on the Osgood scales than on the Likert scales.

Results: Supported by the data.

B. RESPONDENT COOPERATION

Forty-seven subjects out of two hundred made three or more "Respondent Consistency Errors" (RCE's) in Phase I. On the basis of this relatively high percentage (.23) of respondents who made at least three RCE's, it was predicted that 10 to 20 per cent of the sampled population in Phase II would meet the rejection criterion. The more conservative percentage estimate for Phase II was based on the assumptions: 1) more combat experienced respondents would be included in the Phase II sample, and they would be more attentive and commit fewer RCE's than the less experienced, less serious soldiers; 2) only the Osgood scale would be used instead of both Osgood and Likert which would provide clearer task definitions to the troops which, in turn, would result in fewer RCE's.

As it turned out, only 12 per cent of the total sample were classified as "Uncooperative Respondents" (UR) according to the RCE criterion, which was

relatively close to the expected minimum. The data displayed in Table 6 indicates little or no differences between per cent of Uncooperative Respondents in Panama, Hawaii and Okinawa. In fact, a chi-square was computed and there was no significant difference between groups. However, a noticeable difference is indicated between some of the branches within a location. The most apparent contrast is the Special Forces in Panama versus the Airborne in Panama with UR percentages of .03 and .18 respectively. On the assumption that the UR percentage difference between the two groups was a manifestation of some basic characteristics the groups were compared on the demographic variables of age, education, rank, time in service, combat experience, and jungle training experience. Chi-square values were computed between the two groups on each of the demographic variables and all six were significant at the .01 level or greater. The Special Forces group was significantly older, more educated, had higher ranks, had longer service time, more combat experience and had spent more time in jungle training.

The same six variables were examined for the infantry in Panama which had the same percentage of UR as the Airborne. The chi-square values computed indicated that there were no significant differences between the Airborne and the Infantry with respect to age, education and rank, but that the Infantry was significantly less in service time, combat time and jungle training.

On the basis of these data it would appear that, insofar as tropical conditions are concerned, more consistent responses can be expected from troops who are older, more educated, higher ranked, have spent more time in the service and have had more combat and jungle training experience.

TABLE 6

RESPONDENT CONSISTENCY ERRORS (RCE) AND INCONSISTENT RESPONDENTS BY GROUPS

Group	N	No. of RCE's	No. of Inconsistent Respondents	Per Cent of Inconsistent Respondents
Panama	821	952	114	14
Missile	189	205	23	12
Mech.	52	52	5	10
Airborne	186	245	33	18
Special Forces	93	59	3	3
Infantry	287	380	49	17
Med.	14	11	1	7
Hawaii	568	577	64	11
Infantry	248	242	23	9
Artillery	100	125	17	17
Mechanized	130	135	16	12
Support	90	75	8	9
Okinawa	478	426	51	11
Support	198	171	22	11
Artillery	100	87	9	9
Special Forces	180	67	20	11
Total	1867	1955	229	12

If indeed, the sample population can be classified as either "cooperative" or "uncooperative" on the basis of consistency scores, it does not seem too unlikely to expect the two groups to differ in attitudinal disposition as well as in demographic characterization. Table 7 represents comparisons of the topic means and standard deviations between the "cooperative" and "uncooperative" populations. Probably the most striking information displayed by the table is that in every mean comparison the mean of the "uncooperative" group is lower, or more negative. Although half of the mean differences are not statistically significant, it appears relevant that all differences are in the same direction. Also, in twelve of the fifteen standard deviation comparisons the "uncooperative" group was higher, indicating less group homogeneity.

In summary, although fewer than expected, a large number of respondents made three or more RCE's and were placed in the UR category. A comparison of these two groups in terms of both independent (demographic) and dependent (attitudes) variables indicated significant differences between the two groups. The assumption that the three major locations, Okinawa, Hawaii and Panama were representative of different degrees of combat and jungle experience was not entirely born out. The fact that in Panama it became possible to collect data from Special Forces troops resulted in more interested and highly motivated respondents than had been expected. This in turn had profound results on the expected outcome of RCE's committed in each location and provides an explanation for the lack of support for Hypotheses 3 and 4.

TABLE 7

MEANS AND STANDARD DEVIATIONS OF ELEVEN TOPICS FOR TOTAL COOPERATIVE AND TOTAL UNCOOPERATIVE GROUPS

Topic	Means			Standard Deviations		
	Cooperative	Uncooperative	Diff.	Cooperative	Uncooperative	Diff.
Fatigues	3.84	3.81	-.03	1.63	1.57	-.05
Poncho (S)	4.30	4.19	-.11	1.46	1.56	+.10
Jungle Boots	5.12	4.94	-.18*	1.41	1.42	+.01
C. Boots (S)	5.35	5.22	-.13	1.24	1.29	+.05
Canteen	4.97	4.72	-.25**	1.40	1.48	+.08
Poncho (T)	3.77	3.58	-.19*	1.55	1.54	-.01
Weather	3.27	3.19	-.08	1.54	1.68	+.14
Insects	2.55	2.42	-.13	1.39	1.42	+.03
Water	4.70	4.49	-.21*	1.53	1.54	+.01
Entertainment	3 5	2.84	-.31*	1.68	1.77	+.09
Family	4.31	3.89	-.42*	1.46	1.62	+.16

* .05 level of significance
**.01 level of significance

Note. - The positive and negative signs in the Difference columns are indicators of the direction in which the Uncooperative group differs from the Cooperative.

C. TOPIC DIMENSIONALITY

While men develop attitudes about certain aspects of their environment, some of which sometimes can be elicited and scaled, the mechanism by which they process the information needed to arrive at their particular attitudes is little understood. In an attempt to acquire attitudinal information which could be used for equipment evaluation and design, and to better understand the attitudinal process, items relating to various critical topic dimensions were systematically incorporated into the data collection instrument. The nature of the items used for response elicitation allowed the data to be processed and analyzed so as to account for the various beliefs and feelings an individual has about an attitudinal object and which yields a resultant attitude. Not all beliefs and feelings a subject has regarding some object are necessarily of similar directions and strength, and it is the way these differences relate to one another which is of interest in the present research.

Figures 2 through 4 display the relationships of topical dimensions with respect to direction and magnitude. Every figure is characterized by a rather wide, diversified, range of values. In most cases, the topic for which the figure was drawn has some dimensions represented above the "Hypothetical Neutral" of four, and some dimensions represented below the "Hypothetical Neutral" point. In short, the data displays in these figures indicate that most of the topics have some characteristics which are acceptable and some which are not.

Obviously, the dimensions of a topic are not necessarily equivalent in importance. Although global means seem to reflect an average of the dimension means in most cases, there are some instances in which the global

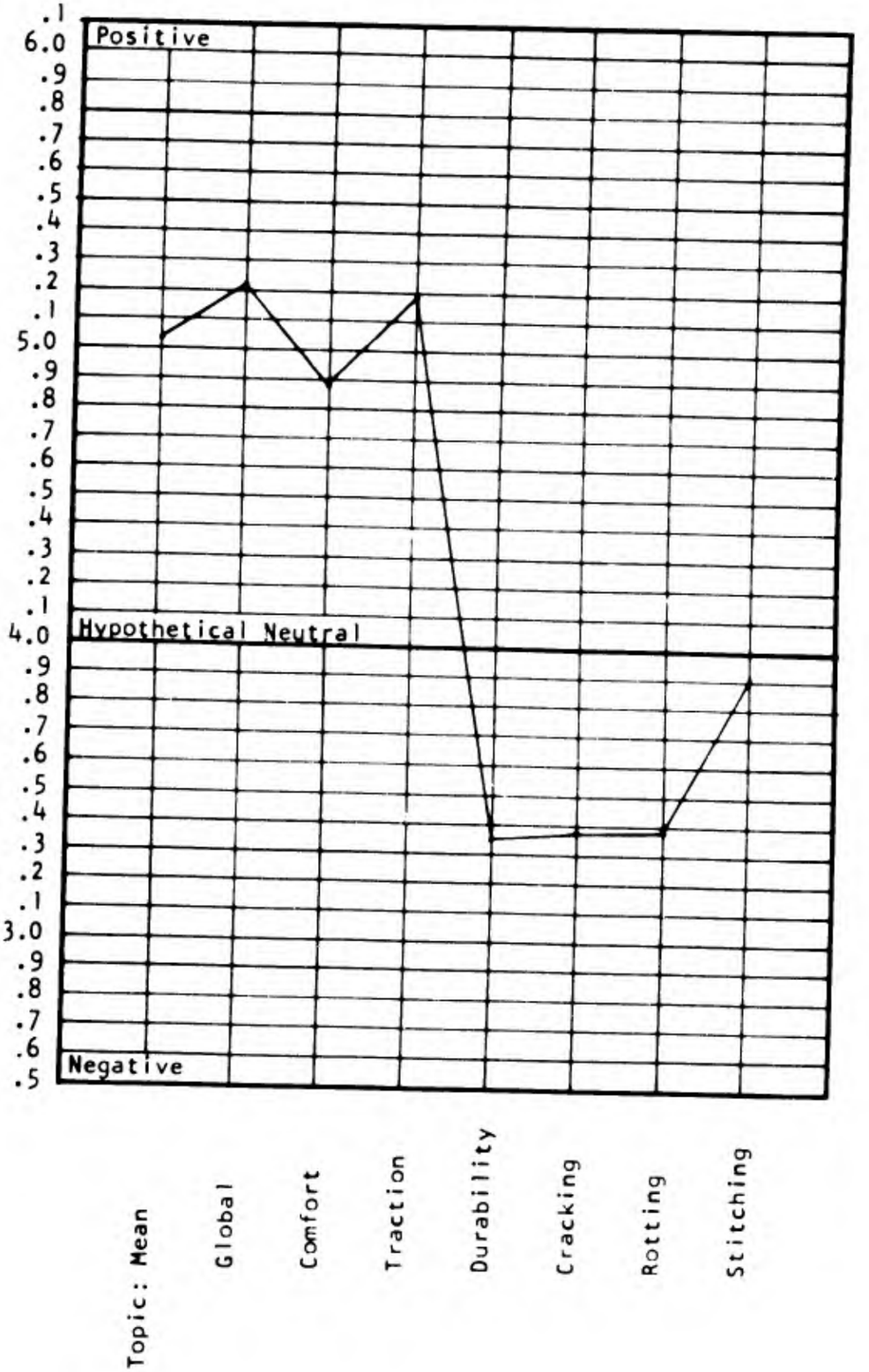

Fig. 2. Panama Population Attitudes - Topic: Jungle Boots

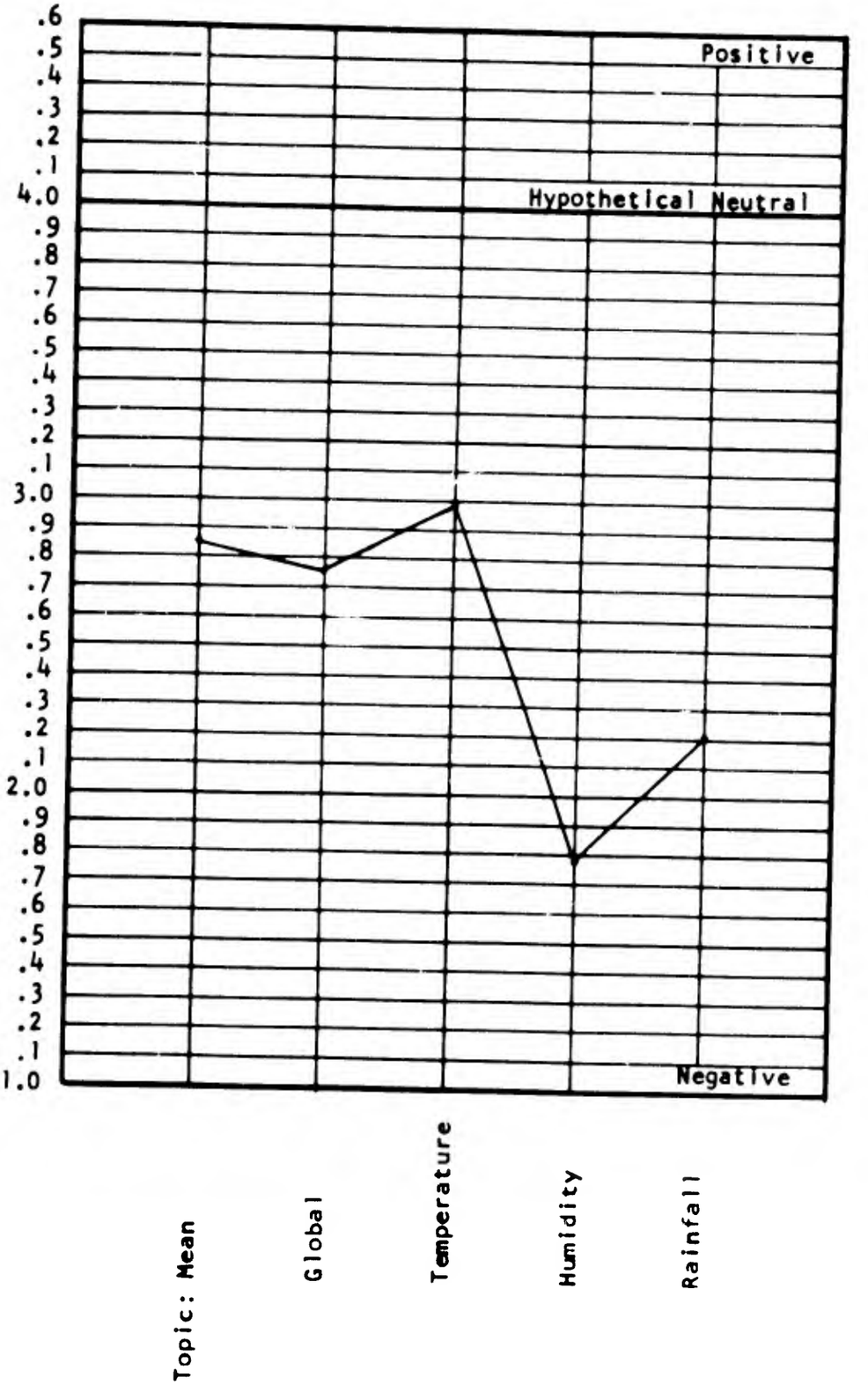

Fig. 3. Panama Population Attitudes - Topic: Weather

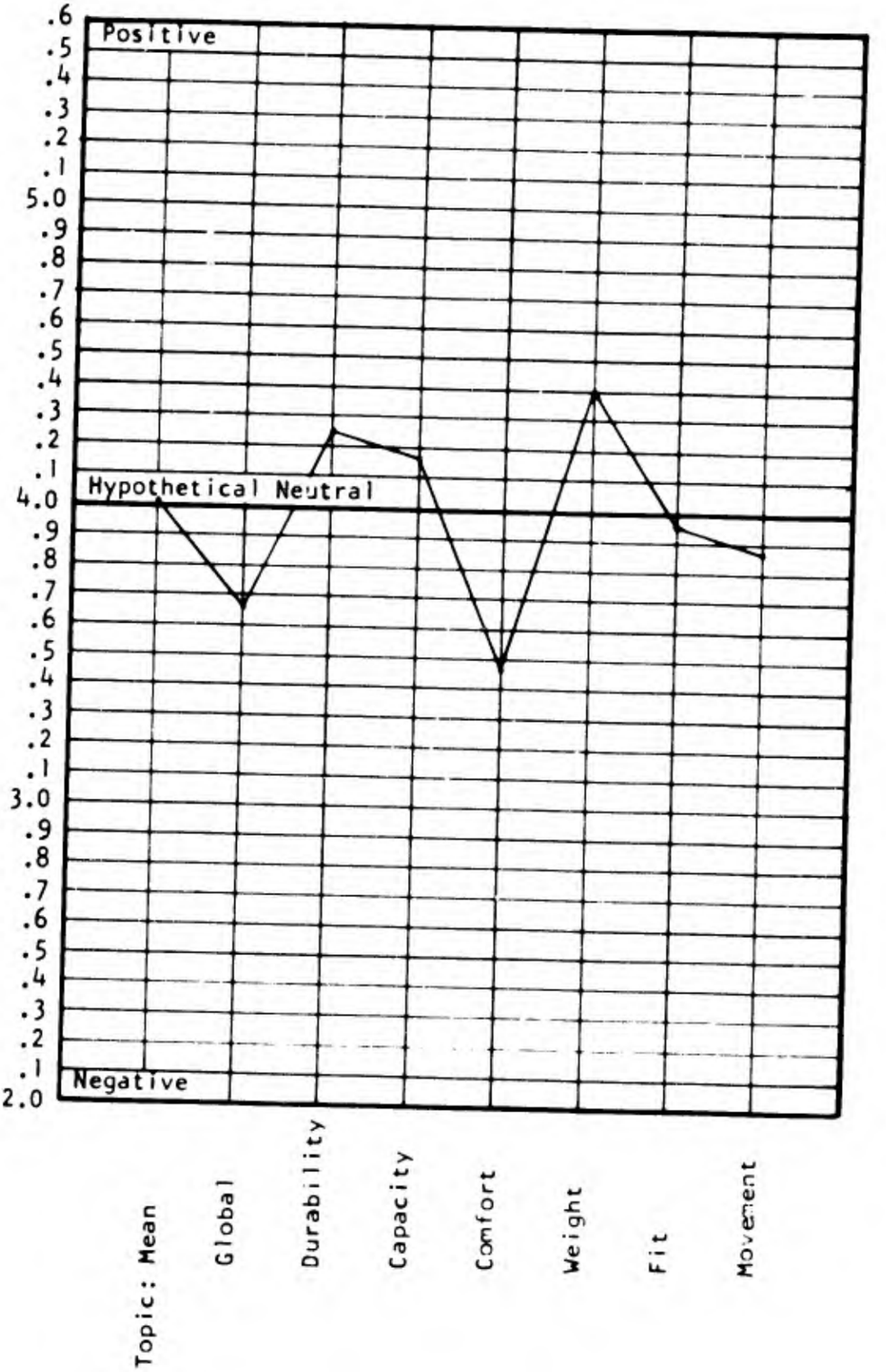

Fig. 4. Panama Population Attitudes - Topic: Pack

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mean is more like the most deviant of the dimensions. Assuming that the most important dimensions are adequately represented it would seem that the most deviant dimension in this case would be regarded as the most important to the respondent. This point is illustrated by the data in Figure 2. The dimensions "Comfort" and "Durability" are both more negative than the global, and "Durability" is nearly two whole points more negative. "Traction", on the other hand, is practically the same value as the global mean and significantly different from the other two dimensions. It would appear that "Traction" had the greatest influence on the global mean and consequently, was probably the most important of the dimensions.

Another example which illustrates the same phenomenon is the topic of "Weather." The global mean for "Weather" which is represented in Figure 3 is very closely associated with "Temperature," while the "Humidity" and "Rainfall" means are both much more negative. It would appear that while the troops regarded the various aspects of weather conditions in Panama as somewhat undesirable, two of the dimensions were much more undesirable than the third. "Temperature," however, had the most influence on the general attitude toward "Weather" and consequently resulted in a higher global mean than would be expected.

"Pack" is another case in point as illustrated in Figure 4. While the dimensions of "Durability" and "Capacity" were viewed on the acceptable side of "Hypothetical Neutral," the "Comfort" dimension was not acceptable, which is also what the global mean reflects.

The results displayed in Table 8 lend even greater support to the notion that the belief value aspects of attitudes and their interrelationships can and

TABLE 8

DIMENSION AND SUB-DIMENSION MEAN CORRELATIONS OF THE NINE COMMON TOPICS FOR TOTAL COOPERATIVE (TC) AND TOTAL UNCOOPERATIVE (TU) GROUPS

Topic	First Level Dimension vs. Second Level Mean		Second Level Dimension vs. Third Level Mean	
	TC	TU	TC	TU
Fatigues	.58	.33	.54	.42
Poncho (S)	.65	.48		
Jungle boots	.63	.52	.59	.30
Combat boots (S)	.57	.41	.42	.33
Canteen	.38	.27		
Poncho (T)	.45	.34	.47	.40
Weather	.57	.39		
Insects	.62	.45		
Water	.54	.42		

Note. - All coefficients are well beyond the .01 level of confidence

should be systematically studied. Dimension responses were correlated with their sub-dimensions' mean for each respondent. Note that without exception all thirteen correlations are significant ones. Interestingly enough, for the most part, the First Level - Second Level correlations are higher than the Second Level - Third Level correlations.

The topic dimensions profiles and the dimension/sub-dimension-means correlations data both support the notion that attitudes toward topics are comprised of beliefs and values about dimensions and sub-dimensions of the topics. The data further indicate that these dimension and sub-dimension beliefs, values and attitudes and their interrelations are amenable to analysis in ways which make level oriented dimension analysis a valuable and constructive way to ferret out specific attributes of attitudes. In this way attitudinal data can contribute directly to equipment design guidance, evaluation of management policies, etc.

D. PROJECTIVE TECHNIQUES

There are some who would argue that projective techniques do not provide meaningful, reliable data, and some who argue that reduction of projective data is prohibitive due to the level of effort required to accomplish the task. Consequently, in this volume projective results are considered in terms of data reduction efficiency and data meaningfulness.

1. LISTING

a. Data Reduction

Data reduction of data collected by way of the Listing technique was

comparatively straightforward. The reductionists were able to accomplish their task at the rate of 200 items per man hour. While eliciting a rather wide range of responses, the Listing technique allowed rapid manual data reduction procedures. The data which were reduced and the topical dimensions and their weighted usage frequencies derived therefrom are displayed in Tables 9, 10, 11 and 12. Four of the eight items included in the listing technique were selected for complete reduction and analysis. The data from the remaining four items were not appropriate for the present analysis and were set aside for possible future exploration.

b. <u>Data Meaningfulness</u>

The Listing technique is considered one of the better saliency measures of the present instrument. The topics and dimensions included in the Phase II data collection instruments were selected in large measure on the basis of Listing results which had been obtained during Phase I. Assuming the Panama sample used in Phase I was adequately representative, Phase II Listing results should therefore compare rather highly with the topics and dimensions used in the Objective instrument of Phase II. The following reports the results obtained from the four items selected for analysis.

Saliency scores were calculated for each topic and/or dimension listed in each of the four items. Saliency scores are weighted scores and were calculated by assigning different values to the three choice positions. For example, in item 24 the respondents were to list three bad things about sleeping in the jungle. Their first choice was assigned a value of 3, second choice a value of 2, and third choice a value of 1. The assumption made here that the

TABLE 9

SALIENCY SCORES OF TOPICS IDENTIFIED BY THE LISTING TECHNIQUE

No. 24. Bad Things About Sleeping In The Jungle

Topic	Panama				Hawaii		Okinawa	
	Mech. Infantry	Airborne	Missiles	Special Forces	Infantry I	Infantry II	Special Forces	Total
Insects	159	218	197	160	135	157	152	1178
Wetness	68	100	90	108	131	153	108	758
Snakes	94	67	147	35	91	27	45	506
Terrain	5	13	12	9	34	26	24	123
Heat	8	12	14	20	10	10	17	91
Animals	17	9	12	8	18	10	8	82
Cold	7	10	5	4	14	19	4	63
Wet Clothes	-	8	-	37	-	13	-	58
Enemy	-	-	-	3	4	-	20	27
Mud	9	-	-	1	5	11	-	26
Lack of Shelter	4	7	4	-	6	3	1	25

TABLE 10

SALIENCY SCORES OF TOPICS IDENTIFIED BY THE LISTING TECHNIQUE

No. 25. Changes Which Would Make Combat Boots Better For This Climate And Terrain

Topic	Panama				Hawaii		Okinawa	
	Mech. Infantry	Airborne	Missiles	Special Forces	Infantry I	Infantry II	Special Forces	Total
Sole - Traction	87	141	36	114	46	80	55	559
Vents, drainage and air circ.	52	37	29	53	44	39	58	312
Lighter weight	20	56	46	19	45	38	49	273
Waterproof	8	30	45	22	56	61	19	241
Better leather	31	20	20	23	27	22	12	155
Stronger sole and heel	29	26	10	12	32	12	16	137
Stronger stitching	13	14	13	12	5	7	3	67
Zipper at side	12	1	3	1	2	10	25	54
Uppers - other material	3	6	3	10	10	12	7	51
Faster drying	-	5	-	3	7	10	12	43
Higher cut	2	1	13	6	6	4	9	41
Lower cut	5	1	13	2	4	12	3	40
Steel plate (sole)	-	-	-	9	7	5	14	35
Arch support	1	5	6	4	5	9	3	33
More flexible	-	10	-	2	4	3	11	30
Hard Toe	-	-	6	6	10	5	1	28
Cushion innersole	3	1	1	3	5	5	4	22
Accessibility	-	2	1	7	6	2	2	20

TABLE II

SALIENCY SCORES OF TOPICS IDENTIFIED BY
THE LISTING TECHNIQUE

No. 26. Pieces of Personal Equipment Found To
Be Most Useful In The Jungle

Topic	Panama				Hawaii		Okinawa	
	Mech. Infantry	Airborne	Missiles	Special Forces	Infantry I	Infantry II	Special Forces	Total
Machete	80	90	86	92	50	83	32	513
Canteen & Cup	79	120	46	69	58	73	54	499
Poncho	13	24	43	102	66	86	81	415
Jungle Boots	54	48	27	16	31	13	24	213
Knife	31	22	14	33	28	18	32	178
Insect Bar	19	40	23	16	34	14	11	157
Hammock	-	-	-	66	-	-	60	126
Weapon	24	8	13	2	12	19	16	94
Compass	6	7	14	29	5	8	8	77
Pistol Belt	13	19	16	3	6	17	3	77
Soft Cap	17	23	5	10	1	4	9	69
Insect Repel.	2	10	18	2	12	8	-	52
Clean/dry clothes	-	3	19	3	11	8	5	49
Rope	15	2	6	7	6	5	3	44
Poncho Liner	-	-	-	-	-	-	42	42
Lt.Wt. Fatigues	4	-	-	4	2	-	28	38
Ent. Tool	3	9	7	1	1	3	6	36
Shelter Half	2	3	9	-	-	11	8	33
Bayonet	4	2	-	-	11	14	-	31
Rucksack	-	-	-	1	1	-	28	30

TABLE 12

SALIENCY SCORES OF TOPICS IDENTIFIED BY THE LISTING TECHNIQUE

No. 28. Three Issue Items That Wear Out Quickest

Topic	Panama				Hawaii		Okinawa	
	Mech. Infantry	Airborne	Missiles	Special Forces	Infantry I	Infantry II	Special Forces	Total
Fatigues	142	147	121	125	147	152	139	973
Combat Boots	41	149	142	35	205	193	10	775
Jungle Boots	142	13	6	127	3	13	134	438
Underwear	55	66	89	30	59	30	39	368
Socks	48	37	44	30	35	38	32	264
Poncho	5	20	5	25	22	34	28	139
Rucksack (new)	-	-	-	24	-	-	11	35
Gloves	3	-	2	7	8	7	5	32
Soft Cap	8	3	3	-	8	4	-	26
Jungle Hat	-	-	9	11	-	2	4	26
Waterproof Bag	-	-	-	15	5	-	-	20
Air Mattress	-	-	-	2	4	3	6	15

thing each respondent considered to be worst about spending the night in the jungle would be most salient and would therefore be listed first.

A topic saliency score then, is a function of two variables; namely, usage frequency or the number of times the topic is listed, and the choice position which is selected when the topic is listed. Topics with saliency scores of 100 or greater are considered salient topics.

Item 24 - Three bad things about sleeping in the jungle are:

Table 9 contains a rank order of all the topics which were listed by the troops in response to item 24. It will be noted that the topics of "Insects," "Rain" ("Weather"), "Snakes" and "Terrain" made saliency scores of 100 or greater. Three of the four were included as topics in one or more of the present data collection instruments. "Insects" and "Weather" were included in the Objective questionnair , while the topic "Snakes" was placed in the more unstructured techniques because there was some question as to its saliency. The data in Table 9 supports the notion that "Snakes" was a less salient topic than the other two in that "Insects," "Weather" and "Snakes" were listed significantly differently in descending order with respect to saliency. A chi-square computed for the three most salient topics indicated the differences between the three topics to be significant beyond the .001 level.

Of the seven groups of subjects studied with respect to the Listing techniques, three of them listed "Snakes" as being more of a problem than "Wetness." These three groups were all located in Panama and were composed of troops who had had little or no experience in the jungle. The Airborne and Special Forces troops stationed in Panama, as well as the Special Forces

stationed in Okinawa and the Infantry in Hawaii had had considerable jungle training.

Insofar as item number 24 is concerned, the Listing technique has supported the use of the topics relating to life in the jungle which were included in the present instrument. No topics were identified as salient which were not included in the instrument with the possible exception of the topic 'Terrain." 'Terrain," insofar as a sleeping in the jungle context is concerned, probably subsumes "Insects," "Weather" and "Snakes," and is therefore not a mutually exclusive category and probably has, in fact, really been included in the instrument.

Item 25 - <u>Three changes which would make combat boots better for the climate and terrain are</u>:

Suggestions for improving combat boots, elicited in item 25, were somewhat more diversified than were the comments on item 24. Six dimensions met the saliency criterion and twenty dimensions were listed in all. Four of the six dimensions which were listed were included in the Objective instrument. "Ventilation" and "Drainage" characteristics are second in saliency which indicates a critical area not covered in the Objective instrument which should be investigated. Again, this information provides a measure of saliency which supports the use of the dimensions which were included in the Objective questionnaire and recommends others not previously recognized by the research team, even after fairly extensive pretrials.

Item 26 - <u>Three pieces of personal equipment I've found to be most useful in the jungle are</u>:

Item 26 pertains to personal equipment thought to be most important

when used in the jungle. Seven topics were listed sufficiently frequently to meet the saliency criterion, saliency scores of 100 or greater, five of which were included in the existing instruments. Although the "Insect Bar" and "Knife" saliency scores are two of the lowest of the top seven, they do meet the saliency criterion and should be seriously considered for inclusion in any future equipment evaluation questionnaires. While some of the Listing items provide evaluative information as well as saliency information, this particular item was not designed to provide evaluative information about the equipment, and this is viewed by the present investigators as a necessary next step.

Item 28 - The three issue items that wear out quickest here are:

In order to explore the "Durability" dimension as it relates to items of equipment used in tropical environments, item 28 was included. Six topics emerged as salient topics when considered for durability in the tropics. Of the six topics, four were evaluated for durability in the Objective Instruments. Socks and underwear were introduced by the troops as being insufficiently durable in the tropical environment.

The Listing results indicate that while most of the salient topics and dimensions within the scope of the present study appear to have been identified and included in the instruments, there are a few which are important to the troops and which should be investigated. Indeed, the Listing technique has been invaluable for identifying salient features initially and for updating the instruments as a larger portion of the total population is sampled. Use of this procedure is highly recommended in connection with attitude surveys.

2. SENTENCE COMPLETION

a. Data Reduction

Although twenty-two Sentence Completion items were included in the administration, after careful study, only nine of them were selected for intensive analysis. These topics were: "Meals," "Combat Boots," "Officers," "Machete," "Jungle Boots," "Pack," "Poncho," "Raincoat" and "Rucksack." The selected items were those which elicited responses of sufficient range and consistency as to be amenable to a meaningful categorization scheme, and which represented the topical areas which were believed to be of most concern to the sponsor. Using two raters who had received one day of initial training, approximately 80 responses per man hour were categorized for content and rated for tone.

While responses from 300 Sentence Completion questionnaires were reduced for analysis it became apparent that a sample of 100 would have been sufficient to establish the salient categories and the tonal means of the group represented. Any larger sample merely increased the frequencies within established categories and did not seem to affect tonal means. A sample size of 300 was selected in this case in order to adequately represent each of the three tropical locations from which the data were collected.

Responses to Sentence Completion items were rated for tone as well as for content. To check rater-rater reliability, three coefficients of reliability were computed. Both raters' evaluations were correlated on each of three groups of fifty respondents. The coefficients of correlation which were computed were .90, .96 and .96 all of which are significant beyond the .001 level of confidence. These coefficients were calculated using tonal ratings

of the raters, but no such statistical technique could be applied nor was it deemed necessary to test the reliability of content classification because, of 171 responses independently classified as to content by the two raters, there were only 5 discrepancies between them.

b. Data Meaningfulness

From a methodological standpoint, the principal function of the Sentence Completion items included in the attitude assessment battery was to serve as a measure of the saliency of the topics and dimensions of topics used in the Objective Instrument. The responses obtained for the nine topics identified in the data reduction process are displayed in tabular form on the following pages by Tables 13 to 21.

Though there were 22 sentence stems, each probing a different item of personal equipment or condition of tropical military service, seven of the nine topics that were used in the analysis were items which had been probed by objective questions. Three of the seven topics with objective counterparts were common topics, three were in the non-combatant questionnaire, and one in the combatant questionnaire. For the seven topics which are directly comparable with objective questions, the following ratios of identical dimensions resulting from the Sentence Completion analysis to dimensions contained in the objective questions were obtained. The frequency of occurrence of the dimensions used in this comparison can be obtained by examining Tables 13 through 21. An asterisk next to a dimension indicates inclusion in this comparison.

TABLE 13

SENTENCE COMPLETION RESPONSES

TOPIC: MEALS

Topical Areas Identified	Responses Positive	Responses Negative
I. Global	636	518
II. Quantity*	40	93
III. Quality*	14	16
Preparation*	22	131
Variety*	8	67
Greasy*	0	26
Meal Balance	14	13
Rice	0	24
C-Rations	7	17
Inexperienced Cooks	0	16
Taste*	5	14
IV. Irrelevant	36	

*Indicates inclusion of dimension in comparison of dimensions obtained from sentence completion analysis to dimensions included in the objective questionnaire.

TABLE 14

SENTENCE COMPLETION RESPONSES

TOPIC: COMBAT BOOTS

Topical Areas Identified	Responses Positive	Responses Negative
I. Global*	453	169
II. Physical Characteristics		
Durability*	65	99
Rotting*	0	53
Soles	0	20
Heels	0	18
Waterproofing	2	32
III. Human Engineering Characteristics		
Weight	3	53
Support	3	17
Ventilation	4	49
Traction*	2	37
Protection*	7	16
Comfort	105	38
Fit	59	37
Too Hot	0	31
IV. Irrelevent		49

*Indicates inclusion of dimenion in comparison of dimensions obtained from sentence completion analysis to dimensions included in the objective questionnaire.

TABLE 15

SENTENCE COMPLETION RESPONSES

TOPIC: OFFICERS

Topical Areas Identified	Responses Positive	Responses Negative
I. Global*	438	218
II. Personality Characteristics		
Common Sense*	0	25
Inexperienced*	3	90
Self Interest	0	58
Fairness	13	13
Considerateness	25	92
Unreasonableness	0	13
Immaturity	1	14
III. Leadership Characteristics	15	35
Young Officers	0	77
Military Training	21	50
Decision Making	0	64
IV. Irrelevant	69	

*Indicates inclusion of dimension in comparison of dimensions obtained from sentence completion analysis to dimensions included in the objective questionnaire.

TABLE 16

SENTENCE COMPLETION RESPONSES

TOPIC: MACHETE

Topical Areas Identified	Responses Positive	Responses Negative
I. Global	648	68
II. Physical Characteristics		
Sharpness	4	55
Grade of steel	1	13
Handle	0	14
III. Human Engineering Characteristics		
Utility as a tool	140	3
Utility as a weapon	131	0
Length		
Too long	0	53
Weight		
Too light	1	30
Too heavy	0	17
Supply		
Difficult to obtain	0	14
IV. No experience, never issued	105	

TABLE 17

SENTENCE COMPLETION RESPONSES

TOPIC: JUNGLE BOOTS

Topical Areas Identified	Responses Positive	Negative
I. Global*	328	73
II. Physical Characteristics		
Durability*	10	84
Soles	2	55
Heels	0	32
Speed of drying	42	2
Water repellent	1	18
III. Human Engineering Characteristics		
Suitability to climate and terrain	77	10
Comfort*	39	21
Ventilation	26	3
Traction*	57	3
Support (arches/ankles)	3	32
Weight	20	6
IV. Have not worn	312	
V. Irrelevent	29	

*Indicates inclusion of dimenion in comparison of dimensions obtained from sentence completion analysis to dimensions included in the objective questionnaire.

TABLE 18

SENTENCE COMPLETION RESPONSES

TOPIC: PACK

Topical Areas Identified	Responses Positive	Responses Negative
I. Global*	92	170
II. Physical Characteristics		
Weight*	130	25
Straps and hooks	33	13
Durability*	17	8
Capacity*	125	36
III. Human Engineering Characteristics		
Movement*	128	23
Protection from water	16	17
Accessibility of articles	13	0
Convenience of size, shape	156	94
Comfort*	77	32
Ease of putting on and taking off	15	1
Rides too low on back	0	12
IV. Never been issued	12	
V. Irrelevant	11	

*Indicates inclusion of dimension in comparison of dimensions obtained from sentence completion analysis to dimensions included in the objective questionnaire.

TABLE 19

SENTENCE COMPLETION RESPONSES

TOPIC: PONCHO

Topical Areas Identified	Responses Positive	Responses Negative
I. Global*	270	187
II. Physical Characteristics		
Durability*	3	13
Weight	2	33
III. Human Engineering Characteristics		
Use as a:		
Shelter	125	2
Sleeping wrap	33	2
Ground cover	21	1
Raft	18	0
Comfort*	2	337
Protection*	84	38
Mobility	0	57
Length		
Too short	0	27
IV. Irrelevant	16	

*Indicates inclusion of dimension in comparison of dimensions obtained from sentence completion analysis to dimensions included in the objective questionnaire.

TABLE 20

SENTENCE COMPLETION RESPONSES

TOPIC: RAINCOAT

Topical Areas Identified	Responses Positive	Negative
I. Global	94	68
II. Physical Characteristics		
Durability	8	8
Material		
Too light	5	6
Length		
Too short	1	20
III. Human Engineering Characteristics		
Jungle and field use	1	10
Protection	11	43
Leakage	1	36
Comfort		
Too hot	2	43

TABLE 21

SENTENCE COMPLETION RESPONSES

TOPIC: RUCKSACK

Topical Areas Identified	Responses	
	Positive	Negative
I. Global*	11	16
II. Physical Characteristics		
Size	0	12
Carrying space*	14	0
III. Human Engineering Characteristics		
Comfort*	9	4
IV. Irrelevant	70	

*Indicates inclusion of dimension in comparison of dimensions obtained from sentence completion analysis to dimensions included in the objective questionnaire.

Ratios:			
	1.	Meals	7/7
	2.	Combat Boots	5/7
	3.	Officers	3/4
	4.	Jungle Boots	4/7
	5.	Pack	6/7
	6.	Poncho	4/4
	7.	Rucksack	3/4

The fact that even the lowest among these ratios is greater than one-half indicates that the topic dimensions which were chosen for inclusion in the Objective booklet were salient.

The analysis of the results of the Sentence Completion items also yielded another methodologically useful product. This product is the identification of still other topics and dimensions which are salient to the troops. The "Machete" and the "Rucksack" were identified as being salient by this technique. The "Machete" received the highest ratio of positive to negative responses, 925/267 of any of the nine topics. While there were not nearly so many responses for the "Rucksack" its saliency as a topic for any future follow-on research is assured by the fact that though there was no sentence stem for "Rucksack" a significant number of respondents answered the "Pack" question in terms of the "Rucksack."

Likewise, it was possible to identify new dimensions of the Sentence Completion topics which are viewed as being important by the troops. A good example of the utility of this process is furnished by the "Jungle Boot" questions. Though the objective "Jungle Boot" questions included four aspects

of "Durability," i.e., "Durability" (global) and "Cracking," "Rotting," and "Stitching," it was found that the "Durability" of "Soles" and "Heels" would have been even more salient to question. Both the Sentence Completion and Your Comments techniques served to point up the fact that the soles on the jungle boots tend to crack and the heels come off under severe field usage.

Therefore, the Sentence Completion items have been used to assess the saliency of items included in Objective instruments and also to identify other salient aspects or dimensions of these topics. These aspects or dimensions of topics have two principal uses. First, they permit the analyst to interpret the objective data accurately and secondly, having been identified, can be included in the objective portions of follow-on research.

When used as a tool to aid in the interpretation of the objective data, it is important for the analyst to know the relative saliency of the Sentence Completion items. When this is done by rank ordering the total number of responses for each of the nine topics which emerged from the Sentence Completion analysis, the following ordering from most to least salient is obtained: 1) "Meals," 2) "Combat Boots," 3) "Officers," 4) "Machete," 5) "Jungle Boots," 6) "Poncho," 7) "Pack," 8) "Raincoat," 9) "Rucksack."

As a further aid to objective data interpretation, a comparative measure of the degree of troop acceptance of various Sentence Completion topics may be obtained. This measure is simply a ratio of the positive to negative responses on each topic. Ordered from most positive to least positive the results are: 1) "Machete," 2) "Pack," 3) "Jungle Boots," 4) "Rucksack," 5) "Combat Boots," 6) "Poncho," 7) "Meals," 8) "Officers," 9) "Raincoat."

By excluding the "Machete" and "Raincoat" items for which there were no analagous objective items, it is possible to cross-verify the Objective and Sentence Completion techniques by rank ordering the means of the same seven topics obtained from the objective questions and correlating the two ordered listings. The Spearman rank correlation coefficient r equals .39 for this statistical comparison. This value is not statistically significant, but at least demonstrates some degree of association between the responses elicited by the two techniques.

Essentially, the Sentence Completion technique has a threefold role in the ROWLAND & COMPANY attitude data collection and assessment system. First this technique provides a means of assessing the saliency of topics and dimensions of topics included in the Objective questionnaire; secondly it identifies new topics and dimensions deemed salient by a particular population, and third it provides ancillary, supportive information which aids in the interpretation of the objective data.

3. PICTURE PROJECTIVES - WRITTEN RESPONSES

While the Objective Questionnaire is highly structured and the "Your Comments" cards offer relatively little explicit structure, the Picture Projectives - Written Response technique falls in between the two extremes in varying degrees of structure, depending upon the particular picture. In some of the pictures the only structure provided was the scene itself, while in other pictures a comment or comments were made by the characters depicted in addition to the pictorial theme. This particular approach requires respondents who have enough imagination to be able to project themselves into the situation depicted by the picture.

For the most part, the respondents of the present study seemed incapable of coping with the Picture Projective - Written Response. At any rate their responses were mostly literal, irrelevant, or pornographic in nature. The pictures did not seem to elicit equipment directed attitudinal responses in great enough frequencies to be of any value for purposes of equipment evaluation. This was the case in spite of the fact that during the administration respondents were instructed that although they had been told to write anything they thought the characters in the pictures might be saying or thinking, they should keep in mind that the main interest was in how the troops felt about their equipment.

Generally speaking the responses were very superficial, and did not seem at all to reflect the subjects' attitudes toward the pertinent topics in any measurable way. It would appear that the pictures need a great deal more structure. The stimulus situation of necessity should include a specific statement about some topic, to which the respondent could then write a reply.

4. PICTURE PROJECTIVES - COLOR RESPONSES

a. Data Reduction

The color responses required more time per respondent for reduction and analysis than any other technique in the battery. However, very little of the total reduction and analysis time was spent on the color responses because of the comparatively small sample who were administered the Projective Pictures - Color Response.

Forty-two man hours were required to reduce the data of 750 pictures, or three pictures each for 250 respondents. The rate of color picture reduction was 18 per man hour. As was the case with the other projective type data, two raters worked on all of the data such that everything was rated and reduced at least twice. Inter-rater reliability coefficients were computed for the two segments of data reduction which required rating, i.e., completion and neatness. The coefficients obtained were .91 for "Completion" and .76 for "Neatness." Although both correlations are significant beyond the .01 level of confidence there is a rather large difference between the two. This outcome was not unexpected because the "Completion" rating was characterized by more definitive criteria than was the "Neatness" rating which allowed more subjectivity. In any event, the ratings of the two raters were sufficiently correlated so as to accept their data as reliable.

b. Data Meaningfulness

With very few exceptions most items in the pictures were colored realistically. Choice of color seemed to be determined in large measure by the "actual color" of the real object represented in the picture. For example, in picture No. 3 the uniform was colored green 68 per cent of the time and brown 20 per cent of the time, with all other colors combined used by 12 per cent of the respondents. The same was true of the combat boots; 75 per cent of the time they were colored black, and brown 19 per cent of the time. Tables 22, 23 and 24 contain a list of the colors and their usage frequencies for each of the items in the first three pictures.

TABLE 22

COLORS USED ON SPECIFIC COMPONENTS
OF PROJECTIVE PICTURE NO. 1

Component	Colors Used									
	Black	Brown	Green	Yellow	Orange	Red	Purple	Blue	Gray*	Total
Skin	16	31	-	17	28	8	-	-	-	100%
Hair	34	24	1	26	2	11	1	1	-	100%
Uniform	2	11	78	1	1	1	3	3	-	100%
Food	9	24	17	24	8	13	2	3	-	100%
Cook	15	15	20	17	7	7	4	14	1	100%
Pots	55	18	2	12	6	3	1	3	-	100%
Mess Sign	5	25	5	5	7	16	7	30	-	100%
Belts	72	5	4	1	1	2	3	12	-	100%
Buckles	10	7	1	72	8	2	-	-	-	100%
Glass	3	71	5	3	10	3	5	-	-	100%
Cook's Hat	23	12	4	40	4	9	3	4	1	100%

*Pencil shading instead of color crayon

TABLE 23

COLORS USED ON SPECIFIC COMPONENTS
OF PROJECTIVE PICTURE NO. 2

Component	Colors Used									
	Black	Brown	Green	Yellow	Orange	Red	Purple	Blue	Gray	Total
Figure A	22	32	1	11	17	14	3	-	-	100%
Figure B	7	29	-	11	28	20	1	4	-	100%
Figure C	10	32	-	12	28	18	-	-	-	100%
Figure D	8	16	14	12	24	12	-	14	-	100%
Hair	42	29	1	19	2	6	-	1	-	100%
Arrow	19	-	7	14	4	54	1	1	-	100%
Towels	6	12	10	28	9	15	6	14	-	100%
Desk	18	54	9	1	4	3	5	6	-	100%
Wastebasket	27	16	19	2	6	8	11	11	-	100%

TABLE 24

COLORS USED ON SPECIFIC COMPONENTS
OF PROJECTIVE PICTURE NO. 3

Component	Colors Used									
	Black	Brown	Green	Yellow	Orange	Red	Purple	Blue	Gray*	Total
Skin	12	35	15	7	21	6	-	-	4	100%
Hair	31	40	1	13	5	7	3	-	-	100%
Uniform	6	20	68	1	2	1	1	1	-	100%
Foot	14	18	-	10	19	35	-	4	-	100%
Boots	75	19	3	1	-	1	-	1	-	100%
Pack	9	47	39	2	-	-	-	3	-	100%
Shovel	19	43	34	1	1	1	-	1	-	100%
Belt	10	46	42	-	-	-	-	2	-	100%
Canteen	11	45	42	-	-	-	-	2	-	100%

*Pencil shading instead of color crayon

On the assumption that cooperation on the objective items, as measured by the Respondent Consistency Check (RCC), might be correlated with the extent to which the respondents completed coloring the pictures, a Pearson Product Moment correlation was computed on the two variables. As it turned out the relationship between them was not significant. Other variables which are expressive in nature, and which are probably manifestations of basic personality traits, were examined for possible relationships with the objective materials. "Density," "Reality" and "Neatness" all appeared to be unassociated with attitudinal variables as expressed by the responses to the objective instrument.

While the results of the color techniques do not support the specific hypothesis that colors used to color an object are related to attitudes toward that object, neither do they disprove the more general hypothesis that there are color correlates of attitudes.

5. "YOUR COMMENTS" CARDS

a. Data Reduction

The reduction of the "Your Comments" card data for the entire sample was carried out in two phases. The first phase involved the classification of all responses into topical areas. This task required approximately three man days for a trained rater. Based on this data, 14 topical areas were chosen for intensive analysis. It was the task of the analyst to go through all the cards and to assign dimensions to comments relating to any of the fourteen chosen topical areas. This task required an additional 4 man days. Therefore, it was

possible to reduce a large number of completely unstructured responses quite economically.

b. Data Meaningfulness

(1) Respondent Cooperation

The inclusion of "Your Comments" cards in the attitude assessment battery developed by the investigators was based on several considerations identified by the staff during the development of the attitudinal model. First and foremost was the conviction that the degree of specificity required by objective techniques forces the respondent to case his answers in terms established by the item writers. From a phenomenological viewpoint this is unfortunate since the force fitting of a respondent's attitudes into pre-established categories may either serve to distort the way the subject really feels and/or may arouse the hostility of the subject by making him feel that "this crazy survey cannot be of value since my attitudes are not really portrayed by any of the possible answers." During the first phase of this project a systematic test of this hypothesis was made and it was found to be valid. Therefore, "Your Comments" cards were provided in the Phase II objective instruments to promote maximum cooperation by all respondents.

Many subjects elected to use this avenue to qual or elaborate on their objective responses. A good example of the way in which the respondents used the "Your Comments" cards is furnished by a series of questions concerning the poncho. Primarily, these questions focused on the poncho as an item of apparel. Many respondents used the Your Comments cards to point out that while the poncho was very unsatisfactory to wear in the jungle, it was valuable as

a ground cover, for makeshift shelters and other such uses. Had this avenue of expression not been open to the respondents, it could not have been possible to evaluate the results of the objective questions in a realistic manner. Therefore, not only do the "Your Comments" cards provide a means of increasing respondent cooperation, but they also provide ancillary data which is useful in interpreting the objective findings.

(2) Topical and Dimensional Saliency

Another use to which the "Your Comments" card data has been put is to identify topical areas or dimensions of topics considered salient by the respondents. The identification of such topical areas has a twofold purpose; to serve as a rough measure of the saliency of topics chosen for inclusion in the Objective instrument, and to identify other salient topics suitable for inclusion in future related research. Using 10 or more responses in any of the three populations as an acceptance criterion, all 17 of the basic topics probed by the Objective instrument were found to have been commented upon by the subjects.

Using the same criterion, 6 other topical areas were identified by the respondents as being important to them. These areas are: 1) "Army Life" which includes a number of specifics relating to such things as passes, laundry and morale; 2) "NCO's;" 3) "Hawaiian Living Conditions;" 4) "Storm Jacket" or "Rainsuit;" 5) "Raincoat;" and 6) "Clothing/Equipment Fit." It is possible to conclude on the basis of this data that the questions asked in the Objective instrument were salient. Likewise, the 6 topical areas discussed by the respondents which were not included in the Objective questionnaire should be considered for inclusion in any related follow-on research.

There were also a number of responses relating to the questionnaire itself. These questionnaire-centered responses mainly objected to the repetitious nature of the Objective questionnaire. Evidently, many respondents did not recognize that though sentence stems were frequently repeated, different dimensions were being probed by the use of different polar descriptors. The RCC's were repetitious and some respondents specifically identified this fact, but for the most part it is believed that use of slightly different stems for probing different topical dimensions would have lessened the troop dissatisfaction with this aspect of the Attitude Assessment battery. Some troops also used the "Your Comments" cards as an opportunity to vent some hostility toward the general concept of troop testing, while others said that more opportunities to communicate with those who design the soldier's equipment are needed.

In addition to the verification of the saliency of the topics included in the Objective instrument, a brief look at the saliency of the dimensions of three topics was taken. The three topics chosen for this analysis were "Jungle Boots," "Combat Boots" and "Poncho." In the objective questionnaire the following dimensions were assigned to combat boots: "Global," "Traction," "Protection," "Durability," "Cracking," "Rotting" and "Stitching." Jungle boots had the same dimensions as did combat boots except that "Protection" was deleted and "Comfort" put in its place. As explained elsewhere in this volume, there are three levels of dimensions represented by the seven categories for each topic; a broad dimensional area represented by "Traction," "Protection," "Durability" and "Comfort;" and the specific level represented by "Cracking," "Rotting" and "Stitching" which are subsumed under the broader classification of "Durability." There were no specific level dimensions analogous to

"Cracking," "Rotting" and "Stitching" for "Traction," "Protection" or "Comfort" since the inclusion of six more items for each three-level question would have made the size of the Objective questionnaire too great. Therefore, as might be expected, some specifics emerged from the "Your Comments" data which would have made appropriate specific level dimensions for "Protection" and "Comfort." It is interesting to note, however, that "Traction" responses were not specific in nature.

Primarily the respondents focused on "Durability," "Fit" and "Traction" for the combat boot; "Fit" being an aspect of comfort. "Durability," "Fit" and "Support" were the principal response areas for jungle boots. Both "Fit" and "Support" are specific attributes of comfort. Therefore, it would appear that the basic categories for both jungle boots and combat boots were well chosen with the possible exception of "Protection" as a dimension of combat boots since "Comfort" seemed somewhat more salient than "Protection" to the troops. Also, more useful data probably could have been obtained from the Objective questionnaire by breaking down "Comfort" into specifics rather than "Durability." Another possibility is that other specifics such as heels coming off or soles splitting would have proven more useful as a breakdown for "Durability."

The topic "Poncho" was divided into only two levels in the Objective questionnaire with the dimensions "Global," "Durability," "Protection" and "Comfort." Responses for the three basic dimensions, "Durability," "Protection" and "Comfort" all exceeded the criterion of 10 or more unsolicited responses in any of the three populations. Two other dimensions also emerged as being

important to the troops. These dimensions were "Other Uses" of the poncho and a number of comments on the "Cumbersomeness" of the poncho as an item of apparel.

(3) Saliency Difference Among Populations

In Volume I of the Phase I report on this project three related hypotheses (13 - 15, pp. 145 and 146) were made concerning the differential saliency of topics to troops in a combat and non-combat status. Hypothesis 13 stated: "Topic saliency will vary with the combat/non-combat state of the area in which the troops are stationed." In order to test this hypothesis the total number of responses to 14 of the 23 topical areas exceeding the 10 or more mentions criterion were rank ordered for each population. The 14 topics so ranked were: "Fatigues," "Poncho," "Jungle Boots," "Army Life," "Meals," "Entertainment," "Canteen," "Combat Boots," "Officers," "Rucksack," "Family," "Pack," "NCO's," and "Tiger Suits." Spearman rank correlations were than run between the ranks on these topics between Panama and Hawaii, Panama and Okinawa and Hawaii and Okinawa. Since Panama and Hawaii represent non-combatant populations and Okinawa represents a combatant population Hypothesis 13 would be supported if the Panama-Hawaii correlation was high and the Panama-Okinawa and Hawaii-Okinawa correlations were low. This is exactly what happened since for the Panama-Hawaii correlations r equalled .947. This statistic was significant beyond the .001 level of confidence for a two-tailed test and neither of the other correlations was significant even at the .20 level.

Hypothesis 14 stated "Topics pertaining to personal comfort such as 'Food,' 'Entertainment,' 'Insects,' 'Climate,' and the like will elicit a larger percentage of unsolicited suggestions from troops stationed in Panama than from

troops stationed in Viet Nam." Translated into terms congruent with the actual locations from which data was collected the hypothesis would be altered to read Panama and Hawaii for non-combatant conditions and would read Okinawa for combatant conditions. The gross response frequency rank orders of the 14 selected topics displayed in Table 25 serve to illustrate the differences which exist between the non-combatant and combatant populations. The three personal comfort items; "Meals," "Family" and "Entertainment" all rank substantially higher in the Panama and Hawaii populations than in the Okinawa population. The topic "Meals" ranks fourth for Panama, third for Hawaii and tenth for Okinawa. "Entertainment" ranks fifth in both Panama and Hawaii while it ranks thirteenth in Okinawa. Finally, "Family" which is less clearly a personal comfort topic, ranks eleventh and eighth in Panama and Hawaii respectively while being rated twelfth in Okinawa. Therefore, all the data serve to support Hypothesis 14.

Since Hypothesis 15 is merely the converse of Hypothesis 14, i.e., "Topics pertaining to items of Quartermaster issue such as boots, fatigues, packs, and weapons, etc., will elicit a larger percentage of unsolicited suggestions from troops stationed in Viet Nam than from troops in Panama," it is also supported by the data in Table 25.

The methodological function of the data derived from the "Your Comment" cards is threefold. First, the technique is used as a means of optimizing respondent cooperation on the Objective Instrument, and secondly the data derived from this technique are useful in interpreting the objective data. The third function of the technique is to provide a means of assessing the saliency of

TABLE 25

FREQUENCY OF "YOUR COMMENTS" CARDS RESPONSES BY POPULATION TO FOURTEEN SELECTED TOPICS

Rank Order	Panama	Hawaii	Okinawa
1	Fatigues	Fatigues	Jungle boots
2	Poncho	Poncho	Poncho
3	Army life	Meals	Fatigues
4	Meals	Army life	Canteen
5	Entertainment	Entertainment	Rucksack
6	Jungle boots	Jungle boots	Tiger suit
7	Officers	Combat boots	Army life
8	Canteen	Family	Combat boots
9	Combat boots	Officers	NCO's
10	Pack	Canteen	Meals
11	Family	Pack	Officers
12	NCO's	NCO's	Family
13	Rucksack	Rucksack	Entertainment
14	Tiger suit	Tiger suit	Pack

specific topical areas and dimensions to either the total population or specific sub-populations. Several hypotheses made during Phase I of this study predicting differences in the topics on which unsolicited suggestions were made from combatant and non-combatant populations were also verified.

E. OBJECTIVE TECHNIQUES

While so-called "objective" techniques seem to be more highly regarded in the field of psychometrics than "projective" or "subjective" metrics, there is a great deal of room left for objectifying the "objective" instruments. Item construction, scale construction, and test administration are each very difficult methodological endeavors to which all too often too little attention is given. Techniques developed during and shortly after the Second World War have been accepted as the way to do it and very little has been done with them since. It was hoped that the present research would provide some new insight with respect to Objective techniques. In the present research program considerable attention has been given to methods of scaling and item construction with a modification of Osgood's Semantic Differential scaling technique selected for the main objective data collection instrument. The other scaling procedure which was seriously considered along with the Osgood Scale was Likert's Method of Summated Ratings. The Likert scale was decided against on the basis of effects explained by two theoretical constructs, "the semantic differential" and "the whip antenna effect," which are discussed in detail in the Phase I final report. In short, the authors hypothesized that the Osgood-type scale would elicit more valid data than the Likert-type scale. One of several findings in the Phase I results which supported this hypothesis was the fact that the

troops made twice as many Respondent Consistency Errors when they responded to Likert-type items than when the same troops responded to Osgood-type items. For verification, the same type of comparison was made in Phase II.

A one group - two condition factorial design was used in Phase II. A group of 185 Airborne troops stationed in Panama were administered both the Osgood and Likert questionnaires. Half of the respondents were administered the Osgood first while the other half were administered the Likert first in order to control for practice effects. Figure 5 indicates the number of RCE's made by questionnaire and by administration sequence. Note that half again as many inconsistent responses were made on the Likert than were made on the Osgood. There were fewer RCE's made on second administration than on the first indicating the possibility of some practice effects. The results of an analysis of variance displayed in Table 26 indicate that the difference between the Osgood and Likert is statistically significant beyond the .01 level, while the difference due to practice effects is not statistically significant at the .05 level. However, careful examination of Figure 5 provides further information on this. The Osgood-Likert sequence group scored fewer RCE's than the Likert-Osgood sequence group on both questionnaires. Although the interaction F score was slightly smaller than necessary to be significant at the .05 level, there appears to be a practical difference. Either the two Airborne groups were inherently different such that one was more prone to make RCE's, or, and this is more likely, administration of the Osgood first provided better task clarification and allowed more consistent performance, while the converse is true of a situation in which the Likert is administered first.

TABLE 26

ANALYSIS OF VARIANCE OF RESPONDENT CONSISTENCY ERRORS

Source of Variation	Sum of Squares	df	Mean Squares	F
Overall Between	66.00	3	22.00	10.60*
Administration	6.25	1	6.25	3.02
Questionnaire	52.59	1	52.59	25.40*
Interaction	7.16	1	7.16	3.46
Within	760.00	367	2.07	
Total	826.00	370		

*0.01 significance level

Questionnaire Type	Administration Sequence: 1st	2nd	
Osgood	114	131	245
Likert	229	152	381
	343	283	626

Figure 5. Number of Respondent Consistency Errors Committed by 185 Subjects on the Likert and Osgood Questionnaires

In any event, regardless of any other effects, the respondents made statistically significantly fewer RCE's on the Osgood than on the Likert, which supports the results obtained in Phase I and the original hypothesis that the Osgood scaling technique would elicit more valid responses than the Likert scaling technique.

It is interesting to note that almost without exception the Likert topic means are more negative than the Osgood topic means. Four of the differences are statistically significant. This same phenomenon occurred in Phase I and suggests the strong possibility of some other differential effects of Osgood vs. Likert techniques not covered in the present report.

F. DATA COLLECTION/PROCESSING

The present investigators accept the basic assumption that data will be no better or no more accurate than the techniques used to collect and process it. More often than not, excellent theory and research design have been offset by the inaccurate techniques implemented to collect and process data. Consequently, since the commencement of the present project a variety of data collection/processing techniques have been explored and one finally selected for incorporation into the present research. Scaling technique based on the Semantic Differential, and an optical scan card for response recording were selected as the most promising data collection/processing systems.

The optical scan card technique that was used for collecting responses of the Objective questionnaire permitted data to flow from respondent to computer with no further human data handling other than feeding cards into

the optical scanner and then a transfer of cards into the computer. This process successfully eliminated a large source of error in data processing, that of preparing raw response data for the computer. This was a fully automated procedure in the present research and is believed to constitute a significant improvement over earlier techniques.

The card format and card/booklet arrangement used to display response choice positions was successful in that no errors were found which appeared to be associated with the arrangement. Errors attributable to oversensitivity of the Optical Scanner were in abundance initially when a small test sample of data was run through the system, however, the necessary adjustments were made and errors (double punches) resulting from smudges and inadequate erasures dropped to less than 1 per cent of the responses. After completion of this phase of data processing a new technique for flagging and correcting double marks was developed which reduces the probability of this kind of error to practically zero.

Each of the questionnaires was double loaded prior to going into the field, which necessitated the removal of the top cards from each booklet after the first administration. Under a careful supervision and checking system the respondents themselves unloaded the booklets. This procedure proved satisfactory in that a great deal of time was saved and little, if any, accuracy was sacrificed. Some of the booklets themselves were re-used as many as three times by merely placing new cards in the booklets.

G. INTER-TECHNIQUE COMPARISONS

Finally, the data from the various techniques were used to excellent advantage in validating and interpreting the results. For example, the standard objective approach if used alone would not permit a saliency analysis contrasting the different groups as the "Your Comments" technique did. This technique not only permitted the investigators to determine the direction and intensity of group attitudes with respect to the different topics, but it allowed the investigators to determine which topics were of most concern to which groups as well. Another example which has already been discussed is the dimension saliency notion. Topics and dimensions were included in the objective instruments as a result of data collected through a series of pilot studies. However, there was no assurance that the most critical topics and dimensions of topics were included for troops stationed in Hawaii or Okinawa. The various unstructured techniques permitted the investigators to assure themselves the right areas had been investigated and allowed identification of subject areas which might be investigated in any further work.

Probably one of the most important contributions of the multi technique approach is the means provided for validating the instruments. Although this type of validation relies on internal consistency rather than external criteria, practically, it yields sufficient information to indicate whether the data are meaningful or not. Without exception, those topics and dimensions of topics which were acceptable or not acceptable according to one technique, were found to be regarded in like manner according to the other techniques. Although rather gross in nature, this kind of information allows a higher measure of confidence in the data.

Pursuing the validation notion further and in a more quantitative manner, the responses to "Poncho" items in the Osgood were correlated with responses to the "Poncho" items in the Sentence Completion for subjects in each of five different groups. The coefficients of correlation obtained were .21, .29, .29, .44, and .57 for the five groups. The first coefficient is not statistically significant but the remaining four are significant at the .05, .05, .01 and .01 levels of confidence respectively. Time did not permit the calculation of any further correlational coefficients of this sort, but the fact that all five correlations run were positive and four of them of magnitudes which are statistically significant is interpreted as strong support for the reliability, and in the broadest sense, the validity of the data.

CHAPTER SEVEN

CONCLUSIONS

Conclusion 1

A significant proportion of the sampled population were inconsistent enough to question the validity of the data, when not controlled f consistency.

Conclusion 2

There is a relationship between response consistency and the demographic variables of age, education, rank, time in service, combat experience, and jungle training experience.

Conclusion 3

Respondents who make three or more Respondent Consistency Errors have more negative attitudes than the more consistent respondents.

Conclusion 4

The relationships and magnitudes of topic dimension attitudes can be identified and subjected to mathematical analysis.

Conclusion 5

Projective, or "unstructured" data collection techniques provide attitudinal data not captured by the more structured techniques.

Conclusion 6

The Listing technique is valuable for identifying salient topic dimensions, salient topics, and for updating instruments which are developed on pilot samples and used on larger populations.

Conclusion 7

The Sentence Completion technique is a useful one for assessing topic and dimension saliency, and for validating the objective techniques.

Conclusion 8

Responses to objective items correlate significantly with responses to sentence completion items of the same topic.

Conclusion 9

The thematic stimuli provided in the Projective Pictures - Written Response technique were inadequate for eliciting the appropriate topic related attitudinal responses.

Conclusion 10

The colors used on the Projective Pictures - Color Response technique did not indicate any relationships to attitudes as measured with the other techniques.

Conclusion 11

Respondents tended to color the pictures realistically which did not lend itself to attitudinal interpretation. These results do not preclude the possibility of some other approach for color/attitudinal analysis.

Conclusion 12

The expressive elements of the coloring task such as neatness, reality, completeness, etc., might very well reveal attitudinal correlates if subjected to further analysis.

Conclusion 13

The "Your Comments" cards assist materially to gather attitudinal data by establishing the proper rapport (allowing respondents complete freedom of response in an otherwise totally structured situation) and by providing a mechanism which encourages a phenomenological viewpoint on the part of the investigators.

Conclusion 14

Osgood's Semantic Differential technique is clearly superior to the "I agree - disagree" version of Likert's Method of Summated Ratings.

Conclusion 15

The use of quick-change optical scan cards inserted in the objective booklets provides an excellent system for response indication due to the fact that the respondent's physical mark goes all the way to the data processing computer without further human handling other than to remove the cards from the booklet and place them in the computer system.

Conclusion 16

A multi-technique data collection system, which consists of a variety of structured and unstructured techniques, eliciting responses pertaining to similar topic areas, provides an effective means for validating and interpreting the data in a way not offered by standard attitudinal data collection procedures.

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