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FIRST TERM ENLISTED ATTRITION

VOLUME I: PAPERS

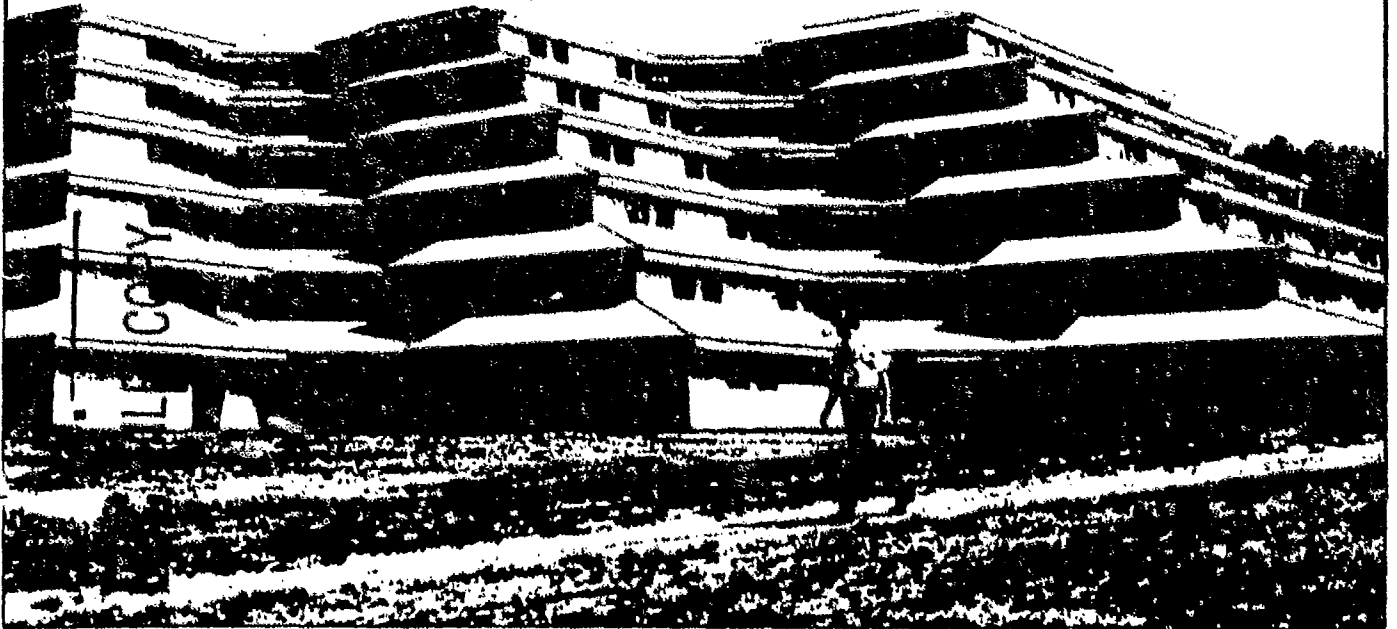
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The cover illustration shows part of the Xerox International Center for Training and Management Development, Leesburg, Virginia, the site of the conference at which these papers were presented.

FIRST TERM ENLISTED ATTRITION

Proceedings of a Conference

held at

Leesburg, Virginia

April 4-7, 1977

Volume 1: Papers

H. Wallace Sinaiko
Editor

Manpower Research and Advisory Services
Smithsonian Institution

JUNE 1977

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Block 20, continued:

Participants in the conference included: uniformed representatives of each of the Services; civilian scientists and research managers from the main DOD personnel and manpower laboratories; academic scientists; and contractors currently working on attrition-related matters. The meeting consisted of five types of sessions: a) a keynote address; b) general sessions in which technical papers were presented; c) small workshop meetings providing the opportunity for informal discussion; d) a roundtable discussion by flag officers; and e) a final session in two parts: comments by a half-dozen discussant-critics and papers by representatives of the two principal sponsors within OSD, i.e., the Assistant Secretary of Defense (Manpower and Reserve Affairs) and the Office of the Director of Defense Research and Engineering.

This is the first of two reports on the conference. It contains an abstract of the keynote address, the technical papers that were presented, and summaries of the OSD talks. A second volume summarizes the observations and recommendations coming out of the papers, the discussants' remarks, and the workshop sessions.

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PREFACE

During April 4-7, 1977, the Office of the Secretary of Defense and the Office of Naval Research co-sponsored a Conference on First Term Enlisted Attrition. The purposes of the meeting were: a) to review what is known about attrition in the Services—its magnitude, current trends and costs, and how it is managed; b) to learn about relevant research—both inside and outside of the DOD—that deals with attrition; and c) to identify gaps in our knowledge that could be addressed by new R&D.

Participants in the conference included uniformed representatives of each of the Services; civilian scientists and research managers from the main DOD personnel and manpower laboratories; academic scientists; and contractors currently working on attrition-related matters. The meeting consisted of five types of sessions: a) a keynote address; b) general sessions in which technical papers were presented; c) small workshop meetings providing the opportunity for informal discussion; d) a roundtable discussion by flag officers; and e) a final session in two parts: comments by a half-dozen discussant-critics and papers by representatives of the two principal sponsors within OSD, i.e., the Assistant Secretary of Defense (Manpower and Reserve Affairs) and the Director of Defense Research and Engineering.

Two reports are being published. The first—this volume—contains the papers that were presented and summaries of the OSD talks. The technical papers, in the interest of an expeditious schedule, are reprinted exactly as they were submitted. The order of their appearance here follows that of the meeting. (The conference agenda is reproduced on the next pages; in a few cases, titles have been modified slightly subsequent to the meeting.)

The second volume summarizes the research and policy recommendations that came out of the conference.

H. WALLACE SINAIKO
Smithsonian Institution

DOD/ONR Conference on First Term Enlisted Attrition

Xerox International Training Center, Leesburg, Virginia - April 4-7, 1977

PROGRAM

Monday, April 4

PM

4:30 Registration

5:30 Dinner

8:30 Keynote address

It's a new ball game: changing
expectations of military service

Prof. Charles E. Moskos
Northwestern University

Tuesday, April 5

AM Chairman: Dr. Glenn L. Bryan, Office of Naval Research

8:30 Introduction, welcome,
objectives, modus operandi

Dr. H. Wallace Sinaiko
Smithsonian Institution

First Term Enlisted Attrition in the DOD

8:45 Trends in DOD attrition

Dr. A. J. Martin
Office of the Assistant
Secretary of Defense (M&RA)

9:45 Gatekeepers: first term enlisted
attrition policies & practices

Mr. Craig Foch and
Dr. Nicki King
The Rand Corporation

10:30 BREAK

10:45 The Army and attrition

MAJ Arthur A. Schulez, USA
Training and Doctrine Command

11:15 Canadian forces' solutions to
attrition

MAJ I. N. Evenic
Canadian Personnel Applied
Research Unit

12:00 LUNCH

PM Organizational Factors - Chairman: Dr. Bert T. King, ONR

1:30 Attrition: the absorption and
integration of newcomers

Dean David Gottlieb
University of Houston

Tuesday, April 5, continued

PM Organizational Factors, continued

- 2:00 Organizational commitment and personnel attrition Prof. Richard M. Steers
University of Oregon and
Dean Lyman W. Porter
U. of California, Irvine
- 2:30 Post high-school drop-outs (and stayers) Prof. David R. Segal
University of Maryland, and
Dr. Jerald G. Bachman
University of Michigan
- 3:00 BREAK
- 3:15 Individual differences, organizational characteristics, and environmental influences on voluntary termination decisions Prof. Charles L. Hulin
University of Illinois
- 3:45 A longitudinal study of enlisted personnel attrition in the U.S. Marine Corps: preliminary recruit training results Profs. William H. Mobley,
Herbert H. Hand, and
John E. Logan
University of South Carolina
- 4:15 Exploratory development research of U.S. Navy/Marine Corps personnel - Phase I: factors affecting attrition Dr. Marshall G. Greenberg and
Mr. Jerry McConeghy
Booz, Allen Applied Research
- 4:45 ADJOURN
- 7:30 Workshops

Wednesday, April 6

- AM Job Factors - Chairman: Dr. Robert W. Stephenson, Air Force Human Resources Laboratory, Lackland AFB
- 8:30 Job changing behavior of young men in the civilian labor market Prof. Andrew I. Kohen
Madison College
- 9:00 An industrial experience: what drives attrition? Mr. William Belknap
Xerox Corporation
- 9:30 Organizational effectiveness and military personnel attrition: DOD management, policy, research issues, and some military service alternatives Dr. Ralph R. Canter
Army Research Institute
- 10:00 BREAK
- 10:15 Minimizing adjustment problems and attrition rates of minority military first term enlisted men Prof. Louis I. Jenkins
Pepperdine University

Wednesday, April 6, continued

AM Job Factors, continued

10:45 Psychological coping skills and the reduction of attrition among military personnel Prof. Irwin G. Sarason
University of Washington

11:15 Quality and requirements - a step toward reconciliation ILT Jack R. Dempsey and
CPT Jonathan C. Fast
AF Military Personnel Center

11:45 LUNCH

PM

1:30 Round Table: Management Actions to Control Attrition - Chairman:
Dr. Robert J. Lundgard, Office of Naval Research

Major General Bennie L. Davis, USAF
Director of Personnel Plans
Vice Admiral John G. Finneran, USN
Deputy Assistant Secretary of Defense (Military Personnel Policy)
Brigadier General Richard C. Schulze, USMC
Director, Manpower Plans and Policy Division
Rear Admiral William R. Smedberg, IV, USN
Deputy Chief of Naval Personnel for Personnel Planning and
Programming
Major General Paul S. Williams, USA
Director of Military Personnel Management

3:30 BREAK

Cost Factors and Field Studies - Chairman: COL Tyree Newton, Air
Force Human Resources Laboratory, Brooks AFB

3:45 Navy voluntary release pilot program Dr. Robert V. Guthrie
Navy Personnel R&D Center

4:15 Personnel effectiveness in the all volunteer Navy Dr. E. K. Eric Gunderson and
Ms. Anne Hoiberg
Navy Health Research Center

4:45 Attrition costs in the Navy and Marines Mr. Daniel F. Huck and
Mr. Dale Midlam
General Research Corporation

5:15 ADJOURN

7:30 Workshops

Thursday, April 7

AM Individual Factors - Chairman: Dr. Jay Uhlener, Army Research Institute

8:30 Selective overview of NPRDC Dr. Martin F. Wiskoff
enlisted attrition R&D Navy Personnel R&D Center

9:00 USAF attrition trends and identifi- Dr. Nancy Guinn
cation of high-risk personnel AF Human Resources Laboratory

9:30 Predicting attrition: a test of Dr. Robert F. Lockman and
alternative approaches Dr. John T. Warner
Center for Naval Analyses

10:00 BREAK

10:15 Research developments and new Dr. Myron A. Fischl
dimensions of potential Army Army Research Institute
attrition

10:45 Quality of Marines: test scores, Dr. Warren T. Matthews
personal data, and performance Center for Naval Analyses

11:15 Increasing the retention of Army Dr. Robert F. Holz and
volunteers: meaningful work may Dr. E. M. Schreiber
be an answer Army Research Institute

11:45 LUNCH

PM

1:30 Wrap-Up - Chairman: COL Henry L. Taylor, Office of the Director of Defense Research and Engineering

Discussants:

Dr. E. Ralph Dusek, Army Research I
Army Research Institute

Prof. George M. Guthrie
The Pennsylvania State University

Prof. Jack Ladinsky
The University of Wisconsin

Dr. Howard McFann
Human Resources Research Organization

Prof. Robert D. Pritchard
Purdue University

Dr. Lonnie D. Valentine, Jr.
Air Force Human Resources Laboratory

Workshop Reports

3:30 Final Remarks - Mr. Irv M. Greenberg, Deputy Assistant Secretary of Defense (Manpower and Reserve Affairs)

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IT'S A NEW BALL GAME: CHANGING EXPECTATIONS OF MILITARY SERVICE *

Charles C. Moskos, Jr.
Northwestern University

One of the main presumptions of the all-volunteer force was that, with longer-term enlistments and professionally committed service members, there would be less personnel turnover than in a military system which was heavily reliant on conscriptees and draft-motivated volunteers. This has turned out not to be the case. In a sense, the all-volunteer force has become something of a revolving door. Five years after the termination of selective service, the armed forces are confronting what they regard as unacceptably high rates of attrition—that is, enlistees who do not complete their first term of service.

Our understanding of military attrition may be informed by noting contrasts in the attitudes of the typical draftee in the peacetime era of the late 1950's and early 1960's with those of the typical volunteer of the late 1970's. In somewhat overstated terms, the salient differences can be described as follows:

Peacetime Draftee

Entered military reluctantly and thereby not subject to profound disillusionment after service entry; accepted military service on its own terms.

Highly valued clean record and good discharge.

Willing to put up with petty harrassment.

Regarded overseas assignment as potentially enriching.

New Volunteer

Enters military as an alternative to limited options in civilian life; regards military in instrumental terms of "what can it do for me?" e.g., skill training, education; subject to post-entry disillusionment if expectations are not met.

If disillusioned, wants out regardless of type of discharge (though may later regret lack of good discharge).

More concerned with self-dignity; quicker to take exception to harrassment.

Regards overseas assignment as an imposition.

The sum of the above typology is to direct attention toward the kinds of expectations and behavior of the new volunteer which can lead to high levels of attrition.

Four perspectives have been advanced to explain military attrition. Each of the perspectives suggests certain avenues of dealing with the

* Abstract of keynote address

attrition issue. (1) A cultural view suggests that there have been fundamental changes in the larger American society which impinge on the likelihood of attrition, e.g., the lessened appeal of military service, a less tractable youth. (2) A sociological perspective emphasizes the differing propensities of subgroups in the population—e.g., regional, economic, educational, racial—to have higher or lower probabilities of attrition (and therefore suggests target areas for recruiting). (3) A psychological approach seeks to identify individual traits which can predict the likelihood of attrition. (4) An organizational perspective focuses on the qualities of the military system which exacerbate or reduce the likelihood of attrition. Of course, all four perspectives can be usefully employed, but observers and students of military personnel typically tend to emphasize one approach over the others.

Whatever the explanations and remedies of attrition, it is essential also to remember that the attrition phenomenon is at least as much an outcome of changing policies and procedures of military separation as it is a reflection of objective changes in the quality and composition of the entering enlisted force. Finally, a sense of perspective is required to remind us that the consequences of attrition are not necessarily always negative.

TRENDS IN DoD FIRST-TERM ATTRITION

A. J. Martin
Office of the Assistant Secretary of Defense
(Manpower and Reserve Affairs)

This paper discusses Department of Defense (DoD) attrition in terms of DoD-wide attrition trends, costs of first-term attrition and its relation to All-Volunteer Force (AVF) prospects as the recruiting challenge becomes more difficult in the 1980s. The emphasis will be on attrition statistics, DoD-wide.^{1/}

The Congressional Budget Office recently released a report on Defense manpower. One issue addressed in some detail was first-term attrition:

"Reduced First-Term Attrition

A principal reason for increased turnover is attrition during the first-term of service, which has increased from approximately 25 to 37 percent in the last four years. The biggest increase occurred in fiscal year 1974.

The increase in first-term attrition results from the new administrative discharge procedures that make it possible to separate personnel prior to the end of the term of service. The new procedures were prompted by the report on the fiscal year 1974 Department of Defense appropriations bill by the House Appropriations Committee that urged simplified procedures for discharging "Marginal Performers" who have served at least one year after initial training. Each of the services has now adopted such programs, though administrative provisions differ by service and also differ to some degree from the Committee suggestions.

While the administrative provisions differ in minor ways, the size of the program differs in a major way from the original

^{1/} The author is indebted to Dr. Eli Flyer, OASD(M&RA), DASD(MPP), who is mainly responsible for the availability of the attrition data being presented here.

intent of the Appropriations Committee. The Committee suggested a goal for marginal performer discharges of 6,500 for fiscal year 1974. The increased losses during the first term for DoD are estimated to be in excess of 40,000 per year for fiscal years 1977-1982, more than six times the Committee guidelines."^{2/}

The Department of Defense agrees with CBO that reducing enlisted turnover is an important objective. However, we disagree concerning the extent to which turnover can be improved.

It is true that more military people are being released before completion of their initial enlistment obligation now than during the draft. This attrition is expensive and disruptive, but represents a serious manpower dilemma. In an all-volunteer force, it often does not make sense to force people to stay in a service. We have found that such practices are more expensive than releasing trouble makers early in their military career and recruiting and training replacements. Yet, an "easy-out" policy encourages many people who are not happy in the military, but do a good job during their tour, to seek release before tour completion. This adds costs and reduces readiness.

The Challenge of the 1980s

Attrition -- i.e., high first-term attrition -- must be viewed in the context of its costs and the challenges to AVF recruiting represented by both a declining youth population in the 1980s and the likelihood of an improving economy making recruiting more difficult.

^{2/} "The Cost of Defense Manpower: Issues for 1977", Congressional Budget Office Budget Issue Paper, January 1977, p. 26.

The future active force recruiting picture appears increasingly challenging. The declining youth population projected for the 1980s has focused attention on the question of the viability of the volunteer force during the next decade. The main questions appear to center on the Services' ability to recruit in the face of a declining youth population base and possible lower unemployment rates in the 1980s.

We know that the number of eighteen year old men in the United States will decline after 1980. By 1985, the number of eighteen year old males will have declined gradually by about one-third of a million, or 15% less than in 1976. By 1992, the decline will have totalled more than one-half million, or 25%.

More intense competition for high school diploma graduates is likely.

High school graduates are the preferred recruits. Non-graduates are twice as likely to be separated early than are high school graduates. Accession quality is an important determinant of first-term attrition. It takes more recruiting effort to recruit quality diploma graduates. A principal reason that the Services are requesting added recruiting resources in FY77 and FY78 is to increase the recruitment of high school graduates now. The objective is to take advantage of the market that is still available, before the declines in the youth population take full effect. If successful, this should tend to reduce future accession requirements.

Beyond improving accession input quality, all management options will continue to be evaluated to reduce accession requirements. Obviously, our attrition rates are a matter of serious concern, and our efforts to reduce them are continuing.

In view of the high attrition and high accession quality, the hard question is, "Why pay more in recruiting costs to attract quality enlistees?"

Clearly, recruiting quality enlistees is becoming marginally very expensive; and this will increase dramatically unless the requirement for high quality male accessions can be reduced as the market declines. Reduction in attrition is one management option that must be addressed.

Attrition Costs

Beyond direct budget costs associated with high attrition, indirect, but real, costs in the form of an additional "failure experience" for young people and in the form of negative attitudes held by prior service personnel must not be overlooked. Negative and credible information about military service experiences among large numbers of prior service personnel can only make recruiter and advertising efforts that much more difficult.

Preliminary work done in my office points to sizeable potential cost avoidance if attrition can be lowered substantially. Cost avoidance would come in training, unrecovered pay, transportation and recruiting. If man-year yields per enlistee could be achieved comparable to the average of today's yields (with high attrition) and yields of the pre-Vietnam period (with low attrition), the cost avoidance would be about \$180 million per year.

Beyond these sizeable attrition cost implications, the sustainability of the AVF in the face of the declining market is obviously related to our ability to implement effectively some mix of management options to reduce male accession requirements and/or increase supply by:

- increased use of women,
 - increased use of civilians,
 - increased use of career force personnel,
 - improved recruiting efficiency,
 - lower mental/physical standards,
- and importantly, if not most important,
- reduced first-term enlisted attrition.

Attrition Trends

Turning to DoD-wide first-term attrition statistics, the first chart provides information on the causes --

CHART 1

for attrition during the first two years of service for four fiscal year entry groups. Note that we have excluded attrition associated with completion of term of service, as well as entries into officer programs. In this and other charts you will see, "percent attrition" is based upon two things: first, the number of people who make up the entry cohort, and secondly, the number attriting from this entry group after entry into service. These data are current as of 30 June 1976.

As you can see from the first chart, "Behavior and Performance" reasons are the primary cause for attrition among men, but among women "Other Attrition", which is principally for marriage and pregnancy, is an important factor.

Among FY71 enlistees, the attrition rate at the two year mark for women was about double that of men. The rise in male attrition over the next three fiscal years, however, and the decline for females over the same period, have succeeded in bringing the rates pretty close together for the two groups.

It should be noted, however, that the decrease in attrition among women has been primarily in respect to marriage and pregnancy. It is possible that part of this type of attrition may have been moved into the third year of service due to changes in attrition policy which now permit pregnant service women to stay on in service if they so desire.

Medical attrition for males and females has remained fairly stable over the four fiscal year entry group. The primary reason for discharge in this category is for conditions existing prior to service -- EPTS discharge. It may also include a number of individuals who show behavioral problems, but for whom it is more convenient to use medical reasons for discharge purposes. Note that male attrition for medical reasons has been about double that of females. We do not know why this is the case. It should be an area of research attention.

The relationship between attrition and length of service is shown in the next chart.

CHART 2

While attrition rates have been increasing for males during the first six months of service, it does not seem to have resulted in reduced attrition during either the second six months of service or in the second year. Among women, the trend is not too clear -- but suggests that whatever is associated with reduced attrition among women appears to be occurring somewhat later in service.

The relationship between high school graduate status and attrition is well known for males. The next chart shows a similar relationship for females as well.

CHART 3

GED entrants have been combined with non-high school graduates, since most studies show that they generally perform and behave more like this group than high school graduates. Most of the non-high school graduate women entered service with a GED.

These data generally support the hypothesis that the ratio for attrition between non-high school graduates and graduates is about 2-to-1 -- regardless of the overall attrition rate. The minor deviation from this for women (after looking at more detailed data) would appear to result from the fact that attrition for pregnancy and marriage occurs with about equal frequency among high school graduates and non-graduates. When attrition for behavior and performance reasons is looked at separately for women, the hypothesis appears to hold true.

In any case, these data clearly show that the trend for increased attrition among men and decreased attrition among women occurs after control for educational level. Increasing male attrition is also seen when we control for AFQT aptitude score and educational level simultaneously, as shown in the next chart.

CHART 4

Results from attrition research of the 1950s are relevant today in at least one respect -- male attrition rates among the highest aptitude non-high school graduates are higher than that of the lowest aptitude high school graduates.

In the next two charts, we are controlling simultaneously for educational level, sex, race, and AFQT. With only a few irregularities, the increased attrition over time persists -- even after control for all these variables.

CHART 5

CHART 6

The next chart provides some comparative data from the previous two charts.

CHART 7

The relationship between AFQT and attrition appears stronger among non-blacks than blacks.

Analysis of aptitude data for women has not yet been completed, so we do not know what will be found here.

In respect to attrition trends when sex and race are both taken into account,

CHART 8

we see that attrition rates among women run higher for non-blacks than blacks.

More detailed analysis of these data show that black women are being discharged less frequently than non-black women for marriage, pregnancy, behavior, and performance reasons.

CHART 9

Chart 9 shows the importance of policy as a factor relating to attrition -- a more important variable than educational level or aptitude. In a regression equation (if we were only fortunate enough to have the data available to us), it is quite possible that year of entry would emerge as the number one variable in predicting attrition -- and the most reasonable explanation for this finding would appear to be that different management policies toward attrition have been in effect over the years. An accession under Project 100,000 during 1967 had a higher probability of completing two years of service than an accession during FY74. As a matter of fact, the Project 100,000 man with an attrition rate of 12.2% was more likely to finish two years of service than a FY74 accession

who was a high school graduate AFQT, Category I and II. The rate for the latter accession was 16.3%. This could only be accounted for by policy differences.

So, what appears to have happened, is that management philosophy, policy, and practice have changed markedly over the years in the handling of motivational, behavioral, and performance problems among enlisted personnel. Personnel quality control through attrition rather than other management techniques appears to be becoming dominant. While this approach would be costly even if the manpower supply were unlimited, under current and projected manpower pool conditions, it can be extremely damaging.

Where do we go from here? Our researchers would probably want to concentrate their resources on the personnel selection side, looking for the unmined variance still to be accounted for by new pre-service predictors, or more sophisticated statistical treatment of the data already available. There probably is some gain to be accomplished here, and these efforts should be encouraged. The most promising approach of this type would be to look among those who do not meet current entry standards to see if we are excluding some who do have equal or higher potential than those now coming in. Regarding the development of additional selection instruments to cut down the available manpower supply, this would appear to have limited utility in an increasingly tight recruiting market.

The major contribution to reducing attrition most likely comes from the organizational side. It is likely that when attention is focused on units, we will find sizeable differences among the units with respect to attrition, misbehavior, and poor performance; and this will be over and above differences among the units in the quality of people that they have. The identification of factors differentiating between high and low attriting units, and use of this information for developing improved management techniques would seem to be an important and logical way to go. The Military Services have always emphasized the importance of good leadership at all management levels. Let's get turned on to this part of the problem. It is where we stand to gain considerably.

Thank you.

CHART 1

MALE AND FEMALE ENLISTED PERSONNEL, ALL MILITARY SERVICES: ATTRITION RATES DURING FIRST TWO YEARS OF MILITARY SERVICE—BY SEX AND CAUSE OF ATTRITION

(FISCAL YEARS OF ACCESSION: 1971-1974)

CAUSE OF ATTRITION	PERCENT ATTRITION BY YEAR OF ACCESSION			
	FY 1971	FY 1972	FY 1973	FY 1974
<u>MALE</u>				
TOTAL	<u>20.7</u>	<u>21.3</u>	<u>23.6</u>	<u>29.1</u>
MEDICAL	3.1	3.4	3.4	3.4
DEPENDENCY OR HARDSHIP	1.3	1.1	1.1	0.6
DEATHS	0.3	0.2	0.2	0.2
FAILURE TO MEET MINIMUM BEHAVIORAL OR PERFORMANCE CRITERIA	14.0	14.7	17.3	22.9
OTHER	2.0	2.0	1.7	2.0
<u>FEMALE</u>				
TOTAL	<u>40.8</u>	<u>35.1</u>	<u>30.8</u>	<u>28.7</u>
MEDICAL	1.5	1.5	1.9	1.6
DEPENDENCY OR HARDSHIP	0.8	0.7	0.7	1.0
DEATHS	0.1	0.0	0.1	0.1
FAILURE TO MEET MINIMUM BEHAVIORAL OR PERFORMANCE CRITERIA	17.8	15.6	13.2	14.9
OTHER*	20.6	17.4	14.9	11.1

*PRIMARILY MARRIAGE AND PREGNANCY.

SOURCE: DEFENSE MANPOWER DATA CENTER TABULATIONS FROM COHORT FILE.

NOTE: INDUCTEES ARE NOT INCLUDED.

**MALE AND FEMALE ENLISTED PERSONNEL, ALL MILITARY SERVICES:
ATTRITION RATES DURING FIRST TWO YEARS OF MILITARY SERVICE—
BY SEX AND LENGTH OF SERVICE**

(FISCAL YEARS OF ACCESSION: 1971-1976)

LENGTH OF SERVICE (MONTHS)	PERCENT ATTRITION BY YEAR OF ACCESSION*					
	FY 1971	FY 1972	FY 1973	FY 1974	JUL-DEC 74	JAN-JUN 75
TOTAL	20.7	21.3	23.6	29.1	()	()
0-3	6.4	6.5	6.5	9.8	10.1	11.0
4-6	1.9	2.2	2.2	3.4	3.4	2.6
7-12	6.5	4.6	5.0	5.2	5.8	
13-24	7.8	8.0	10.0	10.7		
TOTAL	40.8	35.1	30.8	28.7	()	()
0-3	9.5	9.7	8.3	7.7	7.5	9.5
4-6	4.4	3.8	2.5	3.7	3.3	2.9
7-12	10.8	7.9	6.8	6.8	6.2	
13-24	16.0	13.8	13.1	10.5		

SOURCE: DEFENSE MANPOWER DATA CENTER TABULATIONS FROM COHORT FILE.

*DATA CURRENT AS OF 30 JUNE 1976.

NOTE: INDUCTEES ARE NOT INCLUDED.

**MALE AND FEMALE ENLISTED PERSONNEL, ALL MILITARY SERVICES:
ATTRITION RATES DURING FIRST TWO YEARS OF MILITARY SERVICE—
BY SEX AND EDUCATIONAL LEVEL**

(FISCAL YEARS OF ACCESSION: 1971-1974)

EDUCATIONAL LEVEL	PERCENT ATTRITION BY YEAR OF ACCESSION			
	FY 1971	FY 1972	FY 1973	FY 1974
<u>MALE</u>				
TOTAL	20.7	21.3	23.6	29.1
HIGH SCHOOL GRADUATES	14.3	15.5	17.1	19.9
NON-HIGH SCHOOL GRADUATES*	32.2	32.4	35.2	41.7
<u>FEMALE</u>				
TOTAL	40.8	35.1	30.8	28.7
HIGH SCHOOL GRADUATES	39.6	33.9	29.9	27.0
NON-HIGH SCHOOL GRADUATES*	60.3	55.6	48.2	47.0

SOURCE: DEFENSE MANPOWER DATA CENTER TABULATIONS FROM COHORT FILE.

*INCLUDES THOSE WITH GED CERTIFICATES.

NOTE: INDUCTEES ARE NOT INCLUDED.

CHART 4

**MALE ENLISTED PERSONNEL, ALL MILITARY SERVICES
ATTRITION RATES DURING FIRST TWO YEARS OF MILITARY SERVICE—
BY RACE, EDUCATIONAL LEVEL, AND AFQT MENTAL CATEGORY**

(FISCAL YEARS OF ACCESSION: 1971-1974)

EDUCATIONAL LEVEL AND AFQT MENTAL CATEGORY	PERCENT ATTRITION BY YEAR OF ACCESSION			
	FY 1971	FY 1972	FY 1973	FY 1974
<i><u>ALL RACES</u></i>				
EDUCATIONAL LEVEL: TOTAL	<u>20.7</u>	<u>21.3</u>	<u>23.6</u>	<u>29.1</u>
AFQT MENTAL CATEGORIES:				
I AND II	14.3	15.9	17.8	21.8
III	22.3	22.9	26.0	32.0
IV	28.7	27.9	29.4	35.0
HIGH SCHOOL GRADUATES: TOTAL	<u>14.3</u>	<u>15.5</u>	<u>17.1</u>	<u>19.9</u>
AFQT MENTAL CATEGORIES:				
I AND II	11.9	12.7	14.0	16.3
III	15.4	17.0	19.0	21.8
IV	19.7	20.0	21.4	24.9
NON-HIGH SCHOOL GRADUATES: * TOTAL	<u>32.2</u>	<u>32.4</u>	<u>35.2</u>	<u>41.7</u>
AFQT MENTAL CATEGORIES:				
I AND II	27.2	29.2	32.0	36.4
III	31.7	32.0	35.5	42.9
IV	35.5	36.1	37.7	43.6

SOURCE: DEFENSE MANPOWER DATA CENTER TABULATIONS FROM COHORT FILE.

*INCLUDES THOSE WITH GED CERTIFICATES.

NOTE: INDUCTEES ARE NOT INCLUDED.

**MALE ENLISTED PERSONNEL, ALL MILITARY SERVICES:
 ATTRITION RATES DURING FIRST TWO YEARS OF MILITARY SERVICE—
 BY RACE AND AFOT MENTAL CATEGORY**

(FISCAL YEARS OF ACCESSION: 1971-1974)

AFOT MENTAL CATEGORY	PERCENT ATTRITION BY YEAR OF ACCESSION			
	FY 1971	FY 1972	FY 1973	FY 1974
<u>NON-BLACK</u>				
TOTAL	20.1	21.0	23.3	28.7
I AND II	14.2	15.8	17.6	21.2
III	22.0	23.0	26.1	32.3
IV	30.0	30.2	32.1	38.9
<u>BLACK</u>				
TOTAL	24.8	22.9	25.2	30.2
I AND II	20.2	19.2	22.0	28.0
III	24.1	22.5	25.8	31.3
IV	26.1	23.8	25.0	30.0

SOURCE: DEFENSE MANPOWER DATA CENTER TABULATIONS FROM COHORT FILE.
 NOTE: INDUCTEES ARE NOT INCLUDED.

CHART 6

**MALE ENLISTED PERSONNEL, ALL MILITARY SERVICES
ATTRITION RATES DURING FIRST TWO YEARS OF MILITARY SERVICE—
BY RACE, EDUCATIONAL LEVEL, AND AFQT MENTAL CATEGORY**

(FISCAL YEARS OF ACCESSION: 1971-1974)

EDUCATIONAL LEVEL AND AFQT MENTAL CATEGORY	PERCENT ATTRITION BY YEAR OF ACCESSION			
	FY 1971	FY 1972	FY 1973	FY 1974
<u>BLACK</u>				
EDUCATIONAL LEVEL: TOTAL	<u>24.8</u>	<u>22.9</u>	<u>25.2</u>	<u>30.2</u>
AFQT MENTAL CATEGORIES:				
I AND II	20.2	19.2	22.0	28.0
III	24.1	22.5	25.8	31.3
IV	26.1	23.8	25.0	30.0
HIGH SCHOOL GRADUATES: TOTAL	<u>18.7</u>	<u>17.8</u>	<u>19.8</u>	<u>22.4</u>
AFQT MENTAL CATEGORIES:				
I AND II	16.4	15.4	17.1	20.4
III	18.4	17.8	20.2	22.9
IV	19.3	18.1	19.8	22.0
NON-HIGH SCHOOL GRADUATES: * TOTAL	<u>34.1</u>	<u>31.7</u>	<u>33.6</u>	<u>40.5</u>
AFQT MENTAL CATEGORIES:				
I AND II	32.4	27.6	31.1	37.6
III	33.2	30.7	33.9	41.6
IV	35.0	33.6	33.5	39.0

SOURCE: DEFENSE MANPOWER DATA CENTER TABULATIONS FROM COHORT FILE.

*INCLUDES THOSE WITH GED CERTIFICATES.

NOTE: INDUCTEES ARE NOT INCLUDED.

CHART 7

**MALE ENLISTED PERSONNEL, ALL MILITARY SERVICES
ATTRITION RATES DURING FIRST TWO YEARS OF MILITARY SERVICE—
BY RACE, EDUCATIONAL LEVEL, AND AFQT MENTAL CATEGORY**

(FISCAL YEARS OF ACCESSION: 1971-1974)

EDUCATIONAL LEVEL AND AFQT MENTAL CATEGORY	PERCENT ATTRITION BY YEAR OF ACCESSION			
	FY 1971	FY 1972	FY 1973	FY 1974
<i>NON-BLACK</i>				
EDUCATIONAL LEVEL: TOTAL	<u>20.1</u>	<u>21.0</u>	<u>23.3</u>	<u>28.7</u>
AFQT MENTAL CATEGORIES:				
I AND II	14.2	15.8	17.6	21.2
III	22.0	23.0	26.1	32.3
IV	30.0	30.2	32.1	38.9
HIGH SCHOOL GRADUATES: TOTAL	<u>13.7</u>	<u>15.2</u>	<u>16.6</u>	<u>19.3</u>
AFQT MENTAL CATEGORIES:				
I AND II	11.8	12.6	13.8	16.0
III	14.9	16.8	18.7	21.5
IV	20.1	21.5	22.9	27.9
NON-HIGH SCHOOL GRADUATES:* TOTAL	<u>31.8</u>	<u>32.5</u>	<u>35.6</u>	<u>42.0</u>
AFQT MENTAL CATEGORIES:				
I AND II	27.0	29.2	32.1	36.3
III	31.5	32.2	35.9	43.3
IV	35.6	37.0	39.4	46.4

SOURCE: DEFENSE MANPOWER DATA CENTER TABULATIONS FROM COHORT FILE.

*INCLUDES THOSE WITH GED CERTIFICATES.

NOTE: INDUCTEES ARE NOT INCLUDED.

**MALE AND FEMALE ENLISTED PERSONNEL, ALL MILITARY SERVICES:
 ATTRITION RATES DURING FIRST TWO YEARS OF MILITARY SERVICE—
 BY SEX AND RACE**

(FISCAL YEARS OF ACCESSION: 1971-1974)

RACE	PERCENT ATTRITION BY YEAR OF ACCESSION			
	FY 1971	FY 1972	FY 1973	FY 1974
<u>MALE</u>				
TOTAL	<u>20.7</u>	<u>21.3</u>	<u>23.6</u>	<u>29.1</u>
BLACK	24.8	22.9	25.2	30.6
NON-BLACK	20.1	21.0	23.3	28.7
<u>FEMALE</u>				
TOTAL	<u>40.8</u>	<u>35.1</u>	<u>30.8</u>	<u>28.7</u>
BLACK	39.2	32.7	26.5	23.0
NON-BLACK	41.1	35.6	31.6	29.8

SOURCE: DEFENSE MANPOWER DATA CENTER TABULATIONS FROM COHORT FILE.

NOTE: INDUCTEES ARE NOT INCLUDED.

**MALE ENLISTED PERSONNEL, ATTRITION RATES
DURING FIRST TWO YEARS OF SERVICE—
BY SERVICE AND ACCESSION PERIOD**

CHART 9

SERVICE	PERCENT ATTRITION BY FISCAL YEAR OF ACCESSION		PROJECT CONTROL GROUP ^{a/} 100,000 MEN ^{b/} ACCESSIONS ^{c/}	TOTAL ACCESSIONS ^{c/}
	FY 1967	FY 1967		
TOTAL	6.6	12.2		29.1
ARMY	5.6	9.1		32.3
NAVY	6.0	16.3		29.8
MARINE CORPS	11.8	19.6		24.7
AIR FORCE	7.5	19.5		23.0

^{a/} AFQT CATEGORY 1 THROUGH AFQT HIGH CATEGORY IV MEN (PRIMARYLY 16 AND ABOVE). ABOUT 76 PERCENT WERE HIGH SCHOOL GRADUATES.

^{b/} AFQT LOW CATEGORY IV MEN (PRIMARYLY 10-15). ABOUT 45 PERCENT WERE HIGH SCHOOL GRADUATES.

^{c/} AFQT CATEGORY 1 THROUGH IV MEN. ABOUT 58 PERCENT WERE HIGH SCHOOL GRADUATES.

NOTE: INDUCTEES ARE NOT INCLUDED.

The Gatekeepers: First-Term Enlisted Attrition
Policies and Practices
Craig Foch and Nikki King
Rand Corporation

Introduction

In recent years, there has been an increasing amount of concern among the services about early separations. This is reflective of a larger concern about the maintenance of the armed forces to meet defense preparedness requirements in a cost-effective manner. The services control early separations through the administration of various policies which may be regarded as the "gatekeepers" of attrition.

This paper is intended to shed some light on the operation of these "gatekeepers". This will be done in three general sections. The first section will establish a common definition of attrition, and provide a somewhat different perspective on attrition policies by proposing conceptual categories which group reasons for separation. It is hoped that this vehicle can be used to provoke thought about the nature of separations policies. The next section will describe the major differences between the services in separations policies. This will be done by describing the relationships and dissimilarities between service policies in particular areas, which on the whole are quite similar in their wording and interpretation.

Implementation of policy is a major determinant of outcome, and the third section will describe the differences in the implementation of separations policy between the services.

Attrition...What is it?

One of the first problems encountered in any study of attrition is how it will be defined. Everyone generally agrees on Webster's definition of attrition, as a wearing down or reduction, chiefly as a result of resignation, retirement or death, but the interpretations of that definition vary from service to service. As a result, this paper will be using the definition offered in DoD directive #1315.7, which refers to attrition as "separation

prior to completion of the contractual active duty obligation." Discussions of "manageable" and "unmanageable" attrition will *not* appear here; the use of these terms by the various services is too varied to have a consistent or useful definition in a description of attrition policies.

Similarly, the typical categories used for Administrative Separations policies, such as "Convenience of the Government", "Unsuitability" or "Misconduct" will not be heavily relied upon here because they tend to oversimplify the realities of an extremely complex set of personnel policies. Instead, we will be using three general categories which are descriptive of the reasons for which a service member may be discharged early. These categories include:

- o *Clearly unavoidable separations;*
- o *Separations due to attributes for which the member may separate at his or her option; and*
- o *Separations due to member characteristics, behaviors, or levels of performance which the services find unacceptable.*

It should be pointed out that these categories are not intended to replace any of the presently existing DoD or MARDAC separations codes. Their primary function is to lend cogency to the description of separations policies which will follow. A secondary function is to illustrate for the services which areas of separations policy are relatively fixed and which are more flexible.

Clearly unavoidable separations are those which occur because of some set of circumstances which are out of the control of the services, and also for which the services have no legal or administrative recourse other than separation. Examples of these include: death, security, permanent disability (including disabling personality disorders), and void enlistments.

Separations due to attributes for which the member may separate at his or her option include such things as pregnancy or childbirth, hardship, dependency, sole survivorship, or other early separation programs under which a member may be released near the end of his

or her service obligation. The distinction between this category and the previous one is that these attributes are typically brought to the attention of the service for the purpose of obtaining an early separation; as such, they are generally exercised at the option of the service member.

Separations because of member characteristics, behaviors, or levels of performance which the services find unacceptable include qualities exhibited by service members subsequent to entry into the military. These separations are typically the result of the member committing some overt act or series of acts which indicate that he or she cannot be a productive service member. This category includes the full range of separations policies from marginal performance to misconduct separations.

Reasons for separations of this type fit into one or more of the following three categories: (1) job performance, (2) social behavior, or (3) general military standards. Table 1 illustrates these categories with reasons for separation listed left to right, in order of severity.

It should be noted that unacceptable job performance or social behavior are reasons for which any employer might release an employee. Only the last dimension, general military standards is unique to an environment where morale is very important, such as the military.

Separations Policies...DoD and the Services

General guidance in separations policy is provided by DoD directive #1332.14, which outlines broad areas and reasons for administrative separations. Most of the changes in service regulations occur as a result of some change in DoD directive #1332.14, after which the services are normally given sixty days to make printed changes in their individual directives. Compliance with the spirit of the changed DoD directive gradually occurs as soon as the services can notify their respective administering officials.

On the whole, DoD policy governing separations is very broad and gives the services more latitude in separations authority than any one of them takes. None of the military services has separations policies in effect under *all* of the DoD categories, but they generally interpret their own categories broadly enough to encompass any omitted DoD category. For example, #1332.14 lists a reason for discharge which reads: "Condition, not a physical disability, which interferes with the performance of

UNACCEPTABLE ATTRIBUTES OR BEHAVIORS

1. JOB PERFORMANCE

- marginal performance
- shirking
- inaptitude
- apathy, defective attitudes

2. SOCIAL BEHAVIOR

- personal abuse of drugs
- drug abuse
- alcohol abuse
- failure to support dependents
- financial irresponsibility
- failure to pay just debts
- homosexual tendencies
- sexual perversion
- civil court conviction

3. GENERAL MILITARY STANDARDS

- unsanitary habits
- frequent involvement with
- conscientious objection
- personality disorder
- civil or military authorities

CLASSIFIED

DEFINITIONS

duty." Only the Marine Corps lists this as a reason for separation, but all of the other branches appear to have provided for it in some way.

Differences between Services Primarily in Interpretation; Administrative Detail

The general guidance provided by DoD is an attempt to give service separations policy a common framework. The individual service policies do not mirror the language of the DoD directive, but they generally capture the intent, while maintaining the individuality of the services. The DoD directive does not generally contain individual explanations of what a particular reason includes, but it gives general guidelines as to the applicability of potentially controversial sections. This flexibility makes it possible for the services to develop their own interpretations of generally prescribed reasons, and often results in some differences between the various service branches. Other instances of differences between the service seem to be due to variations in administrative detail of a general policy, such as with the Marginal Performer Programs.

Marginal Performer Programs

Marginal Performer Programs represent a major area of variability between the service branches.* These programs are a recent addition to DoD separations policy, and they establish non-punitive and expeditious means of eliminating members who:

- 1) cannot or will not meet required job proficiency standards;
- 2) create an administrative burden to the command due to

*This variability was noted in a report by the General Accounting Office in April, 1975. ("Urgent Need for a Department of Defense Marginal Performer Program") Changes have been made since that time, but some variability still exists.

- minor disciplinary or military infractions; or
- 3) have performance levels which do not contribute to the efficiency or effectiveness of their units.

As a rule, these programs apply to personnel who have less than three years of service and are in pay grade E-3 or below (usually without any prospects for advancement beyond E-3 by the end of their term). The services believe that the presence of these programs is beneficial in two general ways:

- o in the short-run, the marginal performer program improves the effectiveness of the force by:
 - 1) relieving supervisors of spending disproportionate amounts of time in directing non-productive members, and
 - 2) improving the morale of those individuals who are productive.
- o in the long run, the marginal performer program reduces administrative costs and the probability of more separations for Unsuitability and Misconduct reasons.

The overall intent of the service programs is the same, although they differ in several respects. Table 1 illustrates some of the differences in key characteristics of each of the service programs.

The primary benefit of the Marginal Performer programs indicated by the services is that they are expeditious and less costly than other types of administrative separations. The services recognize that this benefit is potentially the largest drawback of the Marginal Performer programs. Therein lies the paradox of these programs and the genesis of much of the controversy that surrounds them. The services are caught between the often conflicting needs of increasing efficiency by ridding themselves of potential troublemakers and non-productive members while maintaining an adequate opportunity for potentially productive members to adjust. To make the paradox even more difficult, the unit

Table 1
Key Characteristics of Marginal Performer Programs, by Service

Program Characteristics	Army	Navy	Marine Corps	Air Force
1. Name	Expeditionary Discharge Program (EDP) ^a	Marginal Performance Discharge ^b	Expeditionary Discharge Program	Marginal Performer Discharge
2. Timing	6-35 months of service	60 days-35 months of service	6-35 months of service	35 months or less of service
3. Member consent needed?	yes	yes	no	no
4. Type of discharge authorized	honorable or general	honorable or general	honorable or general	honorable
5. Discharge action initiated by	Lt. Col./and or Battalion Commander	Commanding Officer	Base Commander	Unit Commander

^aThe Army also has a Trainee Discharge Program (TDP) for discharges prior to 180 days of service. Only honorable discharges are authorized, but member may be separated involuntarily.
^bThe Navy has initiated three programs on a trial basis since January 1976 in an attempt to discover what mechanisms would be most appropriate for separating trainees with low potential for successful service. Such programs operate at member's option.

commanders who have authority to initiate these discharges are making decisions in the field, which leaves policymakers in Washington with very little control over how many people will be separated. There are costs associated with every early discharge as well as the chance of higher costs which may be incurred when necessary discharges *do not* occur. The services are in the unenviable position of designing programs which maximize the benefits of these programs while minimizing the disbenefits, and hoping that their decentralized unit commanders who have discharge authority will make the correct interpretations and decisions relative to separations policy.

Characterization of Service Specified by DoD

The *type* of discharge granted with each administrative separation is again up to the discretion of the services. In this instance, DoD is somewhat more explicit about the amount of latitude in service characterization. Table 2 illustrates the discharge characterization designated by DoD for each of the major separations categories.

In general, then, only separations for misconduct, security, or request for discharge for the good of the service are eligible for discharges under *other than honorable conditions*. This category of discharges has been used as a rough indicator of the extent of service problems with indiscipline. General discharges have been used as a rough indicator of the extent to which service members are somewhat unsuitable to military service. The problem with using these discharges as yardsticks by which to compare indiscipline and unsuitability over time is that DoD and individual service policy governing these discharges has shifted significantly in recent years. As a result, the counts are not merely measuring increases or decreases in certain types of discharges; they are also measuring shifts in service and DoD policy.

What this means for the services is that they can make no

Table 2

Discharge Characterization
 Authorized for Various Separations Categories

Reason for Separation	Type of Discharge Authorized
1. Expiration of Enlistment	honorable or general
2. Convenience of the Government	honorable or general
3. Dependency or Hardship	honorable or general
4. Minority	void enlistment; honorable or general
5. Disability	honorable or general
6. Personal Abuse of Drugs ^a	honorable
7. Unsuitability ^b	honorable or general
8. Security	honorable, general other than honorable conditions
9. Misconduct	normally other than honorable conditions (unless otherwise indicated by service record)
10. Request for Discharge for the Good of the service	other than honorable conditions

^aPrior to the creation of this category in 1973, the services separated members for "Drug Abuse" which was subject to an Undesirable Discharge.

^bOne of the reasons in this category, unsanitary habits, was once in a category subject to an Undesirable Discharge.

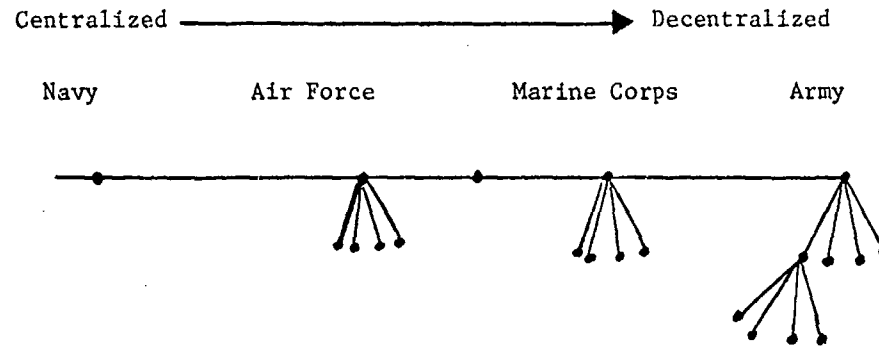
accurate comparative statements over time about the degree of problems with member indiscipline without taking into account that indiscipline as a concept has changed significantly in the services. An example of the impact of this policy shift on the individual service member can be demonstrated if one examines separations for unsanitary habits. This separation reason was at one time part of the general "Unfitness" category (most of which has now been transferred to the "Misconduct" category.) Unsanitary habits, however, now is a part of the "Unsuitability" category, which means that the member who separates for this reason is now eligible for an Honorable or General discharge only, while prior to the change, he or she would normally have received an Undesirable Discharge.

Separations Policy Implementation
How the Services Make the Policies Work

Just as each branch of the service has a somewhat different set of separations policies and interpretations of DoD policies, each branch has a different method of implementing the policies.

The linkage between policymaking and policy implementation is crucial in any consideration of separations policy. For the purpose of this paper, when policymaking and implementation take place in the same location, the locus of authority will be considered centralized. When the two functions take place in increasing numbers of locations (and are controlled by different levels of personnel) the locus of authority will be considered increasingly decentralized. Figure 1 illustrates this point schematically.

Figure 1



As Figure 1 indicates the Navy is the most centralized, with a majority of separations decisions being processed at the Bureau of Naval Personnel in Arlington, Va. This is the center for both policymaking *and* implementation. The next, in descending order of centralization is the Air Force, whose separations are processed at the personnel center at Randolph Air Force Base in Texas, while policy is administered at the Pentagon. The majority of discharges are finalized at the installation command, except for those resulting in a discharge characterization of other than honorable conditions. These separations are normally approved at higher levels. Next is the Marine Corps, which has decentralized separations, with discharge authority vested in commanding Generals, and policymaking centralized in Arlington. Because the Marine Corps is a smaller service, with only major commands, it is somewhat less decentralized than the Army, which has policy administration at the Pentagon, but authorizes separations of personnel by unit Commanders, Commanders with general Court-Martial jurisdiction, and some commanders of medical treatment facilities. All Army discharges are reviewed by the staff Judge Advocate for

legal sufficiency at the level at which they are initiated.

The Role of the Service Member
Being Considered for Separation

Also important to the implementation of separations policy in each branch of the service is the role of the service member being considered for separation. In the case of dependency or hardship, pregnancy or childbirth, sole survivorship and the elective early separation programs which allow separation up to 90 days before expiration of the term of service, separation is voluntary and often initiated by the service member. A member may request discharge for the good of the service under other than honorable conditions to avoid trial by court-martial. This action is voluntary on his or her part. Disability discharges may be voluntary or involuntary, and as mentioned earlier, the Army and Navy expeditious discharge categories can only be used if the member agrees to separation.

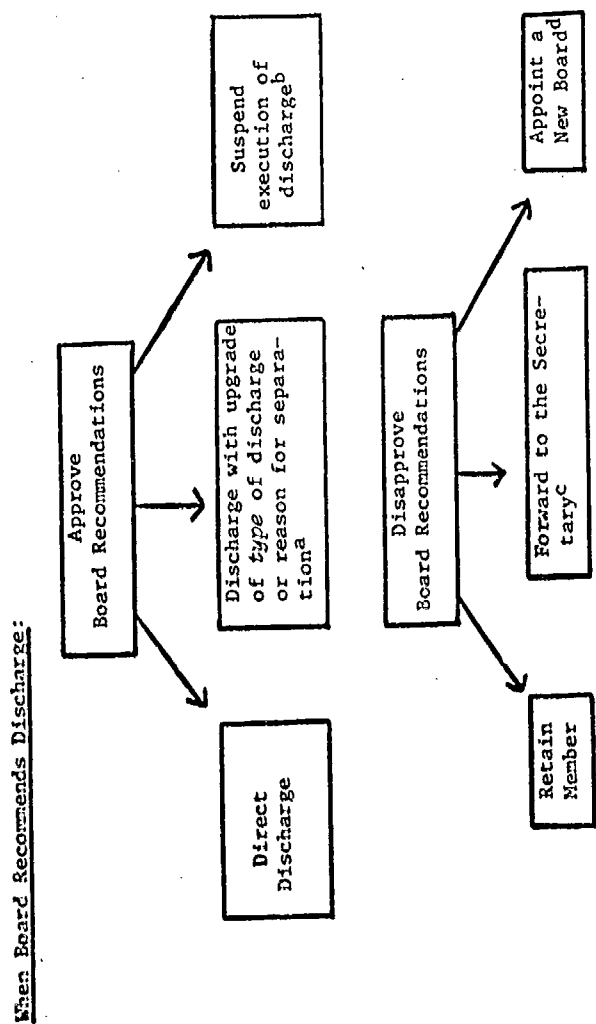
It appears that due process of the member is considered in involuntary separations. In many cases, separations are initiated only after attempts at counseling and changes of duty assignments have not ameliorated the service member's original problem. He or she is notified that a separations action is being initiated, and given an opportunity to respond. In all cases, which may result in separation under other than honorable conditions, military counsel is made available free of charge to the service member upon request.

An Administrative Discharge Board is not normally called when a Marginal Performance separation is challenged by the member. Instead, the member is notified of the action, and given time to make statements on his or her behalf, as to why he or she should be retained. These statements are optional, but should the member elect to respond, military counsel is made available in the

* Counsel is often made available in all separations if the member requests it, but it is mandatory when the separation involves a discharge under other than honorable conditions.

preparation of the statements. Service members processed for other administrative separations, particularly if the member is subject to a discharge under less than honorable conditions or has eight years or more of service may request the appointment of an Administrative Discharge Board. The board may recommend retention or separation, and the recommendation is referred back to the discharge authority. The member may submit a written statement on his or her own behalf which may lead the discharge authority to take any of the courses of action outline in Figure 2.

Figure 2
Options of the Discharge Authority after Receiving
Recommendations of Administrative Discharge Board



When Board Recommends Retention:

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    graph TD
      I[Approve or Disapprove Board Recommendations] --> J[Retain Member]
      I --> K[Forward to the Secretaryc]
  
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^a where appropriate
^b in effect, put the service member on probation
^c if recommendations conflict with own judgement
^d if there is evidence that members' rights were prejudiced

As Figure 2 indicates, the discharge authority has the power to act according to the recommendation of the Administrative Discharge Board, or to select any option which is more favorable to the member. A small percentage of separations (less than 1% per calendar year) result from Court Martial. These represent a separate category of separations from those considered here.

Timing of Separations

A final component to be considered in the implementation of separations policy is the timing of separation. Marginal Performance separations typically take less time than other separations, as was their original intention. If the service member is agreeable, they may take as little as two working days in the case of the Navy, to an average of one to two weeks for the other services. Other separations reasons typically take more time than the Marginal Performance discharges, but this depends in large measures on:

- 1) the amount of paperwork and documentation required by the service, and
- 2) whether the member requests an Administrative Review Board.

In the case of an Administrative Discharge Board, the process can be lengthened by an additional week to three months, depending on the complexity of the reason for separation and the member's amenability to discharge.

CONCLUSION

This paper has illustrated that separations policies are determined in large measure by the framework established in DoD directive #1332.14; although the services have their own interpretations of those policies, their own organizational networks, and their own implementation practices. On balance, though, the services are much more alike in these areas than they are disparate. They have a common need to keep force strengths at certain desired levels and to control costs. Each of the services recognizes that they are facing a reducing pool of male high school graduates* from which to recruit. From this perspective, every loss prior to expiration of the term of service reduces their ability to maintain force strength. On the other hand, they see themselves as having to walk a thin line between the *size* of the force and the *quality* of the force, and this is what they maintain as an overall goal. All of the services echoed the desire of the Air Force that its primary goal was "that the individual who came in would serve well and separate honorably, if possible."

At the same time, OSD has instituted attrition goals for each branch of the service.** These goals apply only to post-training attrition, so the services goal statistics are kept after the first six months. The goals vary from a low of fifteen percent of annual accessions for the Air Force and Navy to a high of twenty-five percent for the Army and Marine Corps.

It is not clear what effect these goals will have on attrition rates of the services. It is apparent, however, that any understanding of current attrition mechanisms and leverage points should be based on an examination of service policies, implementation practices, and DoD goals.

* It is generally agreed upon that these are the most desirable accessions, having lower attrition rates and possibly better on the job performance.

** The original memo, by ASD (M&RA), dated December 24, 19-5 outlined post-training attrition goals of fifteen percent for all four services. This was later modified by a memo titled: "Amended Program Decision Memorandum" (pp. 78-82), dated September 7, 1976.

THE ARMY & ATTRITION

MAJ Arthur A. Schulcz
Training and Doctrine Command, Fort Monroe, Virginia

MY PRESENTATION TODAY WILL ADDRESS THREE POINTS; FIRST, TODAY'S ARMY IS AN EQUIPMENT AND SYSTEMS ORIENTED FORCE REQUIRING HIGH QUALITY SOLDIERS WITH NO ROOM FOR THOSE WHO CAN NOT CONTRIBUTE OR OPERATE IN A SYSTEM ORIENTED ENVIRONMENT; SECOND, ATTRITION HAS BOTH GOOD AND BAD EFFECTS AND THUS REQUIRES A BALANCED APPROACH; AND FINALLY WHAT WE NEED FROM THE RESEARCH COMMUNITY.

LET ME START BY SAYING TODAY'S ARMY IS NOT WHAT MANY PEOPLE PERCEIVE IT TO BE. DUE TO THIS MISCONCEPTION, PEOPLE DO NOT FULLY UNDERSTAND THE NEED FOR A QUALITY SOLDIER. PEOPLE ASSOCIATE NAVY WITH SHIPS AND AIR FORCE WITH PLANES. THE WORD ARMY OFTEN EVOKES ((SLIDE 1 ON)) A SOMEWHAT DIFFERENT RESPONSE. A DIRTY SOLDIER WALKING DOWN A DUSTY ROAD. THIS PERCEPTION IS NOT TRUE. MY ((SLIDE 1 OFF)) NEXT CHART ((SLIDE 2 ON)) WILL SHOW WHY IT IS NOT TRUE. NOW I'M NOT GOING TO EXPLAIN WHAT ALL THESE ABBREVIATIONS AND NEMONICS MEAN; THAT'S NOT IMPORTANT. WHAT IS IMPORTANT, IS THAT EACH ONE OF THESE ABBREVIATIONS REPRESENTS A SYSTEM THAT IS UNDER DEVELOPMENT OR ABOUT TO ENTER THE ARMY. THESE SYSTEMS ARE COMPLEX AND SOPHISTICATED AND THEY IMPOSE ADDITIONAL DEMANDS ON ((SLIDE 2 OFF)) THE OPERATORS. THE NEXT SLIDE WILL SHOW WHAT I MEAN BY THESE ADDITIONAL DEMANDS IMPOSED BY TECHNOLOGY. ((SLIDE 3 ON)) IN THE OLD INFANTRY SQAD THE INDIVIDUAL HAD ONLY TO TAKE CARE OF HIS INDIVIDUAL WEAPON. MOST OF TODAY'S

INFANTRY AND MECHANIZED INFANTRY. THE MECHANIZED INFANTRY COMBAT VEHICLE (MICV) WILL SHORTLY BE ISSUED TO OUR UNITS. IN ADDITION TO THEIR INDIVIDUAL WEAPONS THEY WILL BE RESPONSIBLE FOR THE MECHANIZED INFANTRY VEHICLE, WHICH HAS A BUSHMASTER AUTOMATIC CANNON, A TOW ANTI-TANK MISSILE, NIGHT VISION DEVICES, RADIO/INTER-COM SYSTEM, SHORT & MEDIUM RANGE AT MISSILES AND A WEAPONS SYSTEM THAT WILL ALLOW THE SQUAD TO FIRE ON THE MOVE. WHAT I'M SAYING IS THAT TO DO THE SAME JOB WE HAVE NOW ADDED A MULTITUDE OF TASKS WHICH REQUIRES MORE FROM THE INDIVIDUAL. THIS SAME TREND IS TOWARDS COMPLEXITY AND SOPHISTICATION IS FOUND NOT ONLY IN OUR COMBAT SYSTEMS BUT THROUGHOUT THE ARMY. HOW DOES THIS RELATE TO ATTRITION? IT RELATES IN TWO WAYS. FIRST WE MUST FIND WAYS TO KEEP THESE INDIVIDUALS WHO CAN MASTER THESE ADDITIONAL TASKS AND SECOND WE MUST HASTEN THE IDENTIFICATION OF THOSE WHO CAN NOT CONTRIBUTE OR OPERATE IN THE INCREASINGLY SYSTEMS ORIENTED ARMY. ((SLIDE 3 OFF))

TO FURTHER ILLUSTRATE WHAT TECHNOLOGY HAS DONE TO THE BATTLEFIELD LET'S LOOK AT WHAT HAS HAPPENED ((SLIDE 4 ON)) TO THE RANGE OF OUR WEAPONS. THIS CHART SHOWS THE AREA IN WHICH THE TANK COMMANDER HAD A 50-50 PROBABILITY OF HITTING A TARGET WITH HIS TANK CANNON. THIS IS THE AREA HE CAN AND MUST CONTROL. THE DIFFERENCE BETWEEN THE 500 METERS OF WWII AND THE THREE THOUSAND METERS OF TODAY IS A THIRTY SIX FOLD INCREASE IN AREA. NOT ONLY CAN WE SHOOT FURTHER, BUT WE DO SO WITH A MUCH

GREATER DEGREE OF ACCURACY AND LETHALITY ((SLIDE 4 OFF)). THE COMBINATION OF THIS INCREASED ACCURACY/LETHALITY CAN BE SEEN BY ((SLIDE 5 ON)) CONSIDERING THE LOSSES IN THE 1973 ARAB-ISRAELI WAR. THE TOTAL TANK AND ARTILLERY LOSSES IN 18 DAYS OF COMBAT EQUALLED OUR TOTAL OF TANKS AND ARTILLERY IN EUROPE. ONE OF THE LESSONS LEARNED FROM THIS SHORT WAR IS THAT WHAT CAN BE SEEN CAN BE HIT AND WHAT CAN BE HIT CAN BE KILLED. ((SLIDE 5 OFF)) THIS INCREASE IN LETHALITY IS ALL THE MORE IMPORTANT, BECAUSE THE ENVIRONMENT IN WHICH THE ARMY OPERATES IS SIGNIFICANTLY DIFFERENT ((SLIDE 6 ON)) THAN OUR SISTER SERVICES. HERE WE SEE THE APPROXIMATE MAJOR MANEUVER ELEMENTS OF THE SIXTH FLEET. THE NUMBER OF MANEUVER ELEMENTS IS SMALL AND THE CONTROL HIGHLY CENTRALIZED. THE ADMIRAL IN COMMAND KNOWS GENERALLY WHERE HIS SHIPS ARE. THE TASK FORCE COMMANDER USUALLY HAS VISUAL CONTACT WITH HIS SHIPS, BUT IF NOT, HE CAN SEE THEM ON HIS RADAR. WHEN THE ADMIRAL SAYS "RIGHT TURN" HE KNOWS IF THE ELEMENTS OF THE FLEET OR TASK FORCE TURNED RIGHT. WHEN THE CAPTAIN OF A SHIP SAYS "RIGHT RUDDER," EVERY SAILOR ON THE SHIP ((SLIDE 6 OFF)) TURNS RIGHT WITHOUT ((SLIDE 7 ON)) BEING TOLD. THE AIR FORCE ALSO RUNS A FAIRLY CENTRALIZED OPERATION. THE MANEUVER ELEMENTS CAN BE PLOTTED TO THEIR TARGETS OR THEIR ROUTES CONTROLLED BY PREPROGRAMMED COMPUTERS. ALL OPERATIONS ARE CENTRALLY CONTROLLED. ((SLIDE 7 OFF)) ((SLIDE 8 ON)) THE EQUIVALENT ARMY ELEMENT, A CORPS, PRESENTS A DIFFERENT PROBLEM. BOTH THE NUMBERS AND VARIETY OF MANEUVER ELEMENTS ARE SIGNIFICANTLY LARGER. TO TURN RIGHT, THE COMMAND MUST GO THRU SIX ECHELONS OF COMMAND UNTIL IT REACHES A DRIVER OR SOLDIER WHO MAKES THE TURN. ((SLIDE 8 OFF))

((SLIDE 9 ON)). IN ADDITION THESE ELEMENTS ARE SPREAD OUT OVER GREAT DISTANCES; COMMANDERS ARE USUALLY OUT OF SIGHT OF EACH OTHER. TO OPERATE EFFECTIVELY, THE ARMY MUST BE DECENTRALIZED TO THE LOWEST POSSIBLE LEVEL. THEREFORE, WE MUST HAVE CONFIDENCE THAT THE SOLDIER WILL TURN RIGHT OR IF FOR SOME REASON HE CAN NOT HE WILL ANALYZE THE REASON AND REACT IN A WAY THAT WILL NOT ENDANGER HIS MISSION OR HIS UNIT. WE EXPECT TO FIGHT THE NEXT WAR OUT NUMBERED IN MEN AND EQUIPMENT, AND LIFE AND DEATH DECISIONS WILL BE MADE BY LIEUTENANTS AND CAPTAINS, SERGEANTS AND PRIVATES. ((SLIDE 9 OFF))

WHAT I AM SAYING IS THAT THE ARMY THAT MARCHED DOWN THE ROAD HAS MARCHED INTO HISTORY. WE HAVE NO PLACE FOR THOSE WHO CAN ONLY MARCH. QUALITY IS AS IMPORTANT IF NOT MORE SO THAN QUANTITY: THE QUALITY, TRAINING AND MOTIVATION OF THE INDIVIDUAL SOLDIER WILL DETERMINE WHETHER HE CAN ACCOMPLISH HIS MISSION AND SURVIVE ON THE MODERN BATTLEFIELD AND COLLECTIVELY WHETHER WE CAN WIN THE NEXT WAR.

WHICH BRINGS ME TO MY SECOND POINT. ATTRITION IS LIKE A COIN; IT HAS TWO SIDES, ONE GOOD, ONE BAD. IN A VOLUNTEER ENVIRONMENT IT MAKES LITTLE SENSE TO PUT UP WITH MALCONTENTEDS. WHEN YOU CONSIDER THE CONDITIONS UNDER WHICH WE EXPECT TO FIGHT, IT MAKES NO SENSE TO PUT UP WITH THE INEPT, THE UNMOTIVATED OR THE UNDISCIPLINED; ON THE BATTLEFIELD THEY BECOME LIABILITIES, IN PEACETIME THEY ABSORB THE COMMANDERS TIME AND RESOURCES. ON THE OTHER HAND, ATTRITION REQUIRES ADDITIONAL RESOURCES TO RECRUIT AND TRAIN REPLACEMENTS FOR LOSSES. WE FEEL QUITE STRONGLY THAT ANY DISCUSSION OF ATTRITION MUST ADDRESS BOTH ASPECTS.

MY ((SLIDE 10 ON)) NEXT CHART COMPARES LOSS RATES FOR TWO YEAR GROUPS AND WHERE THEIR LOSSES OCCUR. 1973 IS THE BASE YEAR BECAUSE THIS YEAR GROUP WAS NOT EXPOSED TO ANY QUALITY SCREENING IN THE TRAINING BASE. THE SOLID LINE FOR THE 76 YEAR GROUP SHOWS LOSSES TO DATE; THE DOTTED LINE IS A PROJECTION BASED ON HISTORICAL PERFORMANCE OF OTHER YEAR GROUPS. WE KNOW THAT LOSSES WILL OCCUR, BUT THE SIGNIFICANT POINT ON THIS CHART IS THAT WE HAVE BEEN ABLE TO MOVE THE MOST OF THE ATTRITION FORWARD. ONE OF THE REASONS ((SLIDE 10 OFF)) FOR THIS IS OUR QUALITY SCREENING PROGRAM IN THE TRAINING BASE. WE CALL IT THE ((SLIDE 11 ON)) TRAINEE DISCHARGE PROGRAM. THERE ARE TWO IMPORTANT THINGS ABOUT THIS PROGRAM. FIRST, THE PROGRAM'S PURPOSE IS QUALITY CONTROL. THE BASIC CRITERIA IS A DEMONSTRATED INABILITY TO BECOME A PRODUCTIVE SOLDIER DUE TO LACK OF APTITUDE, ABILITY, MOTIVATION OR SELF DISCIPLINE. SECOND, THE PROGRAM IS DESIGNED TO FOCUS REHABILITATIVE EFFORTS ON THE MARGINAL OR POOR PERFORMER. I'VE ((SLIDE 11 OFF)) TOLD YOU HOW WE'VE MOVED OUR LOSSES FORWARD, LET ME EXPLAIN WHY. THE FIRST REASON IS THAT WE'VE BEEN ABLE TO IMPROVE THE QUALITY OF SERVICE LIFE. THE NEXT SERIES OF CHARTS, WILL SHOW WHAT HAS HAPPENED WITHIN THE ARMY SINCE WE INTRODUCED ((SLIDE 12 ON)) OUR QUALITY SCREENING PROGRAMS. HERE WE SEE WHAT HAS HAPPENED TO THE NUMBER OF SOLDIERS DROPPED FROM THE ROLLS FOR DESERTION FOR YEAR GROUPS 73 THRU 76. THE BLUE REPRESENTS HISTORICAL FACT, THE *ESTIMATE* IS WHAT WE PREDICT THE FINAL TOTAL WILL BE BASED ON PERFORMANCE TO DATE. THIS ALSO REFLECTS THE DECREASE IN AWOL SINCE THERE IS A RATIO OF ABOUT 4 AWOL FOR ((SLIDE 12 OFF)) EVERY DFR. ((SLIDE 13 ON)) NEXT WE SEE

THAT COURTS MARTIAL RATES HAVE DROPPED TO ABOUT ONE HALF. FOR EVERY COURT MARTIAL THERE IS A COST IN TIME, IN MANPOWER, IN ADMINISTRATIVE WORKLOAD. FOR THOSE CONVICTED, IT ALSO REPRESENTS A SCAR THAT MUST BE CARRIED THE REMAINDER OF THEIR LIVES. THIS ((SLIDE 13 OFF)) ALSO REFLECTS THE LOWERED CRIME INCIDENCE RATES. ((SLIDE 14 ON)) WE ALSO SEE THAT OUR PRISONER POPULATION HAS BEEN REDUCED SIGNIFICANTLY. ON 1 SEPTEMBER 1973 WHEN WE BEGAN OUR QUALITY SCREENING IN THE TRAINING BASE, THERE WERE 1,536 PRISONERS ON TRADOC INSTALLATIONS; ON 1 SEP ((SLIDE 14 OFF)) 76 THERE WERE 191. WE ((SLIDE 15 ON)) HAVE A REHABILITATIVE INSTITUTION CALLED THE ARMY RETRAINING BRIGADE. THE NUMBERS OF PRISONERS HAS DECREASED WHILE THE CRITERIA FOR ATTENDANCE HAS BECOME LESS STRICT. ((SLIDE 15 OFF)) THE SUM THAT OF THESE FACTS IS THAT WE HAVE BEEN ABLE TO REDUCE THE TIME, MONEY AND MANPOWER DEVOTED TO CORRECTIONS AND MILITARY JUSTICE AND SHIFT THESE RESOURCES INTO INCREASED COMBAT POWER OR OTHER ARMY NEEDS. COMMANDERS AND SUPERVISORS HAVE HAD MORE TIME TO DEVOTE TO TRAINING AND READINESS RATHER THAN COPING WITH PROBLEMS PRODUCED BY DISRUPTERS.

THE SECOND REASON WE'VE ((SLIDE 16 ON)) MOVED OUR LOSSES FORWARD IS ECONOMY. THIS CHART SHOWS THE ARMY'S INVESTMENT IN A SOLDIER AS A FUNCTION OF HIS TIME IN SERVICE (SHOWN ALONG THE BOTTOM). WHAT THIS CHART SHOWS IS THAT THE LONGER A SOLDIER IS IN THE SERVICE THE HIGHER IS THE INVESTMENT. THEREFORE IF YOU ARE GOING TO LOSE PEOPLE THE MOST ECONOMICAL POINT FOR

THESE LOSSES IS AS EARLY AS POSSIBLE IN THEIR CAREERS WHILE OUR INVESTMENT IS STILL SMALL. IF WE SEPARATE A SOLDIER AT THE END OF BASIC COMBAT TRAINING WE'VE INVESTED ABOUT \$2,100. AFTER ADVANCED INDIVIDUAL TRAINING, THIS INCREASES TO \$5,100. WE WANT TO MAXIMIZE OUR LOSSES WHERE OUR INVESTMENT IS LEAST.

THE FINAL ((SLIDE 16 OFF)) REASON THAT WE WANT TO MOVE ATTRITION FORWARD IS THAT LOSSES OCCURING AFTER TRAINING NOT ONLY REPRESENTS A LOST INVESTMENT BUT ((SLIDE 17 ON)) IT ALSO CAUSES A SKILL DRAIN. THIS CHART SHOWS WHAT HAPPENED TO 100 SOLDIERS IN EACH OF THESE FOUR ARMY SKILL CATEGORIES WHO COMPLETED INITIAL ENTRY TRAINING. (THE COLOR CODED NUMBERS ARE KEYED TO THE COLORS REPRESENTING THESE SKILLS.) THE RIGHT SIDE REPRESENTS THOSE WHO, COMPLETED THEIR ENLISTMENT AND EITHER LEFT THE SERVICE OR REENLISTED. THE BOTTOM SHOWS THE PERCENTAGE OF THOSE WHO LEFT THE SERVICE BEFORE COMPLETING THEIR ENLISTMENT. THE PRACTICAL EFFECTS OF THIS SKILL DRAIN ARE DECREASED READINESS AND UNIT TURBULENCE. SINCE MOST OF THE ARMY OPERATES ON TEAMWORK, WHEN YOU CHANGE THE TEAM PLAYERS ((SLIDE 17 OFF)) YOU AFFECT TEAM PERFORMANCE.

I'VE TALKED ABOUT OUR MAJOR ATTRITION PROGRAMS. NOW ((SLIDE 18 ON)) LET ME GIVE YOU AN IDEA OF THEIR IMPACT. THIS CHART SHOWS OUR MAJOR SOURCE OF LOSSES IN FY 76. TDP LOSSES AMOUNTED TO ABOUT 21,000, 11% OF OUR TRAINING INPUT. WE LOST ABOUT ANOTHER FIVE THOUSAND THROUGH MEDICAL LOSSES DUE TO CONDITIONS THAT SHOWED THEMSELVES ONLY AFTER TRAINING HAD BEGUN.

THE EDP LOSSES THIS PAST YEAR AMOUNTED TO ALMOST 20,000 SLIGHTLY LESS THAN OUR LOSSES FROM THE TDP. THESE REPRESENT THE MAJOR SOURCES OF ATTRITION. A LARGER PORTION OF THE ((SLIDE 18 OFF)) ((SLIDE 19 ON)) OF THIS ATTRITION IS ATTRIBUTED TO LACK OF MOTIVATION, WHICH BRINGS ME TO WHAT WE NEED FROM THE RESEARCH COMMUNITY.

I'VE TALKED ABOUT THE EFFECTS OF LOSSES. WE NEED A BETTER UNDERSTANDING OF THE CAUSES. THIS NEXT SLIDE WILL SHOW WHAT IS ALL TOO OFTEN A TYPICAL APPROACH TO ESTABLISHING A RELATIONSHIP BETWEEN CAUSE AND EFFECT ((SLIDE 19 OFF)) ((SLIDE 20 ON)) - PAUSE - IF WE APPROACH ATTRITION IN THE SAME MANNER WE'RE ALL IN TROUBLE ((SLIDE 20 OFF)) ((SLIDE 21 ON))

FROM THE RESEARCH COMMUNITY WE NEED A BETTER UNDERSTANDING OF THE CAUSES OF ATTRITION AND BETTER DIAGNOSTIC TECHNIQUES TO PREDICT AND TREAT THESE CAUSES. FIRST OF ALL MUCH OF WHAT WE DO WITH PEOPLE IS DONE INTUITIVELY OR BASED ON EXPERIENCE. ((SLIDE 21 OFF)) WE WOULD LIKE A MORE SCIENTIFIC AND FACTUAL APPROACH. LET ME GO BACK TO THE SLIDE ((SLIDE 17 ON)) ADDRESSED SKILL DRAIN. IN THIS ARMY SKILL, 63C, A TRACK VEHICLE MECHANIC, WE HAVE BEEN ABLE TO CUT OUR TRAINING ATTRITION FROM 21% TO 8% BY INTRODUCING SELF-PACED INSTRUCTION. WE FEEL THAT THESE SOLDIERS ARE BETTER MOTIVATED AND BETTER MECHANICS. BUT WHAT HAVE WE GAINED IF THESE GUYS WIND UP WITH THE SAME LOSS RATES THAT THIS GROUP EXPERIENCED. WE NEED TO KNOW WHAT CAUSES THESE GUYS TO BECOME LOSSES ((SLIDE 17 OFF)).

THE OTHER THING ((SLIDE 21 ON)) WE NEED IS BETTER DIAGNOSTIC TECHNIQUES. THE MOST ECONOMICAL WAY TO CUT ATTRITION WOULD BE TO DEVELOP A PREDICTOR THAT WOULD TELL YOU WHO WAS NOT GOING TO BECOME A PRODUCTIVE SOLDIER AND PREVENT THEM FROM ENLISTING. WE RECOGNIZE THAT THE STATE OF THE ART IS SUCH THAT THIS IS NOT POSSIBLE AND MAY NEVER BE POSSIBLE. HOWEVER IT SHOULD BE POSSIBLE TO DEVELOP A DIAGNOSTIC TOOL THAT LETS US KNOW IF JOHNNY IS GOING TO HAVE A PROBLEM, WHAT THE PROBLEM MAY BE AND HOW WE CAN PREVENT OR TREAT IT. THE MEDICAL PROFESSION HAS DEVELOPED PREDICTORS TO INDICATE DISEASE OR MEDICAL PROBLEMS. MOST OF US HAVE HAD A TINE TEST - A POSITIVE REACTION DOES NOT MEAN THAT YOU HAVE TB - IT MEANS YOU NEED A CLOSER EXAMINATION. WE WOULD LIKE A SIMILAR TOOL THAT'S EASY, SIMPLE AND RELIABLE. IN THIS WAY WE COULD PREVENT THE PROBLEM OR IF A PROBLEM SURFACES TREAT IT. EITHER WAY WE GET A PRODUCTIVE SOLDIER AND WE DO SOMETHING FOR THE INDIVIDUAL AS WELL AS THE ARMY. IF HE/SHE DOES NOT RESPOND TO TREATMENT THEN WE SEPARATE THEM. I WOULD LIKE TO EMPHASIZE THE WORDS SIMPLE AND EASY. THE PEOPLE WHO MUST DO THE PREVENTIVE TREATMENT ARE DRILL SERGEANTS, NOT PSYCHOLOGISTS. (SLIDE 21 OFF))

THIS BRINGS ME TO THE END OF MY PRESENTATION. BEFORE I OPEN IT UP FOR ((SLIDE 22 ON)) QUESTIONS, LET ME SUMMARIZE. TODAY'S ARMY IS AN EQUIPMENT AND SYSTEMS ORIENTED ORGANIZATION. BECAUSE ATTRITION PRODUCES GOOD AND BAD EFFECTS WE NEED A BALANCED APPROACH TO PREVENT THE ATTRITION WE NEED AND HASTEN THE ATTRITION OF THOSE WE DON'T NEED. FINALLY, TO DEAL WITH ATTRITION WE MUST KNOW WHY WE LOSE PEOPLE AND DIAGNOSTIC TOOLS SO THAT WE CAN PREDICT THESE CAUSES AND TREAT THEM BEFORE THEY OCCUR. ((SLIDE 22 OFF))



**NEW WEAPONS SYSTEMS
(DIVISION)**

MEADBY	ABNDR	AVIATION
MIY	AMI	BOBAYLOW
W/BUSSMASTER (BAY)	MGOAB	SCOUT WEAPNS
SAZ	IV	ASH
IV	MIYASHOU(GAY)	PAH WHEELFIRE
THERMAL SIGHTS	THERMAL SIGHTS	UTAS
UP 37mm MORTAR	FIELD ARTILLERY	
	IMPROV TO BARR	
IPD 37	155mm MIDDLE RIFX	MI-198
IPD 36	MUNITIONS	MUDAI
CLGPAY/GLED	SCAF MINES	
TACHIB & BUDY COMPUTER	ICM AT	
	BSRS	

=====

IMPACT OF MECHANIZATION/TECHNOLOGY

OLD SQUAD

INDIVIDUAL WEAPONS

NEW SQUAD

INDIVIDUAL WEAPON

MECHANIZED INFANTRY VEHICLE (MICV)

BUSHMASTER AUTOMATIC CANNON

TOW (ANTI-TANK MISSILE)

NIGHT VISION DEVICES

RADIO/INTERCOM

VIPER

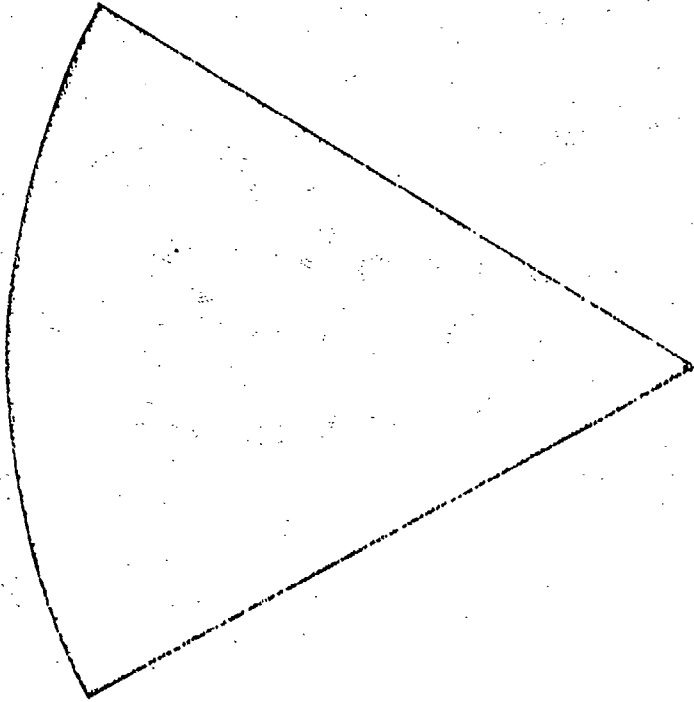
DRAGON

AT MISSILES

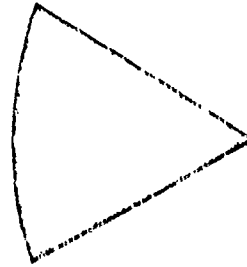
FIRING PORT WEAPONS

SAME JOB - NEW DEMANDS

50-50 HIT PROBABILITY



NOW



KOREA



WW II

INTENSE 10-DAY BATTLE

(ALL FIGURES APPROXIMATE)

LOSSES	TANKS	APC'S	ARTY TUBES
ARAB	1500-2000	1000	500
ISRAELI	700-1000	1500-2000*	50-75

*INCLUDES HALF TRACKS

6th FLEET CMDR

AUXILIARY FORCES

CPT
4 B AMPHIB

OILERS
4 AMMO STORES

1800 MARINES

TASK GROUP CMDR

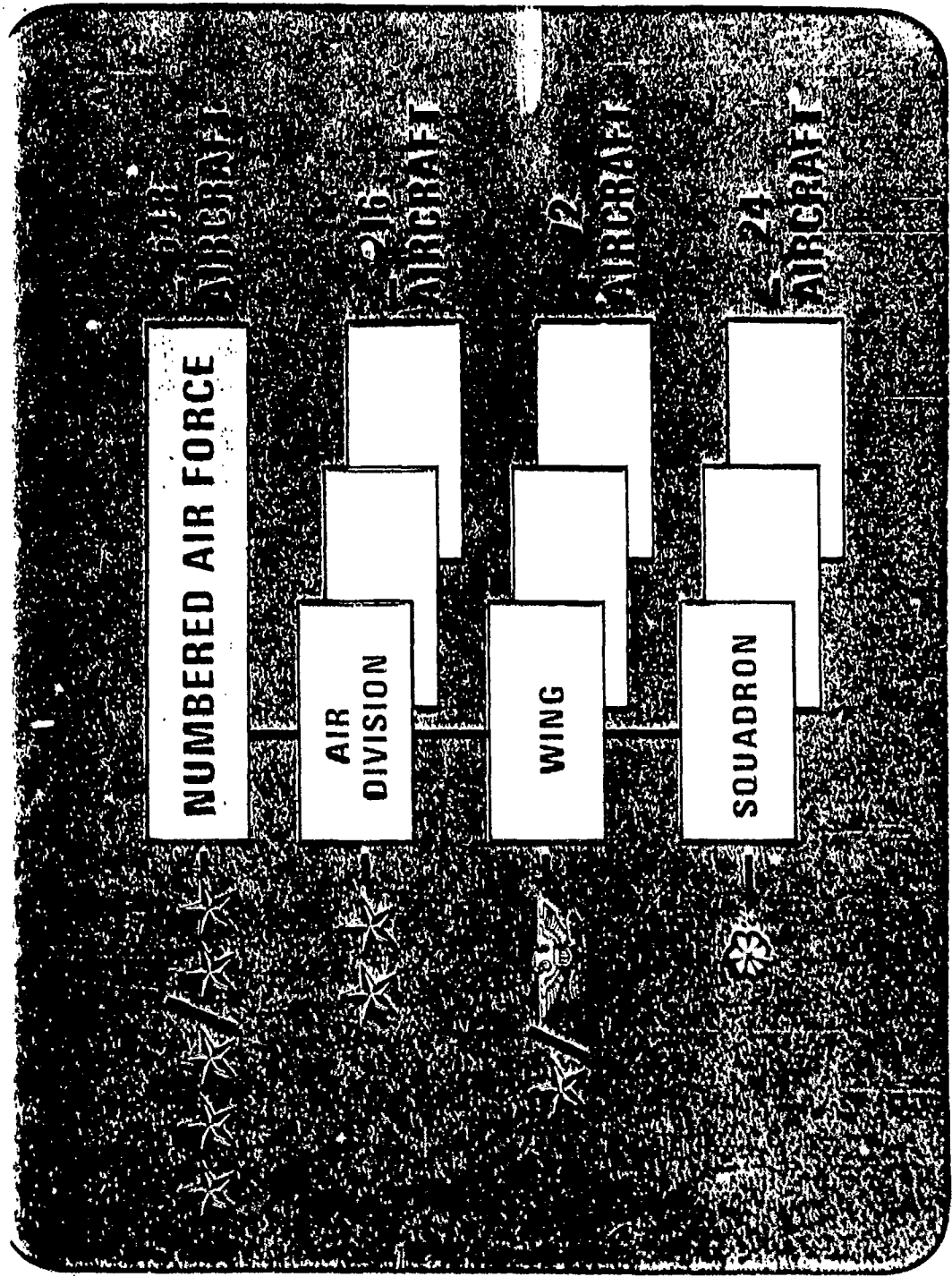
1 CARRIER
1 CRUISER
9 ESCORTS

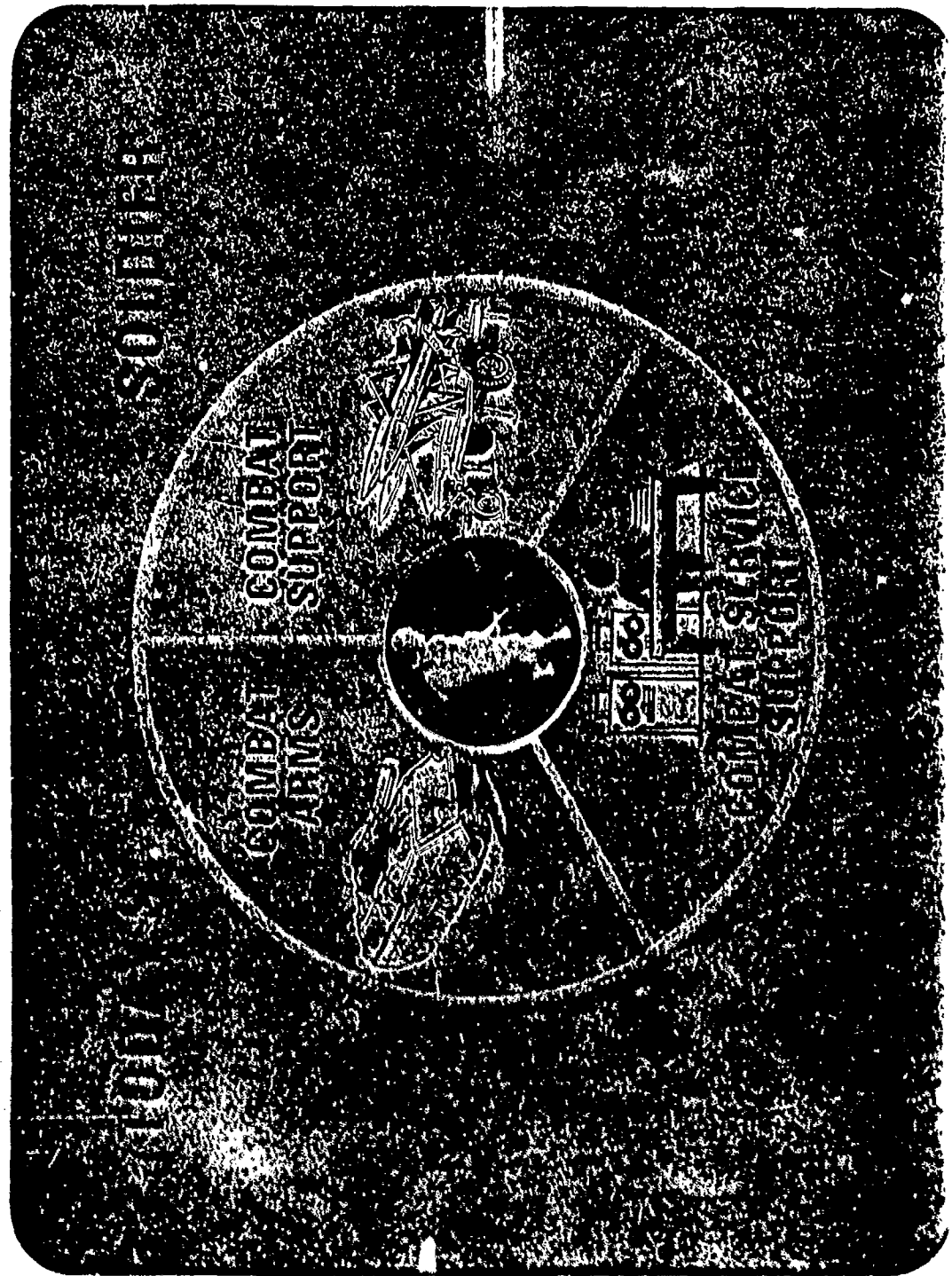
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TASK GROUP CMDR

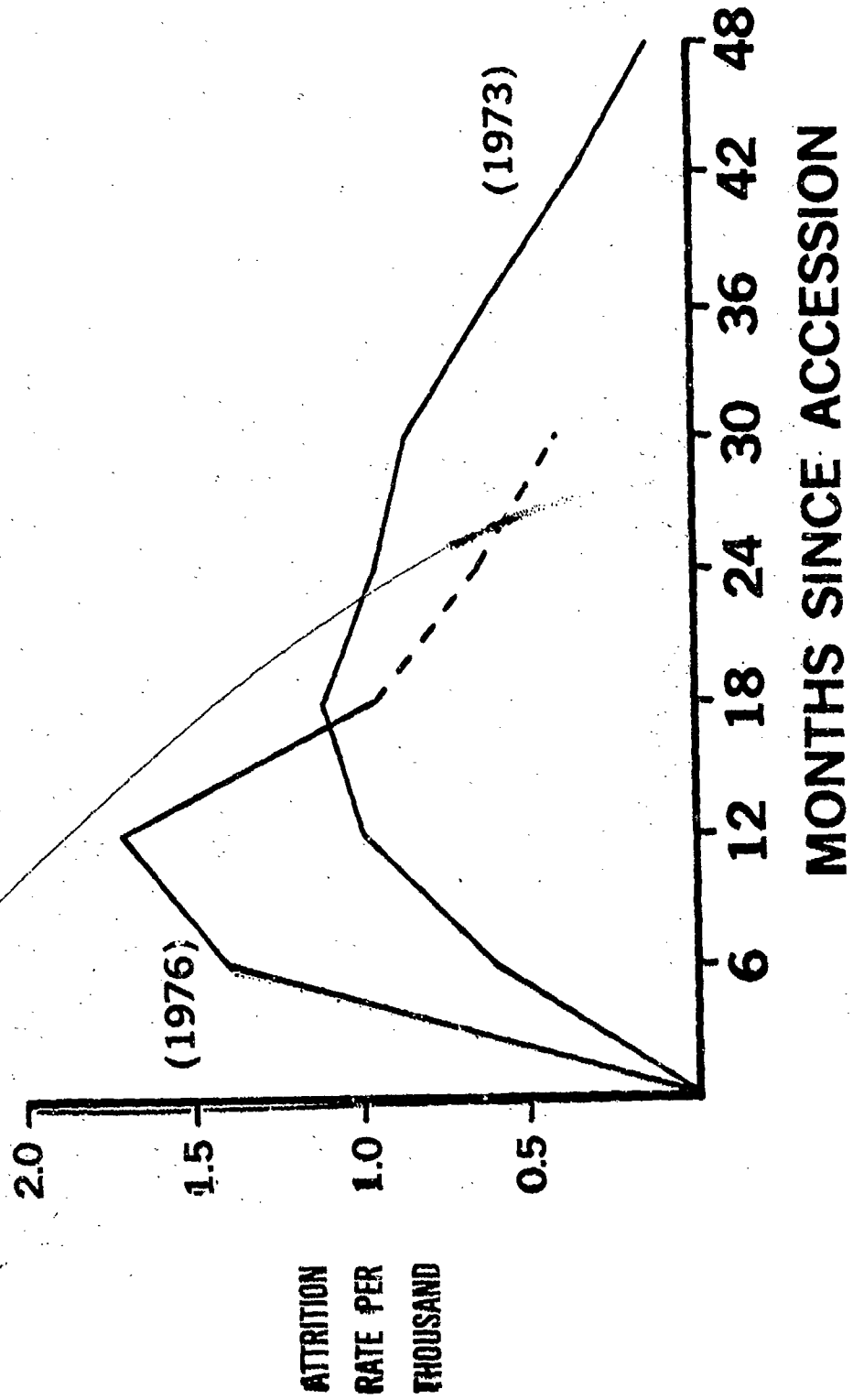
1 CARRIER
1 CRUISER
9 ESCORTS
(GM, DD, DE, FRIGATES, SUBS)

100 AC





FIRST TERM ATTRITIONS



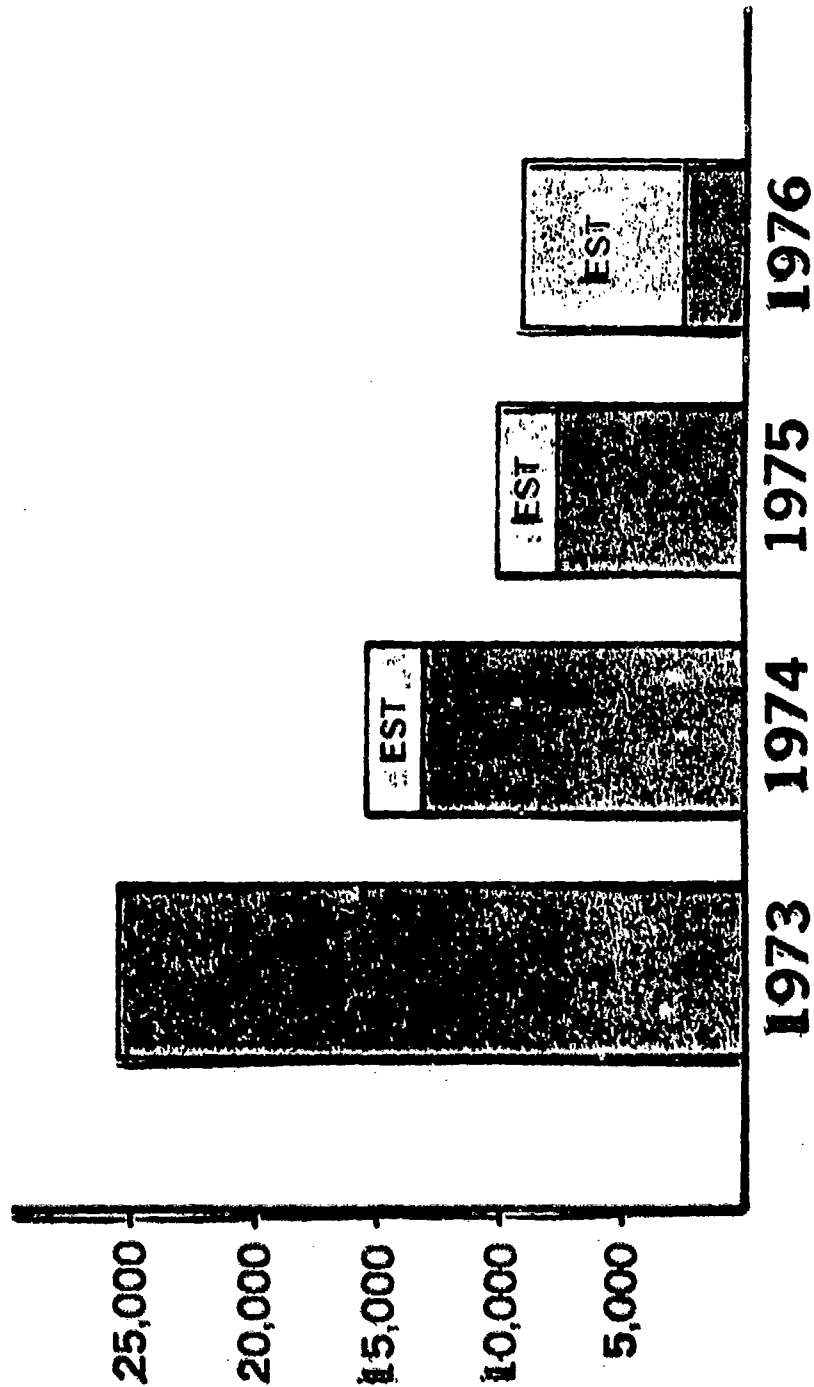
ATTRITION
RATE PER
THOUSAND

#10

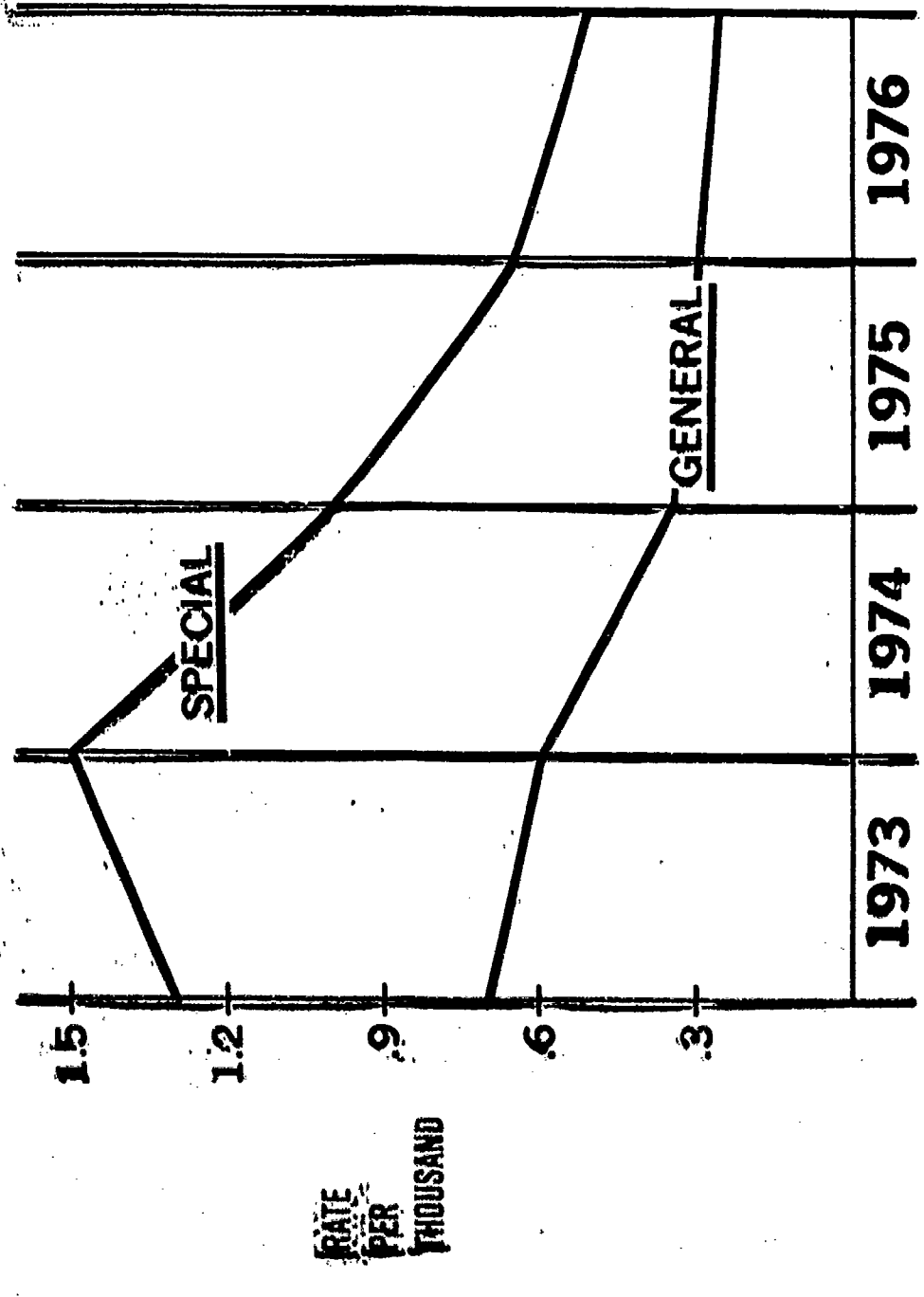
TRAINEE DISCHARGE PROGRAM

- CANNOT MEET MINIMUM STANDARDS DUE TO LACK OF APTITUDE, ABILITY, MOTIVATION OR SELF-DISCIPLINE.
- FOCUS REHABILITATIVE EFFORTS ON MARGINAL OR POOR PERFORMER.

CUMULATIVE DFR BY YEARGROUP

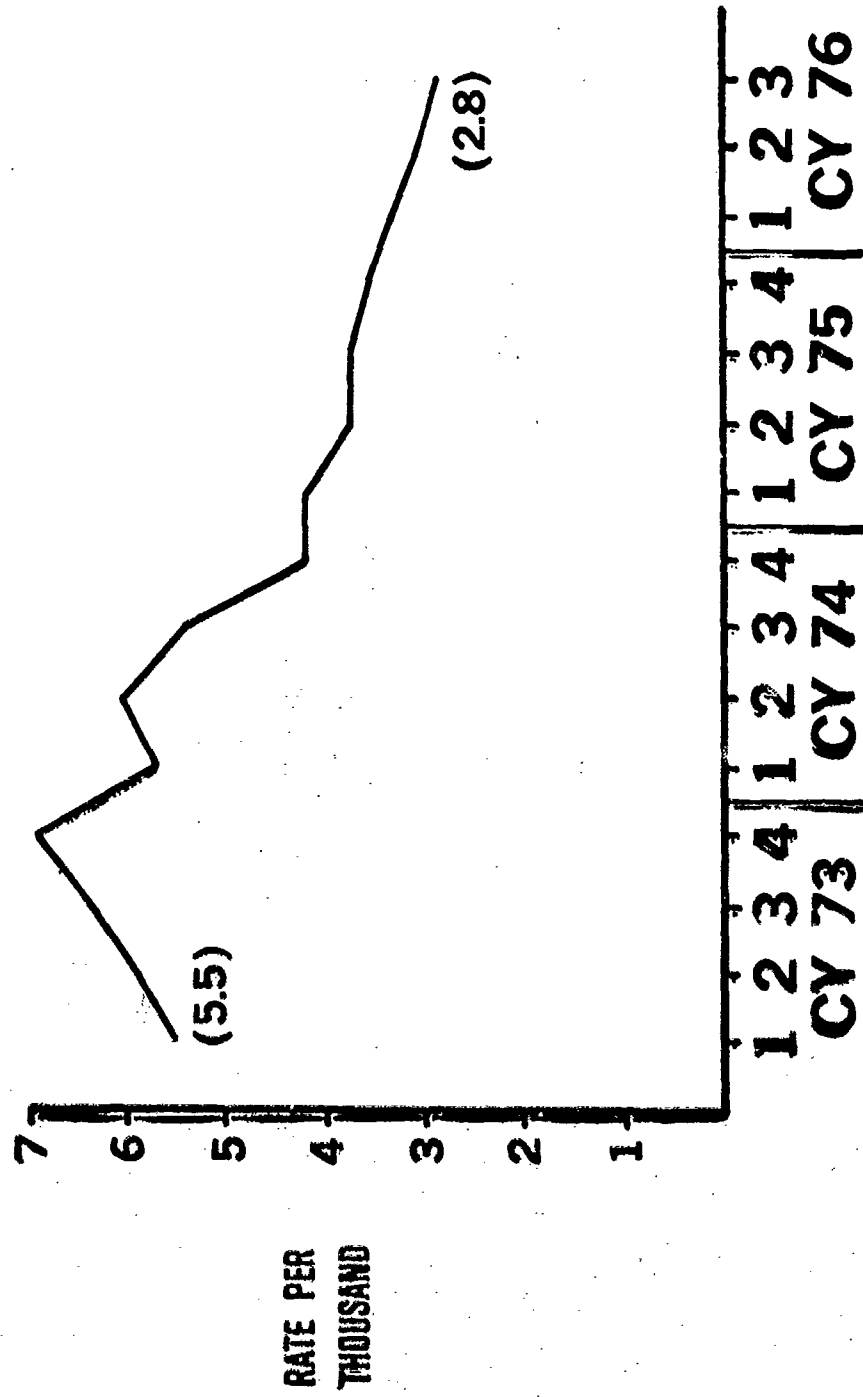


COURT MARTIAL RATES

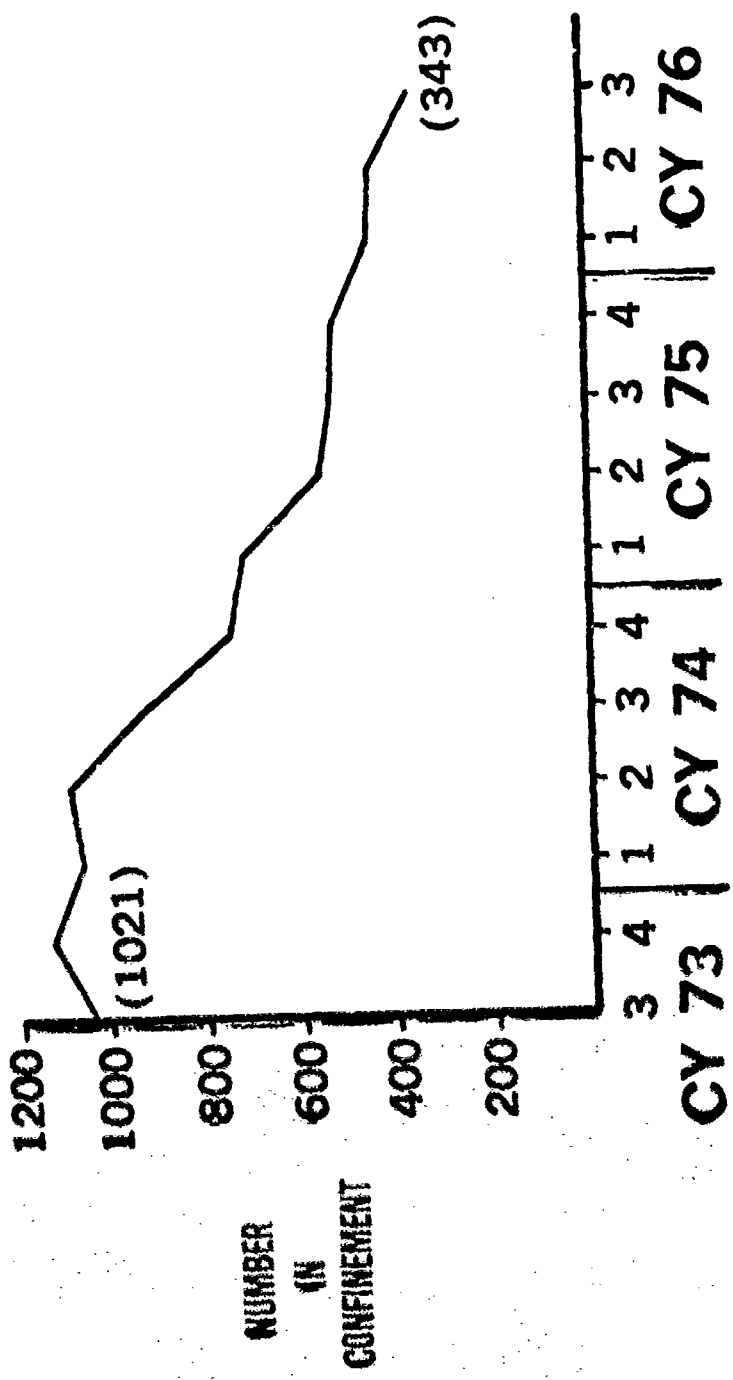


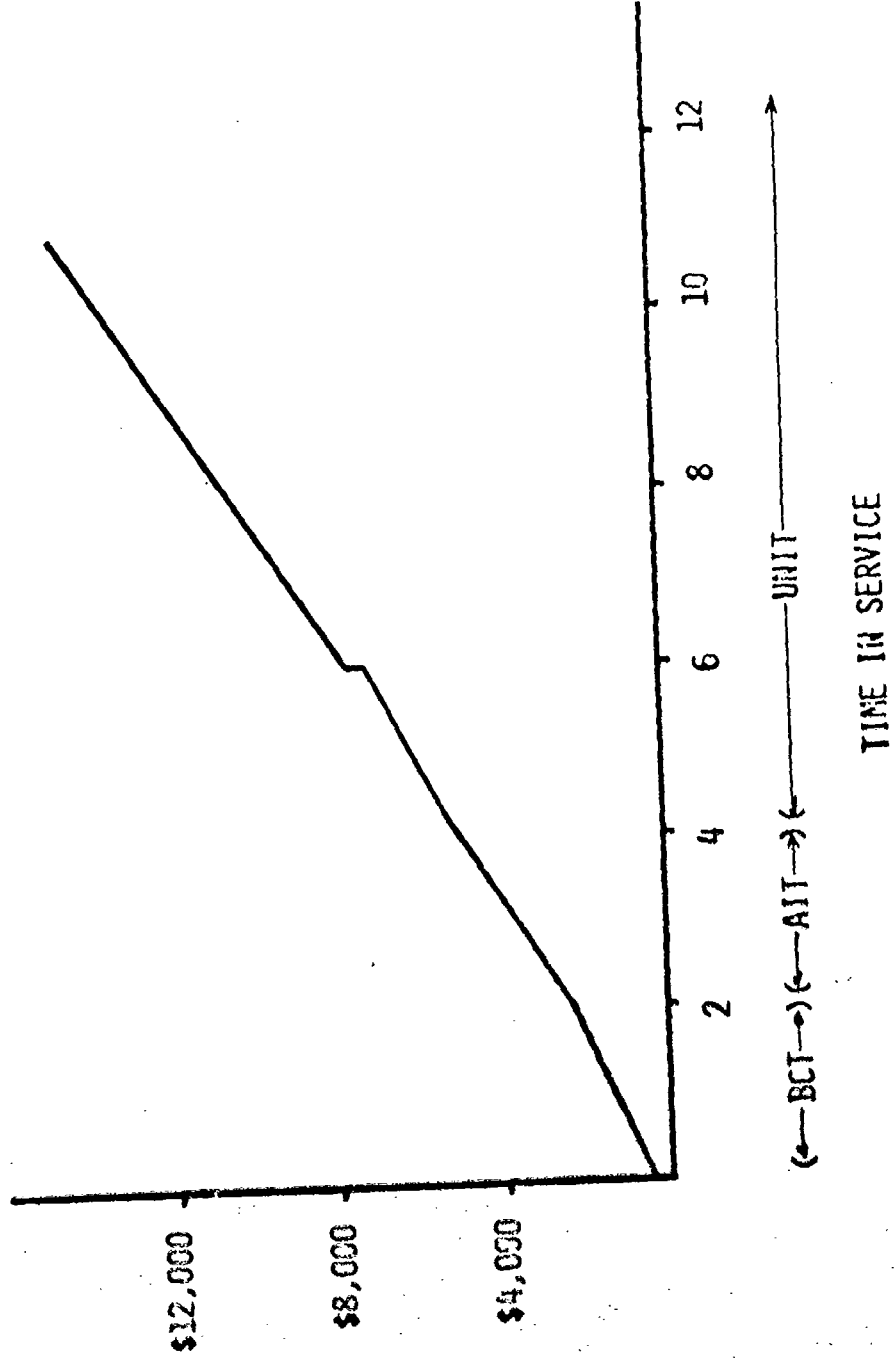
RATE
PER
THOUSAND

WORLDWIDE PRISONER POPULATION



USARB PRISONER POPULATION

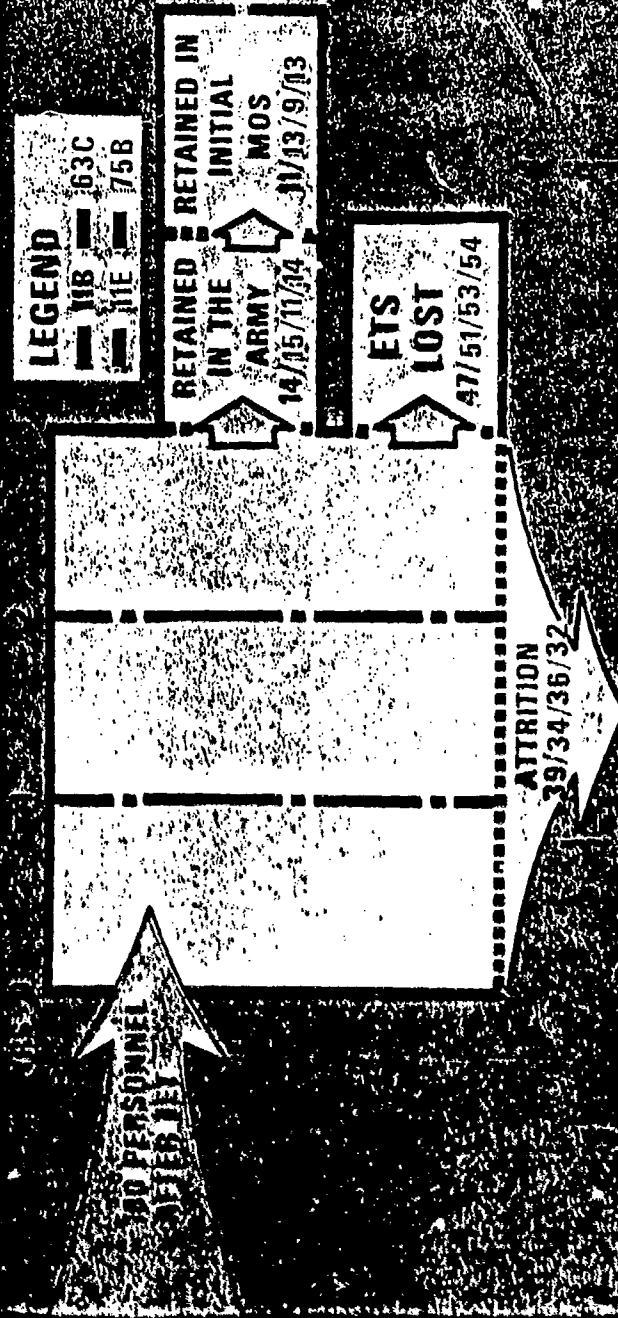




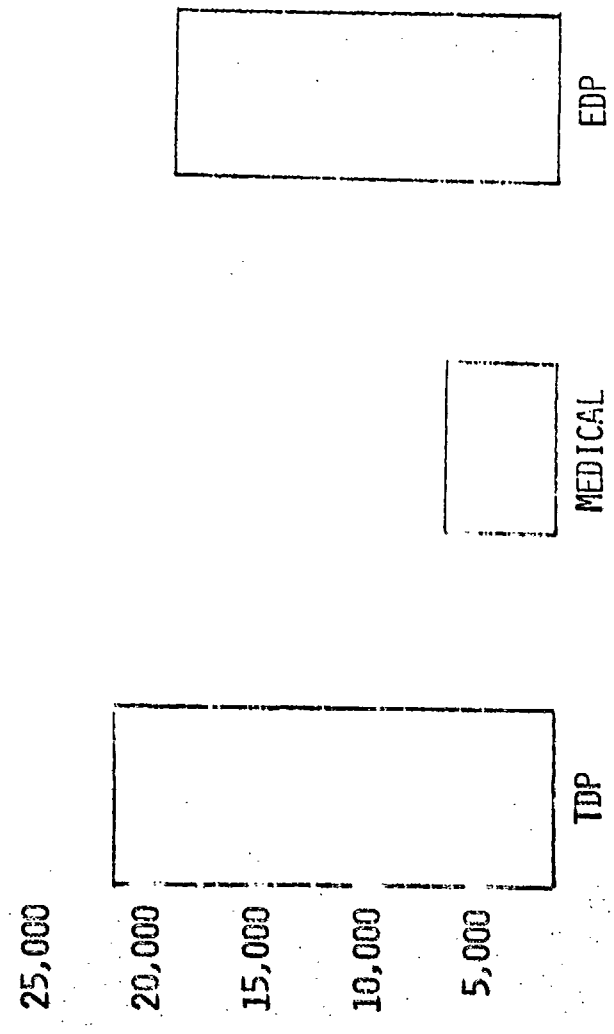
ARMY INVESTMENT DOES NOT INCLUDE RECRUITING COSTS)

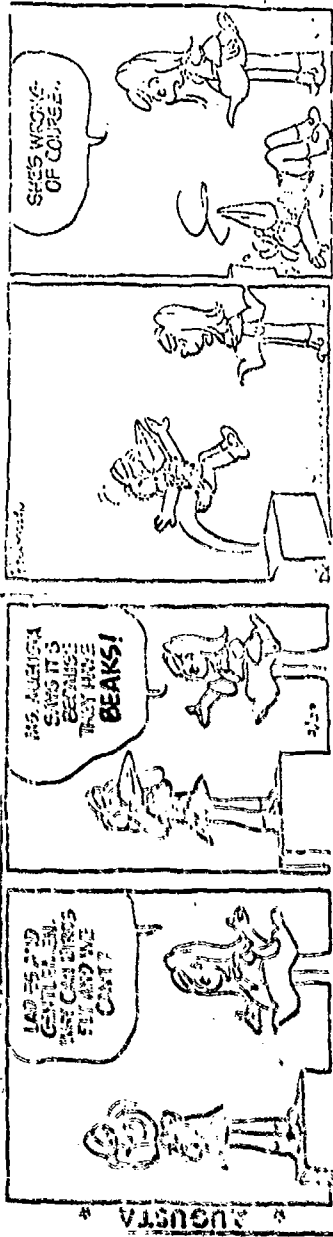
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SKILL DRAIN (1ST TERM PROFILE)



LOSSES TO THE FORCE 1976

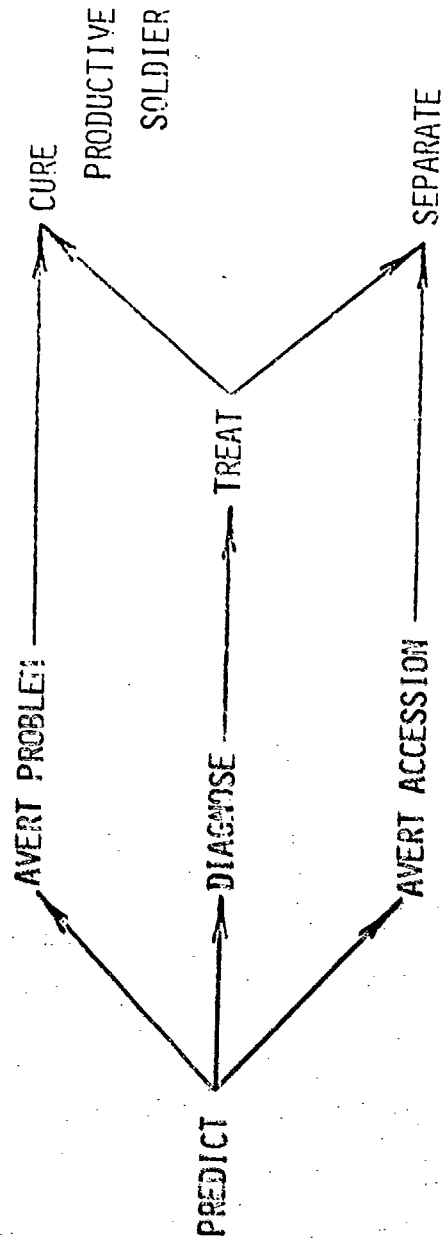




WE NEED:

TO UNDERSTAND REASONS FOR LOSSES

DIAGNOSTIC TECHNIQUES



TODAY'S ARMY - SYSTEMS/EQUIPMENT ORIENTED
- REQUIRES QUALITY SOLDIER

ATTRITION - GOOD AND BAD

WE NEED: UNDERSTANDING OF ATTRITION
DIAGNOSTIC TOOLS

CANADIAN FORCES PERSONNEL APPLIED RESEARCH UNIT:
APPLICATION OF RESEARCH ON ATTRITION AND RETENTION --
MAJOR I.N. EVGNIC, 5 APRIL 1977.

INTRODUCTION

1. The Canadian Forces Personnel Applied Research Unit (PARU) exists to provide research and advice to Canadian Forces' policy-planners on all aspects of manning the Forces. PARU advises on the selection and classification of personnel, and also on their training, employment and management. Over the past dozen years, PARU has interpreted this mandate to mean that any factor which affects the recruitment of a Canadian male or female, or the maintenance of performance of a Canadian Forces serviceman or woman is within its realm of interest and research. In other words, this means that our research horizons encompass the very young Canadian as potential serviceman and the senior citizen as retired serviceman.
2. The unit is relatively small; there are only about 14 research officers in the establishment, with a variety of backgrounds, both military and academic, thus making for an interdisciplinary group. This is translated into an operating philosophy with certain characteristics. First, we try to work as one team with one overall research problem namely, manning the Forces. Specific questions are handled by sub-groups, which have a high degree of inter-action and exchange of membership. Second, the research is basically problem-oriented; it is an applied research unit. This demands that there be a mix of theoretical, empirical, and practical concerns. Because resources are limited, all research activities must be tied to some kind of theory-development schema, and research focussed on priority tasks. Theory development and research are usually conducted in response to a practical problem. This in turn demands a high degree of inter-action with senior policy-planners in order to identify the problems, define them and generate solutions and implementation plans.
3. Thus "first term" attrition is not the main focus of personnel maintenance and performance activities at PARU; rather the Unit is concerned with manning at all stages of careers, short or long. That is, recruiting, selection, classification, training, employment and re-settlement make up one process, this being the essence of the "one-problem" concept. The process, naturally, can have many results, or systems; attrition is but one of these. Figure 1 illustrates one problem under examination by one of our subgroups in PARU. It is a theoretical view of our recruitment base for youth in the Canadian Forces. Overlaid on this is a complementary formulation derived from some other research, concerning the possible losses of quality Canadian Forces personnel. It suggests that poor job satisfaction among our young personnel may indeed lead to increased attrition and thus also contribute to the high-quota/low-quality spiral. A third overlay is possible which would describe the interplay of the external (civilian) job market, wherein a high employment climate generates a group of applicants which tends to be more sceptical, and more demanding of job satisfaction, in early career stages.

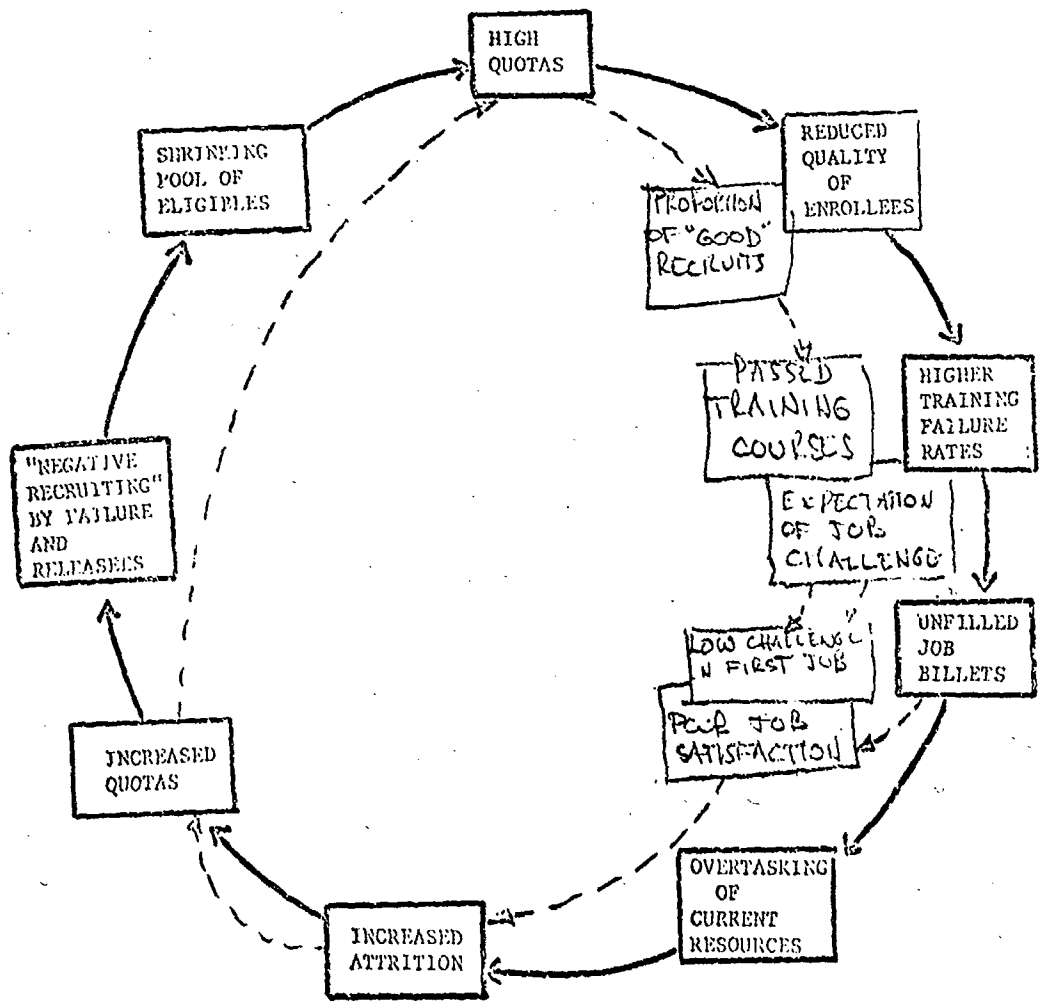


Fig. 1 The Manpower Production Dilemma.

Such factors also act to increase attrition. Nevertheless, the principal lesson of Figure 1 is that PARU research commences with a practical problem in the Canadian Forces, which is identified and defined in terms of some theoretical constructs, and then research focusses developed. Without some sense of theoretical connection, it would be impossible to develop priorities for research projects, relate research results obtained from other PARU projects or from other agencies, or to develop the understandings crucial to the development of the working relationships between researcher and policy-planner.

4. I will be discussing, this morning, some aspects of our work. I will speak about three research commitments: "analytic" work, used to develop some of our theoretical constructs as well as to advise policy-planners on recruit potential; some empirical work, used to develop specific answers to research questions and to understand the "psychology" of membership in the Canadian Forces; and finally, some practical applications of our work, to illustrate the interaction between our research and Headquarters' policy.

SURVEY OF RESULTS

Outline

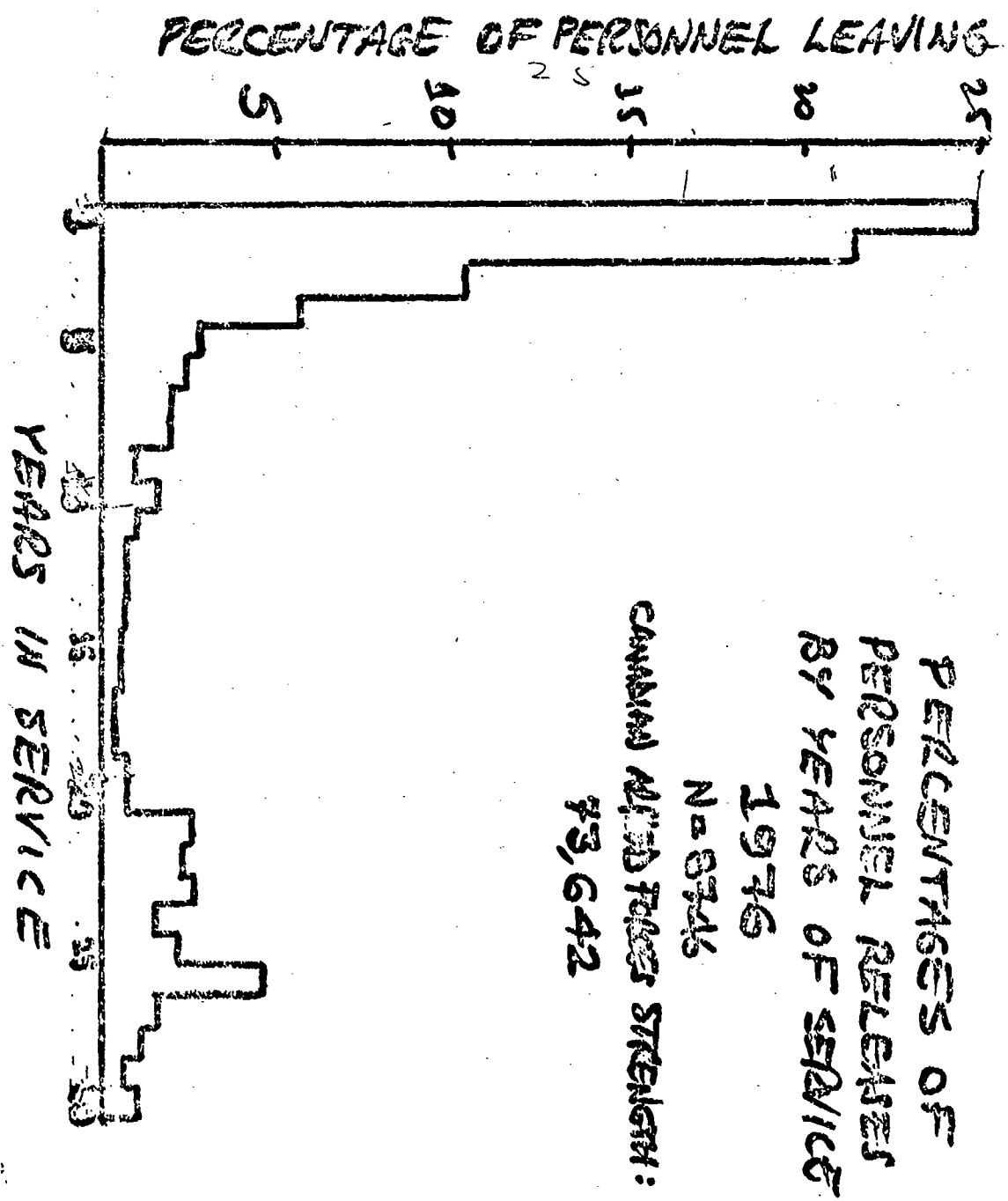
5. I intend to cover attrition in the Canadian Forces in two main areas. First I will present a quick summary of the results of some of our research, and then I will speak very briefly about the applications of some of these research results. I intend to discuss attrition at key points across a "service career". This is obviously a theoretical notion - individuals usually leave the Forces only once. I will try to draw attention to the principal reasons expressed by leavers at different stages in a thirty-year span which approximates a full-term career. I will try to identify "constellations" of reasons and show how they vary from period to period. It is obvious that individuals leave every year, but there appear to be times in which these "migrations" seem to increase. During this discussion I will try to separate out the reasons for release as clearly as possible and I will try to dwell somewhat more on the early stages of the service career. I will finish with a few examples of kinds of interaction between researchers and planners which are geared to enhance our ability to attract, stimulate and ultimately retain individuals to membership in the Canadian Forces. My theoretical departure is that most of our work in attrition/retention centres upon the concepts of job satisfaction and commitment. PARU has done a number of studies concerned with job-satisfaction and has recently begun work on commitment (à la Dr. Porter). Our principal hypothesis is that job satisfaction is a short-time phenomenon which affects the development of commitment. This in turn is related to tenure, to "stay in", if you will.

Results

6. Figure 2 is an overview of losses by years of service up to 30 years. The bulk of departures occurs early, but there are two or three other periods when the probability of release rises. You are cautioned that this being a "snapshot" taken during 1976, the modalities can shift from time to time (for example, due to economic conditions and personnel policy, and also to the conditions of service in different trades).

7. I will be making a few remarks about some points or nodes along this graph, under the following headings,

- a. Recruiting exits, i.e., in the first year or so;



- b. Contract Termination, i.e., the end of the initial engagement period;
- c. Early Resettlement; and
- d. Retirement.

Recruiting Exits and Contract Termination may be thought of as "first term", or to use Owen's expression, "assimilation phase" attrition. These two groups account for the majority of Canadian Forces' losses. In fact 58% of all enrolled depart for one reason or another in the first 4 years of service; we hit 50% by the end of the third year.

Recruiting Exits

8. Social Trends. To understand the losses here, we must examine some social trends which occur well before enrolment. These may be regarded as pre-conditions of enrolment or societal factors which influence the development of commitment during the early stages of membership. PARU has done a number of studies which attempt to identify these factors. First, Capt Frank Pinch's report 75-6 showed how societal supports for enrolment and membership in the Canadian Forces varies from one part of the country to another. Capt Cotton, (who addressed this meeting last year), has shown that precisely the group our recruitment is aimed at (the young, inexperienced worker), is characterized by high job turnovers. For example, he reported that the under-25 age group tends to change jobs two-and-a-half times in the first five years of employment; 50% turnover occurs in the first year. He attributed this to a "poor" work ethic, i.e., poor commitment to work in general. In another report (74-5) he pointed out the limited supply of "unskilled" manpower. We are recruiting from a decreasing base while our quotas are going up. More and more Canadians are staying in school longer, and tend to educate themselves out of our recruitment market. Cotton & Pinch (Report 75-8) showed that our actual applicants seem to be coming increasingly from the young, inexperienced, marginally-employed, and perhaps academically-marginal segments of the population. In other words, we seem to be bringing into the Forces a group of people drawn from the lower end of the "success" scale. The successful ones tend to stay in school and then seek specialized employment. We are getting a lot of drifters. That is, we should expect them to leave, or to develop commitment more slowly.

9. Recruit School Losses. There is a substantial number of releases which occur during the trainees' period at recruit school ("Boot Camp"), which covers the first three months of the individual's career. The losses occur in two principal categories. First, those the Service invites to leave because of inadequate progress during recruit training, and those who voluntarily withdraw from the Service. The proportions are these:

Invited to leave	56%
Voluntary withdrawal	44%

Fairly large numbers are involved here, and the reasons cover a fairly wide spectrum. Lt Mullin of PARU conducted a detailed examination of all releases at our Boot Camp last summer. He divided the two main categories further, and found that the two most important service-initiated reasons to release personnel were "medical" and "adjustment". "Motivational" and requested releases (voluntary) accounted for 36.3% and 4.3% respectively. Between January 1976 and June 1976 (inclusive), 763 male recruits were released from CFPS Cornwallis for various

reasons prior to completing basic training. A breakdown of release reasons by categories indicates the following:

<u>Release %</u>	<u>Release Category</u>	<u>Description</u>
36.3	Motivation/Interest	lack of effort and desire to be a CF member
26.9	Medical	mostly pre-enrollment medical conditions
13.1	Adjustment	situational anxiety, personality disturbance, etc.
7.3	Failure	academic or practical weakness in performance
5.9	Mixed Medical/Motivation	medical problem complicated by a lack of motivation
4.3	Voluntary	acceptable performance but lack of interest in becoming CF member
3.7	Other	compassionate, pregnancy, etc.
2.0	Discipline	AWOL, violence, etc.
.5	Drugs	mostly pre-enrollment/residual symptoms

Total 100%

In the areas of poor adjustment or poor interest in recruit school losses, it is evident that there is a substantial proportion of recruits who enter the Forces with unrealistic expectations. In a nutshell, these individuals expect rapid advancement, a marketable trade and other personal benefits, without much effort and without much recognition that their mediocre school and employment records are relevant. (25% have been fired from a job; 65% state that most bosses expect more work than they are willing to pay for, 40% hate getting up early in the morning). However, the main reasons for requesting release, or explaining poor adjustment, are that the individual did not know what he was getting into in the Canadian Forces, or that the recruiter gave him a false impression of what to expect. In other words, the individual suffered from the recognition that the reality of recruit training did not match his expectation. Although the individual experienced only a very narrow portion of the work the Canadian Forces could offer him, he left the Forces mainly because we did not offer him challenge, or we denied him feelings of self-worth, i.e., basically lack of intrinsic satisfaction.

10. Trade Training Losses. Following successful completion of Boot Camp, individuals are sent to different trade schools to learn the secrets of their military occupation. This period covers a span from one to one-and-a-half years of the service career. During this period of time the Canadian Forces shifts him from a team-training concept to an individual training concept for the most part. It also shifts him from a vocational orientation to an occupational one (à la Segal). Losses can be substantial in numbers here; Pournier and Keates (Report 75-4) showed that 32% of all the exits in 1974-75 occurred during the period of recruit and trade-training, although in a relative sense a much smaller proportion left during trade training.

11. Here the main reasons for loss (voluntary withdrawal) focus upon improper trade placement. When the individual is enrolled in the Forces he is assigned a trade at the Recruit Centre, according to his interests and aptitudes, and to Forces' quotas. Many leave at trade-training stages because "it wasn't what I wanted", "this was the only trade open", or "it wasn't what I thought it would be". Clearly, here, too, the indictment is lack of intrinsic satisfaction. The focus

of comments dwells upon lack of stimulation in the work itself, much of which stems from an initially weak interest in the work.

Contract Termination

12. Many individuals leave the Canadian Forces near, or at the end of, their contract period of enrolment. In the Canadian Forces, individuals sign up for an initial engagement of five years; re-engagement is for an indefinite period. The span of time for this group of losses goes from one-and-a-half to five years, and covers the period in which the individual is assigned to his first unit, and he begins to put his trade-training into practice. Losses during this period are surprisingly small. Surprising, that is, without the knowledge of Canadian Forces' release policy. Essentially we let people out at any time; we hold an individual to his contract only in exceptional circumstances. Normally, we require 90 days' notice. Thus much of the losses which should occur here have appeared earlier, so there is no modal point as one might expect. Some are invited to leave, while many more leave voluntarily. The principal sources of understanding our losses during this period come from the following reports: Chomey (72-2), Fournier (73-8), Fournier & Keates (75-4), and Fournier & Franklin (1977). This last study was conducted to test the relationships between the Job Description Index (Smith, Kendall & Hulin, 1969) and Porter's Organizational Commitment Scale, in the Canadian Armed Forces. The relationships were modest, but they showed that intrinsic factors lead to the development of commitment, with particular emphasis on the work itself and promotion/self-worth. It also showed, in conjunction with earlier studies, that the Canadian Forces offer little job challenge in the first post-training jobs (see also Porter 1973; personnel in lower jobs get mostly extrinsic satisfaction). In short, it is yet another indictment of lack of intrinsic satisfaction among leavers. Fournier & Franklin concluded their paper thus:

- a. initial post-training (low level) employment offers primarily extrinsic satisfaction;
- b. the majority of military respondents describing their first employment typically describe it as devoid of challenge and opportunities to use their skills and training; but also that:
- c. intrinsic satisfactions are critical to strong Organizational Commitment;
- d. intrinsic satisfactions are strongly related to actual tenure behaviour (ie., quitting or remaining with the employer).

Two important implications flow from these data:

- a. it appears that the longer term predictor of tenure (Organizational Commitment) is systematically related to the shorter term job itself; and
- b. substantial attention must be directed towards improving the intrinsic appeals of initial post-training employment in order to capitalize on the development of positive Organizational Commitment."

13. The main kinds of reasons given for leaving include "I did not get the chance to practice my trade", "there was no challenge", "I had no responsibility or authority". Some individuals did not like the work in the beginning; the trade

they wanted wasn't open when they applied, so they accepted an alternate which turned out not to their liking, just as with trade-training losses. There were, however, some reasons given, especially by land and sea tradesmen, which differed slightly. Working conditions were viewed as difficult, with no foreseeable relief. Therefore many individuals in combat arms and sea-going trades felt obliged to leave the Service.

14. Thus, the reasons for leaving centred upon intrinsic factors, with some extrinsic dissatisfiers in certain trades. The overall theme of the research results indicate the need for challenging, worthwhile work, which keeps the individual fully occupied, and which supports a positive self-image. It seems apparent that the Canadian Forces must attempt to find ways of increasing intrinsic satisfaction in the first few years of service, if it is to reduce unexpected losses, (with the recruiting and training burdens that these imply), early in a career. Without such a strategy, the Forces cannot expect the development of organizational commitment in a large number of individuals.

Early Resettlement.

15. There are a few places along the graph, well after the indefinite re-engagement point, at which losses rise. I refer to these as "Early Resettlements". One group of releases seems to occur at about the tenth year of service, and is almost exclusively a voluntary release category. The numbers are not great but they seem to recur, reflecting a systematic increase in the probability of separation from the Service. The reasons vary largely, from a desire to apply one's trade knowledge in civilian life (at times in spite of a relatively high satisfaction with Service employment), to a response to external pressures (e.g., parental illnesses, etc.). This suggests a fairly even mix of intrinsic and extrinsic influences in the decision to separate.

16. At about 18 to 20 years' service, there is a small but significant increase in the probability of release, increasing to about the 23rd year. The reasons seem to be fairly clear. Some members intend to start new careers while still young, but many express wishes "to settle down", "children in high school", "wife working", "need geographic/education/employment stability". Many personnel who pass the ten-year mark in service feel "locked-in" by the pension provisions and thus remain in the military until they have 20 years service. At that stage, because of poor promotion prospects plus family and environmental pressures, they decide that it is time to seek civil employment. The individual who voluntarily leaves the military between 10 and 20 years generally does so for the following reasons:

- a. He is transferred to a place which is not compatible with his family situation or personal desires; or
- b. He finds employment outside the service which he feels will bring him greater job satisfaction and/or financial rewards.

Normally, the "turned-off" individual will stay in the military in order to collect even a penalty-reduced annuity. In addition, he may feel "job-secure" if not "job satisfied" and stay in the Canadian Forces only because of family and financial pressures. For this person there is not a lot that can be done. He has lost his "spark" because of growth-depressing experience in the military and unfortunately his attitudes and lack of motivation have a detrimental effect on the new serviceperson. This raises another point: "un-loavers". We are really confronted by three kinds of people: stayers, leavers, and those who are "marking time". They have "left" but not told anyone about it. We haven't studied this group at all. An interesting hunch has come out of our research here, one that we have not yet examined. We think that there is a tendency for those who leave at these mid-career

points may influence younger servicemen to leave also. Whether it's a "leadership" phenomenon, a demonstration that a full-term career is not inevitable, or merely a figment of our imagination, we don't know. At least we think that we must develop an understanding of what kinds of things precipitate leaving. Again, these conclusions are tentative. It seems then that the principal reasons for departure late in the career are extrinsic in nature. Overall, most express satisfaction with their work over the period of their membership, but now wish to move on to other employments which allow them to practice their trades without disruption of personal life.

Retirement

17. At anywhere from 25 to 30 years, the remainder of the Canadian Forces enrollees depart the Service. This group constitutes the main component of "planned attrition", and needs no discussion.

Summary of Main Points

18. It seems that, among leavers, across the 30-year span normally considered as a full-term career, there exists a systematic shift in reasons for release. For the most part, we are talking about the voluntary withdrawals. Early in the career a proportion of releases are for service reasons, such as inability to adjust, course failure, etc. Later in the career, almost none is released for service reasons. I note, however, that all across the span of time, there is relatively little difference between stayers and leavers. It seems that the sources of satisfaction and dissatisfaction which affect commitment are the same for both groups. Stayers and leavers both seem to operate with the same catalogue of benefit and cost, praise and complaint, for the Canadian Forces. The difference between stayers and leavers may rest exclusively with individual tolerance for dissatisfaction or lack of satisfaction. Thus it seems that policies aimed at reducing attrition will act to increase the strength of association among those who, in the past, have chosen to remain a little longer. This expresses further need to understand the "precipitants" of leaving.

APPLICATIONS OF RESEARCH RESULTS

19. A number of interchanges have occurred between PARU and National Defence Headquarters' policy-planners which have been aimed at improving retention. Discussions have always included the belief that attrition cannot be eliminated; it is necessary and sufficient to attempt to decrease it. In practical terms, we do not talk about encouraging a leaver to stay for a career. We attempt to develop policies which will encourage individuals to stay a little longer.

20. One area that we had tried to influence is the policies which are affected by, or rest on assumptions about, the social trends of Canadian society. For example, in attempts to expand our recruit market (numbers, quality), PARU has been instrumental in developing a system called the "Land Operations Trade Re-Assignment Programme". Borrowing heavily from Dr. Moskos, the Canadian Forces have recently implemented a "feeder trade concept" to man the Combat Arms. All recruits destined for "land" trades now will be required to spend three years in Infantry, Artillery or Armoured employments before training and employment in other land-support trades. In developing this scheme, PARU and MDHQ policy-makers have worked extremely closely together. The scheme has only been in effect.

for a very short period of time, but early returns are encouraging.

21. A system of "lateral entry" is being developed for use especially in the sea-going trades. This will enable the high-technology "Navy" to take advantage of recruiting among those who graduate from our community colleges. This scheme is still under development.

22. There has been much discussion between PARU and NDHQ on ways to decrease disruption at the entrance and exit of service life, so that a period of time "out of society" and into the Forces will not seem so frightening. The main thrust here is the development of a "re-location" assistance programme so that individual members of the Forces can expect educational and vocational development which will enhance their probability of success when they return to civilian life. How much it resembles your veterans' benefit package remains to be seen; the project is just now being initiated for study by headquarters.

23. Perhaps a more vigorous approach to increasing job satisfaction is under development at PARU. The concentration here is upon the development of a more effective Canadian Forces placement strategy so that individuals can achieve better job satisfaction early in their careers. We are working on a new classification battery which should enable a much more effective match of individual interests, aptitudes and abilities, and this is associated with a more concentrated career counselling procedure. The intent here will be to offer an individual the best counselling he can find in Canada, whether he chooses to join the Canadian Forces or not. Each individual will be regarded as enrollable, but with differential probabilities of success in the occupations he may pursue within the Forces. We are well underway on this project, and we are very much interested in the school approach technique of the USNPRDL.

24. Other activities, such as LOTRP, are being developed as ways of attempting to generate some kind of vocational commitment early in the career before occupational development.

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ATTRITION: THE ABSORPTION AND INTEGRATION OF NEWCOMERS

David Gottlieb
University of Houston

My primary purpose here is to attempt to point out certain factors and conditions which have been associated with youthful attrition from school and employment. Hopefully identification and understanding of these intervening and contributing variables might be of some practical value to those seeking to minimize undesirable or unnecessary attrition from the armed forces. Using, for the moment, a chronological base I am defining youth as those who are between the ages of 18 and 24. As will be noted later, however, age alone is not the single or even most important criteria which should be used in defining any particular stage of the human developmental process. The focus here upon the 18-24 year old age group is of benefit for two reasons: First, it is the age group which is most likely to fall within the problem area of first term attrition; secondly, relevant available data are usually published in a manner which makes such an age grouping most convenient for the purposes of this particular presentation.

Prior to my presentation of these data, I feel it would be helpful to provide you with some idea as to the historical and conceptual considerations which act to shape my own thinking about this serious and costly problem.

Let me begin by noting that my own empirical research has been almost exclusively devoted to issues of youth socialization and youth behavior. Due to these interests I have been a participant in perhaps too many workshops, conferences, symposia, and task forces--designed to propose solutions, policies, and programs which might enhance the educational, employment, and social achievements of the young. I should add here that whether or not there was or is consensus between the target population (youth) and policy planners (adults) as to what constitutes achievement or success, was then and remains now an unanswered question. Suffice to say in the majority of instances

where judgements are being made as to what is best for the young, for social institutions, and society--those judgements are being made by adults. Whether such should be the case or whether youth should be more or less involved in matters effecting their destiny is not the central concern of this discussion. Nor am I proposing that generational consensus is necessarily desirable or possible. Rather it is simply an observation and one which I feel is worthy of consideration.

My own research and policy experience leads me to also conclude that the state of the art--that is the art of understanding the dynamics of youthful attrition from social organizations as well as the art of effective remediation--has advanced little in the course of the past twenty years. I believe an objective review of the literature would show, among other things, that current explanations offered to account for youth unemployment, youth mobility, school dropouts, and youthful delinquency, vary only slightly from explanations offered in the 1950's. Nor does there seem to be much recognition that problems of youth attrition are not limited to males, to the poor, or to minority youth. Proposed ameliorative strategies also have a most familiar ring. The offered solutions continue to place the burden of proof upon the youthful client with limited attention being paid to the responsibilities and obligations of those institutions engaged in the training, education, and employment of the young. My conceptual view is that in matters of socialization, education, employment, and training, it takes two to tango: the socializee (in this case youth) and the socializer (which includes educational institutions, organizations which recruit and employ, and the various organizations which constitute the military). It follows then, that equal attention must be given to both the characteristics of the recruit, student, and employee and the characteristics of the receiving

organization. How these receiving organizations go about the business of the absorption and integration of newcomers has, I maintain, been given only limited study.

Hopefully this particular discussion will shed some light upon both sides of the socializing coin. With regard to the understanding of youth behavior some progress has been made in recognizing the potential impact of such variables as: sex, socio-economic status, age, race, ethnicity, familial structure, and place of residence. The tendency, however, is to continue to view youth as a monolith. Hence, the fifties are seen as the age of youth apathy; the sixties as the age of youth rebellion and activism; and the seventies we are told represents a return to the apathy of the fifties.

Sweeping statements and generalizations are made about population categories which often number in the millions. We hear statements such as: "College youth today" or "young women want" or "Black adolescents seek" or "middle class youth are experiencing..." and "today's Marines want". Obviously there is a need for more in the way of multi-variate analysis and much more in the way of caution in bridging between limited samples to massive population-projections.

Contradiction can be found between the concept of human development as articulated by behavioral scientists and the realities of generational related research. Conceptually we see human development as an on-going process of change in which physical, emotional and intellectual development plays only a secondary role in determining the behavior considered appropriate for people who are at different stages of the life cycle. Our methodology, however, encourages a view of human development as representing a series of arbitrarily divided and theoretically unrelated age groupings. As a consequence we become locked into an age based policy and programmatic orientation establishing what may in fact be undesirable and inefficient methods for meeting our human resource

needs. Hence, we think in terms of which age categories for which types of task fulfillment as opposed to which types of skills and behaviors for which kinds of jobs and responsibilities. This lock step approach denies the fact that there are numerous tasks and needs which can be handled as well by the young as by those who are older--by males as well as by females. Particularly in a highly technologically developed society where work calls for less and less in the way of physical strength; age and sex become less salient criteria in the efficient use of human resources. The realities more than suggest the need for greater flexibility and a shift away from outmoded age and sex stereotyping. We now find, for example, that there are large numbers of adults who are seeking out mid-career changes. Men and women wishing to explore new employment and life style alternatives. Over the past ten years there has been a very dramatic change in the college age population with a very significant influx of students who are over 25 years of age. There has been a similar and even more impressive enrollment of the middle aged in non-credit skill and individual development courses and programs. At the same time, we find an increase in the proportions of young people--those we would expect to be in school, dropping out either permanently or temporarily in pursuit of alternative work and life experiences.

Perhaps one potential and partial solution to first term attrition would be to encourage the enlistment of an older, more mature, and more settled segment of the population. There may well be highly qualified and highly motivated adults who would be responsive to the idea of serving a term in the armed forces. Organizations such as Vista and Peace Corps have found that it is in fact the older volunteer who is most likely to complete the required term of service. Further, the older volunteer shows higher morale and expresses

a greater sense of achievement and satisfaction with the assignment.¹

Yet another important reason for thinking in terms of expanding the age pool of the military stems from the hard data which makes apparent that ours is rapidly becoming a society of older people. Nor is there any reason to expect a shift in this demographic pattern.

Certainly colleges and universities have not been unaware of the impact of shifting population age groupings upon the immediate future of institutions of higher education. It is not because of altruism alone that more and more colleges and universities have liberalized both admissions and curricular policies. Unlike the armed forces, institutions of higher education do not currently have available the alternative of compulsory service. At the same time, universities and the armed forces are confronted with similar problems: 1) how to maximize the recruitment of those clients who are essential for the continuation of the institution; 2) how to identify and attract new and different clients; 3) how to minimize the attrition of those whom the institution seeks to retain.

Continuing with the discussion of our inability to deal adequately with questions of human development, I do have another observation which may have some relevance to the specific concerns of this conference.

It was less than one hundred years ago (1904) that the psychologist, G. Stanley Hall coined the term adolescence as a social stage of the life course.² Despite a lack of consensus among social scientists, adolescence was and continues to be viewed as that life stage which falls between childhood and adulthood. The upper boundaries of adolescence and the lower boundaries of adulthood being perceived as the point when the young enter into what are considered to be the adult roles of marriage, parenthood, or full time employment; adulthood being confirmed once the individual moves from

a position of dependence to one of independence.

More recently (1970) Kenneth Keniston sought to add some clarity to the developmental discussion by suggesting that youth, as opposed to adolescence, could be viewed as a new "psychological stage of life"³. Briefly, Keniston takes the position that for many young people, matters of dependence and independence are neither complete nor clear. There are numerous college and graduate students who remain financially dependent. On the other hand, there are many 15, 16, 17 year olds who are totally detached from parents and dependent upon themselves alone for physical survival. Similarly, there are thirty year olds who are single and nineteen year olds who are both married and parents.

Factors such as social class, personal choices, and a socialization process which keeps the young in training and in preparation for so-called adult roles for ever extended periods of time, does empirical damage to a developmental process which sees all age cohorts behaving in much the same manner in all periods of history.

Youth, then, is seen as a post adolescent stage which may or may not coincide with various behaviors or statuses which are normally associated with adulthood. It is a term which is not easily defined by the dimensions of chronological age. Simply stated, a married doctoral graduate student, father of two children, cannot be viewed in the same manner as his 30 year old counterpart who is employed full time with General Motors. Nor as we have come to learn, can an 18 year old combat veteran be viewed as being less an adult than a 25 year old engineer. One value of the youth concept is that it makes the point that chronological age alone is not sufficient to tell us where people are with regard to their own development nor to the extent which they have achieved some personal closure as to how they seek

to connect and interact with their society. With the prolonging of the pre-adult socialization process has come an extended moratorium on the time period for which the very young and not so young have an opportunity to explore, experience, and test out prior to the making of more permanent commitments. Deferring of marriage to a later period of life is but one component to the overall practice of delay. Deferment and delay will also occur in matters of career choice and career commitment. One consequence of this delay is higher mobility and less stability in the work and educational behavior of the young. Unless there is a dramatic reversal caused by severe economic conditions, I see no reason to anticipate a change. I would propose, on the contrary, that given rising expectations of the young and a decline in career opportunities which match expectations, an escalation in restlessness and mobility with more and more of the young taking more and more of their life time in deciding upon an acceptable self concept and an acceptable accommodation with their society.

The deferring style does, of course, have implications for any social institution, including the military, which is dependent upon the young. Despite high levels of unemployment worker attrition and absenteeism, particularly in the under age 30 group, is high. Employers complain that huge training investment costs are lost because of youth instability. Attrition in colleges and universities continues to climb with fewer and fewer students completing baccalaureate degree requirements within the traditional four year period. Obviously this same lack of stability--reluctance to commitment--will impact upon attrition rates in the armed forces. We should not expect that a pattern which is so prevalent among the young will be easily abandoned. I would go a step further and speculate that the imposing of severe sanctions alone will

not cause significant reduction in first term attrition. Certainly current sanctions are not mild and not unknown to members of the armed forces. Beyond that we already know that reprimands as well as threats have not been terribly effective in altering undesirable or unproductive behavior. Youth do leave school knowing full well of the financial investments made by parents or the student. School attrition increases despite the still popular belief that educational credentials alone will separate out the high wage earners from the low. Employment is abandoned even when there is no other career alternative available. Costs may be quite high, financially and emotionally, but the need and desire to hang loose--to explore--and therefore to delay--what we have called maturity and settling down--remains a very important ingredient of the American developmental process.

Recognition of the deferment-delay variable would suggest a need for some organizational re-arrangement in the process by which service personnel are recruited and classified. It may make some sense to establish ground rules where the recruit is given a decision time moratorium. A period of time in which the recruit as well as the organization have an opportunity to work out acceptable connecting arrangements. A period of time during which it is understood that either side may choose to dissolve the relationship without punishment or reprimand. Recruits in this initial stage would not be classified as being full members of the armed forces. It would be understood that service departure during this pre-service period would not entitle the recruit to usual full service benefits.

Based upon what we have learned about youthful attrition from work and school, it would appear worthwhile to consider several other cooling out and opting out strategies.

On the enlistment side, we know that decisions to accept employment or enroll in school are not always based upon rational behavior or systematic study. Young people do react to a variety of influences. A lack of counseling resources or perceived alternatives may provoke behavior which is neither in the interest of the individual or the receiving institution. Wise choices and a faultless decision making capacity is hardly the norm among adults and we should therefore not expect more of the young.

To this end, it may be reasonable to consider some process whereby potential recruits would have an opportunity to re-consider actions taken during a less than optimal period. The re-thinking designated time period should, however, be one that will enable the potential recruit to learn more about the subtle and less apparent implications which will follow from organizational entrance. No matter the organization, where survival is based upon voluntary entrance there will always be a discrepancy between expectations and realities. Seldom are new recruits, be they students, employees or service personnel, provided with a complete or realistic picture of the receiving organizations expectations, procedures, demands, or social climate. One result is that we find numerous youth who insist that they were misled. Obviously, attack upon or criticism of the receiving institution is to be expected from dissatisfied or disgruntled clients. Only in rare instances will people admit that personal failure was the determinant factor in ones inability to successfully deal with organizational demands and expectations. Still, there is more than little reason to believe that in moments of recruitment zeal, in part, stimulated by quota filling pressures, organizational representatives will either distort or minimize reality in order to meet recruitment demands. Regardless of the institutional and personal dynamics involved, it does make sense to provide the potential recruit with reasonable time and information.

Ultimately, it would seem to me, such an arrangement would be of cost, morale, and psychic benefit to both the individual and the receiving organization. At this point I recognize that my observations may be viewed as the rhetoric of one who is either unaware or indifferent to the workings of formal organizations. I do, of course, appreciate the need for planning and the fact that every organization must demand compliance to legitimate rules and regulations. Nor do I operate under the naive assumption that organizational policies and programs should be determined by novice recruits. On the contrary, I tend to agree with those who hold the view that we may have gone too far in stressing the rights and privileges of youthful recruits whether the setting be work, school, or the military. Privilege and self-determination must be coupled with responsibility to self, others, and society. If anything I would concur with the view of Dr. D. Baumrind who took exception to certain recommendations made by the Panel of Youth, a federal government sponsored task force. The report, issued in 1973, placed far more emphasis on youth rights and privilege than upon youth responsibility. Baumrind makes the following observations:

"Adults who continue to protect the youth in this way or to reward into late adolescence his egoistic, antisocial, irrational side prolong unduly his period of childhood omnipotence. The effort on the part of many 'liberated' adults and communities to provide adolescents with a plethora of unreal options effectively neutralize the efforts of other adults who would require of youth that they reciprocate for services received with something of value and that while dependent upon their elders for support and substance, they adjust to their idiosyncracies and limitations. Adults have the responsibility to provide a youth not with a multitude of pseudopossibilities, but rather with genuine choices among a few good options."

I would go a step further in suggesting that youthful attrition from voluntary organizations may be enhanced by our failure to stress the saliency of youthful responsibility and obligation. Surface rhetoric to the contrary youth do look to adults for the setting of organizational guidelines and procedures. The prevalent expectation is that those who do operate and control social institutions do have the knowledge as to how those institutions should function. Complaints of inconsistency and inequities do not necessarily represent a view that control should be turned over to less knowledgeable and less experienced individuals. On the contrary most youth would accept the proposition that it is, despite shortcomings, the responsibility and right of the parent, teacher, employer and administrator to determine the direction and process of the training, management, and socialization mechanism. Given that adults do have the societal responsibility and control, it is not unusual for youth to expect adults to establish and enforce organizational groundrules. What young people do seek is clarity, communication, truth, and equity in how these organizations and institutions go about the business of youth socialization and youth control. It may well be that in our desire to be more responsive to what we perceive as youth needs and desires we have pursued policies and procedures which are neither coherent or consistent. Of critical importance is the presentation of a posture which communicates to the young that the line between privilege and responsibility is inseparable. Of equal importance is the obligation of every social institution and organization to present a truthful and realistic picture. Each institution and organization must be held accountable for the providing of authentic data as to purpose, goals, structure, processes, opportunities, constraints and rewards. My emphasis on the need for opting out opportunities as well open

and full disclosure is not to be confused with issues of organizational management. Again, I hold the position that in our apparent desire to be more responsive to the young, we may have done more harm than good. The task of turning things around will not be a simple matter, made all the more difficult by a societal climate in which many adults also stress rights and privileges ahead of responsibility and community commitment. Youth who are now entering the military are products of a variety of institutions and settings which contribute to a youth posture which tends to negate the importance of responsibility to self and country. Some recognition of this problem has come to the surface and concern is being expressed by some institutional representatives.

Recently the Kettering Foundation, following a review of a wide sample of school publications dealing with student rights and responsibilities, reported that:

"about 99 percent of the content of these documents deal with student rights and less than one percent with responsibilities."⁴

In response, the commission laid out a list of what it felt was needed: including "the responsibility for all adolescents to protect the constitutional rights of others, to obey 'reasonable' rules and regulations established by the board of education and implemented by school administrations, to refrain from libel, slanderous remarks, and obscenity in verbal and written expression, and to undertake a social commitment." While the commission's recommendations hardly represent a bold and startling statement it does stand in contrast to institutional expressions of the past decade.

Given that the armed forces must, similar to employers, colleges and universities, deal with the products of earlier socialization it may make some

sense to increase the interactions between the three institutional sets. While admittedly differing in purpose, structure, and process, there are numerous commonalities. Each must deal with problems of recruitment and attrition. Each must be sensitive to economic, social, political, and psychological issues. Each is confronted by problems of training, discipline, morale, productivity, interpersonal relations, race and ethnicity, and effective strategies of conflict resolution.

A more formalized relationship would not only enhance the sharing of data, but might also act to alter the image of the military as a highly isolated and insulated organization.

Several recent studies dealing with youth attitudes and perceptions report yet another youthful characteristic which holds important implications for the military as well as other youth receiving organizations. These studies point out that many young people do not feel a sense of loyalty or commitment to massive institutions or territories. Public patriotic expressions of commitment to one's country, state, or city are not the norm among youth. Nor is there very much in the way of a strong sense of attachment to one's university or one's employment organization.

While social class, age, and education to generate some variation, contemporary youth attitudes do reflect a strong sense of turning inward--of personal privatism; a presentation of self which includes rejection of things large and complex. My own research with college age youth suggests a dramatic departure from that recent period where the young were seen as highly altruistic and much concerned with problems of poverty, racism, and social injustice.⁵ I think it would be fair to conclude, then, that this generation of high school and college age youth does not hold as a first priority resolution of the

problems of others or the problems of society. Although not indifferent to such issues, the first priority is to oneself, one's immediate family, and one's closest associates. This emphasis on self and small groups of significant others is not necessarily the product of self-indulgence, denial of the needs of others, or the single minded pursuit of affluence, rather, it represents what many people, particularly young people, see as the only efficient way of retaining a feeling of self-worth, self-determination, and self-fulfillment. In part, this turning inward, this self privatism, does reflect a desire to escape from the constraints and pressures imposed by external institutions of which youth have minimal understanding and for which they show little sympathy. The end result is a posture of strained accommodation where youth give little more than that which is required or expected. Since these data are based upon interviews with college enrolled and full time employed youth we should, I propose, expect even less in the way of commitment from youth in the armed forces. Both higher education and employment are seen as legitimate and socially acceptable activities. Formal education is, of course, recognized to be the proper means for preparation for productive adult roles. Full time employment is seen as the next natural step and an essential life sustaining requirement. Both activities are perceived by youth and others as being needs toward the fulfillment of some identifiable end. Both are viewed as socially endorsed necessities, from which few, no matter personal preferences, are allowed to escape. Such is not the case with military service particularly in times of peace. There is little in the social climate of our society which represents endorsement of military service. There is little, outside of legal sanctions or familial pressure, which acts to enhance completion of obligations for those who do enter the military. While I do not have access to the necessary

data I would think that in most cases in service peers do not actively attempt to discourage those who do seek to leave the service. Further, if I might project from earlier research involvements with the 82nd Airborne Division, I would speculate that military officers facilitate departure of the dissatisfied in order to minimize the negative impact of that "one bad apple". In any event, I would propose that what appears to be a significant alienation of youth from massive bureaucracies combined with a primary concern for self does very little to encourage commitment to the armed forces.

To this point I have sought to identify certain youth characteristics, behaviors, and values which may have some impact upon questions of first-term attrition. I have also attempted to make the point that while I am data free of information from youth who are of or have been in the service, I do believe there is much of value to learn from data collected from youth in work and school settings. Finally, and perhaps most important, I take the position that while the current condition of the young leaves much to be desired, there are intervention steps deserving of consideration and possible implementation. Some of these strategies and propositions have been identified during the course of this discussion. Those which follow are based again upon my own work and experience and a recently published work by Alexander W. Astin, entitled, Preventing Students From Dropping Out.⁶ What most impressed me about Astin's work is that the methodology is sound, the analysis is complete, the conclusions concur with my own views, and do have application to all institutions confronted with problems of youth attrition. Of equal saliency is the fact that Astin is one of the few behavioral scientists who express the opinion that while such of the youth problem is created and influenced by external social structural factors, certainly some of the difficulty is provoked by

those institutions which deal with the young.

Astin begins his discussion with several notes of caution: First, that there are cases where early attrition is probably the best course for both the individual and the institution. Secondly, that this particular investigation is based upon research conducted with full time students enrolled for the first time in traditional college institutions. Students who aspire only to an associate degree or to no degree were excluded.

A critical factor in student survival is the degree of student involvement with the life and environment of the institution - the greater the involvement in organizational based activities, the greater the likelihood of program continuation.

Astin notes also that "the students undergraduate grade point average has a stronger relationship to dropping out than any other single variable". This relationship is found to exist even when the students' prior academic background and ability are taken into account, thus anything that can be done to enhance students academic performance will also tend to reduce attrition. A similar conclusion can be drawn from research dealing with work satisfaction and worker attrition. The more evidence of achievement and achievement recognition, the greater the likelihood of career satisfaction and career stability. No doubt these findings would have some applicability to the armed forces. Possible intervention techniques are numerous: tutoring, programmed instruction, special skill development courses, self paced learning, among others. No matter the intervention approach the goal would be two-fold: 1) to enhance the achievement levels of recruits and 2) provide recognition of achievement in order to reinforce the recruits own sense of progress and accomplishment.

Tied in with the two factors of institutional involvement and achievement is a third variable found to play an important role in attrition. Astin points

to boredom with courses. Both men and women cite boredom more often than poor grades, and it is, in fact, the single reason given most frequently by male students. Obviously boredom cannot be detached from matters of involvement or achievement.

As Astin notes, "while boredom may be a socially acceptable rationalization for leaving college, it also indicates non-involvement".

Boredom and monotony appear as an explanation frequently offered by those who leave employment, particularly the young.

Research dealing with worker alienation indicates clearly that even in white collar professional job settings boredom, routine, and monotony contribute significantly to production sabotage, attrition and absenteeism. To offset or perhaps minimize worker alienation some corporations have made serious attempts in both work setting redesign and employee involvement. I am not speaking here of the traditional school of management approaches which have done so little to alter the mood of worker alienation. Models already exist in this country as well as overseas. Enlightened management has already learned that flexibility and choice in job design, length of work week, hours worked, and forms of compensation can contribute significantly to worker productivity and satisfaction.⁷

I, of course, am not in a position to assess just how much flexibility and change can be brought about in the training work climate and structure of the various armed forces. I would, however, contend that such experimentation may be of some potential value in helping to counter the problem of first year attrition.

Along similar lines it might also make some sense to seek to reduce the size of the various within service units in order to enhance a stronger feeling of community. As noted earlier youth are inclined to shy away from large organizational attachment with a preference for smaller and more cohesive

groups. Smaller groups are more effective structures for increased communication, esprit, and self management.

In attempting to minimize attrition, youth dealing institutions have pursued efforts to identify dropout-prone clients. The object, of course, being to screen out, at the entrance stage, those least likely to remain with the institution. If successful in such prediction efforts, the institution could no doubt show some benefits both in costs and planning.

Unfortunately, such predictive devices have not been proven to be terribly effective. Astin makes the following observation:

"Using all the best predictor variables from this study as admission criteria would make possible only a moderate improvement in predictive accuracy. Thus, a substantial proportion of the most dropout-prone students admitted would complete their program and a small but significant number of the least dropout-prone students would not finish theirs. In short, institutions can be more flexible in their selective admissions without fear that dropout rates will be unduly influenced".

Similar findings have emerged from studies of youth in the labor market; youth in vocational-career training programs; and youth in Peace Corps and VISTA. The current state of affairs would suggest concentrating upon the receiving organization and its methods of absorption and integration as opposed to a concerted focus upon predictive devices.

In conclusion then, with regard to matters of first term attrition, I do believe that with certain within institutional changes improvements can be accomplished. Still, given the needs and organization of the military and the conditions of youth and society, I doubt seriously if proposed cures will generate a significant dent in the problem. No matter the steps taken by the armed forces, particularly in times of relative peace, I do not believe we can anticipate a serious change in how the young will respond to such

service. Military service is not an activity supported or endorsed by a society committed to social mobility. It is not an activity typically encouraged by parents. The armed forces are not an institution accepted by many of the young. Its status as critical only emerges at times of recognized national crisis. It is not viewed as a viable alternative to civilian educational and employment organizations.

It is for these reasons and others that I hold a fairly pessimistic view as to the effectiveness of proposed intervention strategies. My own inclination, again, for a variety of reasons probably not appropriate for discussion here, is that our nation implement a program of national citizen service which would include service in the armed forces.

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Organizational Commitment and Personnel Attrition

Lyman W. Porter
University of California, Irvine

and

Richard M. Steers
University of Oregon

Abstract

This paper focuses on the construct of organizational commitment as it relates to personnel attrition in organizations. The first part of the paper reviews the nature of organizational commitment, along with several individual and organizational antecedents of the construct. Based upon this introduction, data are reviewed from a recent study that specifically addressed the commitment-turnover relationship. Following this, conclusions are drawn concerning the role of organizational commitment in the prediction and reduction of employee turnover.

Organizational Commitment and Personnel Attrition*

In the search for ways to reduce employee turnover in organizations, increased attention has been focused in recent years on the development of comprehensive process models of the withdrawal process. Such models are judged to be superior to static correlations between a set of variables and turnover at a given point in time (Porter & Steers, 1973). If we can study turnover from a more dynamic perspective and learn more about the process leading up to the turnover decision, administrators will be in a better position to take the necessary steps to minimize the loss of valued personnel. This paper attempts to facilitate the development of a process model of employee turnover by focusing on the concept of organizational commitment and its role in employee retention decisions.

Organizational commitment may be defined as the relative strength of an individual's identification with and involvement in a particular organization (Porter, Steers, Mowday, & Boulian, 1974). It can be characterized by at least three factors: (a) a strong belief in and acceptance of an organization's goals and values; (b) a willingness to exert considerable effort on behalf of the organization; and (c) a strong desire to maintain membership in the organization. Thus, commitment, as opposed to simple attachment or membership, involves an active relationship between an employee and his employer in which the employee is willing to give something of himself in order to contribute to the realization of the organization's goals.

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If the concept of organizational commitment is used as a central variable in the study of the withdrawal process, two important questions must be answered. First, we need to know which factors seem to enhance employee commitment. Second, we need to know the specific nature of the commitment-turnover relationship. Hence, the partial model of commitment and turnover suggested here consists of two parts: antecedents of organizational commitment and outcomes of organizational commitment (Steers, 1977).

Antecedents of Organizational Commitment

A great deal has been written about the possible antecedents of organizational commitment. When the various studies are examined, it becomes clear that major influences can be found throughout the work environment. For the sake of parsimony, these influences can be grouped into three main categories: personal characteristics, job characteristics, and work experiences.

Personal characteristics. Several individual difference characteristics have been found to influence commitment. Specifically, commitment has been found to be related to age (Hrebiniak, 1974; Lee, 1971; Sheldon, 1971; Steers, in press), achievement opportunities (Brown, 1969; Hall, Schneider, & Nygren, 1970; Lee, 1971; Patchen, 1970), education (Koch & Steers, 1976), role tension (Hrebiniak & Alutto, 1972), and central life interest (Dubin, Champoux & Porter, 1975).

Job Characteristics. Commitment has also been found to be related to several job characteristics. These include job challenge (Buchanan, 1974; Hall & Schneider, 1972), opportunities for social interaction (Sheldon, 1971; Steers, in press), task identity (Steers, in press), and feedback (Ross & Zander, 1957; Steers, in press).

Work experiences. Finally, based primarily upon the work of Buchanan (1974), commitment appears to be influenced by the nature and quality of the work experiences that occur during an employee's tenure with an organization. Work experiences are viewed as a major socializing force and as such represent an important influence on the extent to which psychological attachments are formed with an organization. Work experiences that have been found to be related to commitment include group attitudes toward the organization (Buchanan, 1974; Patchen, 1970; Steers, in press), organizational dependability and trust (Buchanan, 1974; Hrebiniak, 1974; Steers, in press), perceptions of personal investment and/or personal importance to an organization (Buchanan, 1974; Sheldon, 1971; Steers, in press) and rewards or expectations realizations, (Steers, in press).

When taken together, the findings offer substantial evidence concerning the varied sources of influence on organizational commitment. Even so, a common theme runs through many of these variables; that is, the notion of exchange (March & Simon, 1958). Individuals come to organizations with certain needs, desires, skills, and so forth, and expect to find a work environment where they can utilize their abilities and satisfy many of their basic needs. Where the organization provides such opportunities (e.g., where it makes effective use of its employees, is dependable, etc.), the likelihood of increasing commitment is apparently enhanced. However, where the organization is not dependable, or where it fails to provide employees with challenging and meaningful tasks, commitment levels would tend to diminish. Moreover, where employees have higher educational levels, it may be more difficult for an organization to provide sufficient rewards (as perceived by the individual) to equalize the exchange. Hence, more

education employees (who are also typically more cosmopolitan) would tend to be less committed to the organization and perhaps more committed to a profession or trade.

Commitment and Employee Turnover

The second aspect of the model discussed here focuses on the impact commitment has on employee retention. Several recent studies (using both cross-sectional and longitudinal data) have found a consistent if moderate correlation between an employee's commitment to an organization and subsequent turnover (Porter et al., 1974; Porter, Crampon, & Smith, 1976; Steers, in press; Steers & Koch, 1976). We would like to discuss in some detail one such study (Porter, Crampon, & Smith, 1976). The reason for singling out this particular study for attention is because it contains certain features that are fairly unique in the turnover literature and because the findings are suggestive for both further research and for organizational action.

The features of this study that set it off from the typical turnover study are the following: (1) the sample is composed of individuals starting out in managerial careers; most studies dealing with turnover focus almost exclusively on rank and file employees; (2) the attitude measured is the individual's commitment to the organization; most other turnover studies involving employee attitudes deal simply with "job satisfaction"; and (3) most importantly, the study is longitudinal; individuals' commitment patterns are tracked from the first day on the job through the end of the first 15 months of employment. From what we know from other literature on turnover, this beginning period of membership in an organization is the most critical period for turnover, since that is where most of it occurs.

In order to put the findings in context, a few words about the sample and the methodology are necessary. The sample consisted of 156 management trainees who were starting employment with a large retail organization. Of this number, about 25% voluntarily left the organization during their first 15 months of employment. This group thus was designated the "leaver" group in our study. The remaining 100+ individuals who remained with the organization at least through 15 months were termed "stayers". Several kinds of attitudinal data (including organizational commitment) were collected at each of the following points in time: first day, end of two weeks, end of 2, 4, 6, 9, 12 and 15 months. The average response rate during these periods was about 75% of the possible respondents for a given data collection point. (Since individuals were leaving along the way, the sample size naturally shrank from the first day to the end of 15 months.)

The basic data analysis consisted of "pairing" each "leaver" with a given "stayer." As noted earlier there were 37 leavers, but the use of stringent matching criteria left us with an analytical sample of 25 closely matched pairs of stayers and leavers.

What did the data show? First, and most strikingly significant (statistically and otherwise), the eventual leavers had significantly lower attitudes along the way than did the stayers. More specifically, the eventual leavers were significantly lower in commitment attitudes than stayers ($p. < .05$) on the first day on the job, and were even more separated from the paired stayers in the two months period just prior to leaving (whether they left in the first month or so, or in the 12th or 15th months). Put another way, stayers maintained a fairly constant level of commitment throughout the first 15 months on the job, whereas those who would eventually leave sometime during the first 15 months started out on the job (first day) with lower commitment and their commit-

ment declined (though not statistically significantly so for this relatively small matched sample) as they got closer to the point of leaving the organization. These results are based on a strict longitudinal analysis of the data.

A somewhat different analysis that involved cross-sectional comparisons demonstrated the same effect. This analysis, however, showed the differences between the two groups (stayers and leavers) in somewhat more dramatic form. It used a "last back" technique of analysis. That is, leavers' commitment attitudes measured within 1-1/2 months of the time they actually left were compared with those of the matched stayer group at the same point in time; likewise, leavers' commitment attitudes 3 months prior to leaving and 5 months prior to leaving were also compared with the attitudes of the stayer group measured at the same point in time. What this analysis shows clearly is that the closer an eventual leaver comes to the point of termination, the more his or her attitudes separate from the comparable stayer. Thus, if a leaver is within a couple of months of leaving, his or her attitudes are clearly lower than comparable stayers; on the other hand, if he or she is at least six months away from leaving, his or her attitudes are indistinguishable from those of someone who is not going to leave in six months.

To put the total set of findings from this study in perspective: The respondents -- that is, the management trainees -- who left the organization voluntarily sometime during the first 15 months of employment typically had begun to show a marked decline in commitment to the organization prior to actually leaving it. Some leavers-to-be started to report this decline immediately (i.e., the first day on the job) and thus turned out to be ones who were likely to leave in the first few

months of the job. Others, who would eventually leave before 15 months, maintained relatively high commitment until just a few months before departure. Of course, still other leavers never did show any drop in commitment before terminating with the organization. These findings, taken together, would seem to point to the following conclusion: if an individual member of an organization begins to show or demonstrate a definite decline in commitment, it is a clear warning sign that a voluntary termination may occur within the near future. Termination can occur without this decline, but if it is there it likely has meaning for subsequent behavior.

A final point on this study: It does not answer questions regarding cause-effect sequences. We do not know if the typical leaver decided to terminate and then started expressing lower commitment, or whether commitment started to deteriorate and was followed by the decision to leave. Perhaps some individuals alternated back and forth between tentative decisions to leave and changes in commitment. Also, of course, our study did not address the question of the possible critical events in the employment situation that could have started an individual thinking about leaving and/or that lowered his or her commitment to the organization. It will take additional longitudinal studies, supplemented by other types of data in addition to the kind we collected in our study, to help provide answers to some of these questions. What our limited results do point toward, however, is that some sort of "early warning" attitude detection system might assist organizations in identifying the individuals most likely to want to leave and thus might be able to give organizations time to take action that would lessen the chances of turnover if that is desired.

Conclusions and Recommendations

When the above findings are examined, at least two important conclusions emerge. First, influences on the extent and quality of an employee's commitment to an organization can be found in several areas of organizational life. We have identified three such areas: (1) personal characteristics (e.g., age, education, n Achievement); (2) job characteristics (e.g., task identity, opportunities for social interaction); and (3) work experiences (e.g., the extent to which an employee feels personally important to an organization and the extent to which he or she feels the organization can be trusted).

The second conclusion to be drawn from this paper concerns the relationship between commitment and subsequent turnover. In at least four studies, organizational commitment was found to be a moderate but consistent predictor of employee turnover. Moreover, in the longitudinal study discussed above, measures of commitment improve in their predictive powers vis-a-vis turnover as one approaches the point of termination.

Based on these findings, what kind of recommendations can be made concerning ways to improve commitment and reduce turnover? Several courses of action are possible:

1. Organizations can endeavor to build commitment by placing employees in situations where they have opportunities to achieve goals that are personally meaningful to them. To the extent that the organization is seen by its members as a primary source of need satisfaction, attachment and commitment should increase.
2. Employees must be shown that their peers and superiors are truly concerned about their welfare. One possible way to show such in-

terest is through the use of employee career counseling programs, where employees are shown the various options available to them should they remain.

3. In some cases, it may be possible to modify certain aspects of employees' jobs so they have greater autonomy and responsibility and can identify more with the actual tasks they perform.
4. It is important that employees understand and identify with the objectives and goals of the organization. One way in which this can be accomplished is by showing employees how their own personal goals are congruent with the goals of the organization and how contributing to the organization helps in their own personal goal attainment. In other words, it would be desirable to create an atmosphere of mutual trust and support between employees and the organization where both contribute something toward the attainment of the other's goals and where such an exchange is made with adequate consideration for the employee's needs and desires.
5. Finally, it may be desirable in some cases to monitor attitudes toward the job and organization at various intervals to serve as an early warning system for potential turnover. Such monitoring could be done formally or informally. Perhaps one of the most effective means is through the supervisor or superior. If a superior understands his or her subordinates and feels relatively close to them, he or she should be in a good position to sense changes in attitudes (from positive to negative) in time to attempt remedial action.

In summary, it would appear that one way to reduce personnel turnover in organizations is to focus on building employee commitment to the organization. To the extent that employees identify with the organization and are committed to helping it reach its goals, we would expect them to be inclined to remain in the organization. Thus, while we would not wish to imply that organizational commitment is a panacea for problems of employee turnover, it is clearly one vehicle to improving the stability of an organization's workforce.

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POST HIGH-SCHOOL DROP-OUTS
(AND STAYERS)

David R. Segal
University of Maryland

Jerald G. Bachman
University of Michigan

The educated American middle-class, from which our policy-makers and our social scientists come, has a fairly lock-step notion of what one should do in the late adolescent and early adult years. The young American is expected to complete high school, and proceed immediately to some other gainful investment of one's time: higher education, entrance into the civilian labor force, or military service. Actually, there are two different kinds of expectations here. The expectation that an individual will get a job after high school is tied to the notion of a work career. It is expected that the first job will lead to a second, with greater responsibility and remuneration, and so on in a continuing progression. That is, once the individual enters the labor force, he is generally expected not to leave it until retirement.

The second expectation posits an additional stage in this progression. Between high school graduation and entrance into the labor force, the individual enters an institutional setting that on the one hand encompasses more of his total life at that point in time, a total institution (Goffman, 1961), and on the other represents a transitional state that he will leave when he reenters the common world, and enters the civilian labor market. The examples that come to mind here are the university, the monastery, and, in the days of conscription, when we believed in the citizen-soldier, the armed forces (see, e.g. Kennedy, 1974).

The first expectation runs counter to the dynamics involved in the individual's search for identity during this stage in the life-cycle, according to Erikson (1968). In terms of Erikson's developmental psychology, the adolescent years define the period during which the individual makes decisions about his or her future life: decisions based upon free choice, self-actualization, and experimentation. From this perspective, we should not be surprised to see adolescents and young adults appear completely indecisive about their futures, or to make decisions and then change their minds, or to reject the cultural values and styles of the parental generation.

Prior to the advent of the all-volunteer military force in America, the military was seen as a transitional stage by most people who served. Except for the career nucleus, the services were staffed with "citizen-soldiers": conscripts, draft-motivated volunteers, reserves, and even true volunteers who did not intend to spend more than a few years in uniform. Military service fit the expectation of a transitional phase between high school and civilian employment very well.

With the change to an all-volunteer force, however, the definition of military roles changed. The assumption was increasingly made that a volunteer military would be a career military. Driven by recruiting shortfalls, recruiting and training costs, and projections of declining age-eligible cohorts, efforts were made to make the enlistment decision the first step in a career, rather than a transitional step in develop-

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issues, manifested in concerns as wide-ranging and abstract as Roszak's (1969) thesis regarding the rejection of America's technocratic culture by the ascending generation, as specific as the rate at which American youth were dropping out of high school, and as dramatic as the violent opposition aimed at the unconventional life-styles of some anti-war activists on college campuses. One manifestation of this awareness was the national concern voiced regarding the number of young Americans who failed to complete high school. Secretary of Health, Education, and Welfare Ribicoff, President Kennedy, and President Johnson all expressed their concern with the high-school drop-out problem.

Early research on high school drop-outs, conducted at the University of Michigan as part of the Youth in Transition project, suggested that the "drop out rate" measured a symptom, rather than the problem itself. The problem, at the most basic level, was identified as a mismatch between the characteristics of some individuals, and the typical high school environment (Bachman, Green and Wirtanen, 1971). This suggestion, in turn, can be viewed as a manifestation of a more general "contingency approach" to adjustment at various stages in the life-cycle. From this perspective, individuals differ in the characteristics they seek from an educational, occupational, or organizational environment, and the probability of their adjusting to a specific environment is seen as a direct function of the degree to which the characteristics sought are in fact provided by any given organizational context (see e.g. Segal, 1977).

The Youth in Transition Project identified another form of dropping out as well: slippage between the post-graduation plans of high school seniors, and their actual post-graduation activities. Three quarters of the young men in the high school class of 1969 who, in their senior year had expected to go to work, continue their educations, or enter the military after graduation, did so. However, there was a difference here among post-graduation environments. Slightly more than three-quarters of those who had expected to enter the civilian labor force or continue their educations did so. Slightly less than two-thirds of those who had anticipated entering military service did so. In short, there was a "drop-out rate" of about 25% for the civilian labor force and higher education, and a "drop-out rate" of about 37% for military service immediately after high school graduation (Johnston and Bachman, 1972).

We can look at these figures from another perspective as well. Rather than looking at the degree to which plans formulated in high school were realized after graduation, we can look at whether behaviors after graduation were planned in high school. Of those young men in the Youth in Transition sample who in fact went on to higher education after high school, 90 percent had planned to continue their educations by their senior year in high school. Thus, while some people who had planned to continue school didn't do so, 9 out of 10 of those who went further in school had planned to do so. This of course reflects the temporal requirements of the college admissions process: application, testing, interviews, and so forth.

By contrast, of those young men who went into the armed forces after ment. This subtle change in definition of the military role, we believe, has implications for military attrition.

Deviations from developmental expectations have not been well received in America. The 1960's saw a heightened awareness of these

graduation, only 49 percent had planned to do so by their senior year in high school. That is, over half the young men in the Class of 1969 who entered the military the year after their high school graduation had not planned to do so by the Spring of their senior year in high school. Of course, military conscription had something to do with this.

Those who went into the civilian labor force after high school showed an even poorer fit between pre-graduation expectations, and post high-school behavior. Only 30 percent of the young men who got civilian jobs the year after graduation had expected to do so by the Spring, 1969 survey. Obviously, the draft alone cannot explain the poor fit between plans and behaviors.

Research has shown that realistic job expectations are related to higher retention (Wanous, 1973). If most young men who enter the military do not expect to do so at all less than a year prior to their induction, we would anticipate that their expectations regarding specific characteristics of military service would be likely to be ill-formed and unrealistic. In turn, as their expectations failed to be confirmed, they would be likely to experience adjustment problems, and ultimately to leave the service (Ilgen, 1975). Wiskoff (1976), in a review of research on career expectations among military personnel in the Anglo-American nations, found that in fact, prior to service, expectations tended to be unrealistic and idealistic. Thus, both from the perspective of ego psychology, and from the anticipated consequences of expectancy disconfirmation, we should expect, rather than be surprised by, educational drop-outs, labor-force drop-outs, and military drop-outs during the first post-high school year.

DATA BASE

Comparison of the relative dropout rates of military and educational environments in the year following high school graduation is possible with data generated by the University of Michigan's currently ongoing project, Monitoring the Future. This project consists of a series of annual national surveys of seniors in high school, which began with the class of 1975. In addition, annual follow-up surveys are used to track these classes for the first five years following graduation. Samples are large-scale and nationally representative.

The initial contact with each cohort takes place in high schools during the senior year. Each year, a sample of about 125 schools is drawn so as to be representative of high schools throughout the United States. As many as 200 or more seniors are surveyed in each school, yielding a total sample of approximately 16,000. The first data collection for each class (average age 18) consists of group-administered questionnaires. Follow-up data collections to average age 23 involve mailed questionnaires. The data to be reported here are drawn from the base year survey of the high school class of 1975, and the first year follow-up of that class, as well as from the 1976 base-year survey. Thus, we will be able to look at expectations regarding post-high school activity reported when our respondents were in their senior year, and their actual post-high school activities, and well as comparisons between the 1975 and 1976 cohorts.

MILITARY, WORK, AND EDUCATIONAL ENVIRONMENTS

Previous analysis of the base year 1975 survey has shown that the military is seen in the abstract to be a work place with considerable opportunity for education and promotion, and little discrimination against minority groups, but one characterized by rigidity and arbitrariness. When viewed in comparison with other work settings, both men and women in the class of 1975 reported the military to be the least acceptable or desirable place to work: slightly below police departments and educational institutions, and considerably below small businesses, self-employment, large corporations, and civilian governmental agencies (Blair, 1977).

While most contemporary discourse on changing military organization focusses on job-related characteristics of the armed forces (e.g. Moskos, 1977), we would like to focus on comparisons with educational institutions. Despite the shift in the definition of the military from a transition institution to a post high-school career, the former function is far more important to many potential recruits. Among the major motivations for enlistment in the military are the opportunity to get vocational training, and G.I. educational benefits. In a survey of basic trainees at Fort Knox in 1974, for example, Kristiansen (1975) reports that of his sample of 605 men, 24 percent indicated that their primary reason for enlistment was to get additional education through the Army, or for G.I. Bill benefits, and 31 percent indicated job training as their primary motivation. Moreover, when asked about secondary enlistment motivations, an additional 30 percent indicated education or G.I. Bill benefits, and an additional 22 percent listed job training. Similarly, a survey of over 10,000 airmen in 1974 indicated that over 94 percent of the sample had been influenced to join the Air Force by the perception that the Air Force offered better opportunities for training and education than did the other services (Mullins, et al., 1975:13).

Beyond the motivational factors of education and job training, but associated with them, we must face the structural reality that the armed services are in competition for personnel with civilian educational and training institutions. The civilian institutions are explicitly designed to play a post-high school transitional role in preparing people for entry into the civilian labor force. The impact of this competition for military manpower has been demonstrated in the case of Canada (Pinch and Cotton, 1976). The empirical question confronting us is whether the U.S. Forces can improve their own personnel posture by supplementing the career force, recruited in competition with civilian industry, with a short-term force of citizen soldiers. These latter can be brought into the service with educational and training incentives, in exchange for which they will serve their country for a limited number of years as citizen soldiers. Our own preference is for precisely such a mixed force of military careerists and citizen soldiers (see Bachman and Blair, 1976). And it is our feeling that if such a force is to be maintained, the military will have to shed some of the trappings of the occupational setting that it has begun to take on since the advent of the all-volunteer force, and aim at providing a post-high school institutional environment for a large number of young men and women whose military service will be only a short phase in their own lives.

RESULTS

The data from Monitoring the Future clearly show that high school seniors are more likely to expect and to desire post-high school job training or education than they are to expect or to desire to serve in the military. Table 1 presents, for the 1975 and 1976 base year samples, the percentage of respondents who indicated that they probably or definitely would enter each of five post-high school environments, and the percentages that would choose to enter those environments if they could do exactly as they pleased.

Several interesting findings appear in this table. First, both expectations of and preferences for military service are lower than expectations and preferences for vocational school, 2 year colleges, 4 year colleges, and graduate training. The modal response for both 1975 and 1976 indicates that attending a four year college is regarded as the next "normal" step after high school graduation.

Second, military service and vocational schooling have in common the fact that slightly more high school seniors would have liked to go on to such an activity than expected to do so. That is, some respondents clearly perceived factors that would prevent them from doing what they would most like to do after graduation. By contrast, at least in 1975, considerably larger percentages would have liked to graduate from a four year college and attend graduate school than expected to do so. These latter activities were clearly regarded as more desirable, but also more difficult to achieve. On the other hand, fewer high school seniors wanted to go to two year colleges than expected to. It would seem that some seniors who would have preferred to go to four year institutions were going to settle for two year colleges instead.

Third, while the 1975 and 1976 figures are relatively close, there are notable declines in preferences for and expectations of four year college and graduate school. This decline was greater for preferences than for expectations, so that the gap between preference and expectation narrowed from 1975 to 1976. To the extent that aspirations for higher education were rooted in vocational or economic interests rather than self-actualization, this might reflect a realization that college degrees were no longer (if they had ever been) guarantees of employment, and a recognition that after graduate school, many people were experiencing difficulty finding work in their fields. Interestingly, however, the corresponding increases in expectations of attendance at vocational schools and two year colleges, as well as military service, all of which might be seen as more employment oriented, are so modest as to be negligible, and preferences for these three activities declined modestly as well, rather than increasing.

We should note that there were interesting gender differences regarding preferences and expectations about military service in 1975 (Blair, 1977) and 1976 (Bachman, Blair and Segal, 1977). As Table 2 shows, in each year, more males than females expressed a preference for military service, and more males than females expressed an expectation of military service. However, in both years, more males expected to serve than really wanted to, while more females wanted to than expected to.

For the males, we suspect that this reflects, at least in part, a recognition that jobs in the civilian labor force may not be available to them, or that they might not qualify for, or be able to afford, higher education. In any case, it reflects an expectation of being in the armed forces on the part of some males who would prefer to be doing something else. For women, on the other hand, we suspect that our findings reflect a recognition that because women are excluded from combat occupations and from non-combat jobs in combat units, and because armed forces selection standards are higher for women than for men, women who aspire to military service are more likely than are men to have their aspirations unfulfilled. The findings suggest that if combat specialties, and non-combat jobs within units, were to be opened to women, there would indeed be women interested in serving in the armed forces who are not currently accommodated.

EXPECTATIONS AND EXPERIENCES

A subsample of the 1975 sample was resurveyed in 1976, and we have analyzed data on about 2500 cases to determine the fit between expectations of vocational training, higher education, or military service expressed during the senior year, and actual activities the following year. Table 3 presents the data for the males in this subsample.

The first column of Table 3 represents slippage between high school plans and actual behavior, and this slippage varied considerably among the four activities. Only eight percent of the males who, in high school, had expected to attend a four year college, had changed their minds (or had their minds changed for them) a year later. By contrast, forty-one percent of those who had expected to serve in the military changed their minds in the intervening year. Pre-enrollment attrition appears to be a greater problem for the armed forces than for educational and training institutions, and the military drop-out problem seems to be greater among males in the class of 1975 than it had been in the class of 1969.

Column 2 of Table 3 presents the degree of fit between expectation and activity. Again, the differences among the four environments are clear, and again, four year colleges and military service define the extremes. Sixty percent of those who had expected to attend a four year college were doing so a year later. The comparable figure for military service was 24 percent.

The third column of Table 3 represents, for those who attended vocational or technical schools, attrition plus those people who completed courses of study that took less than one year. For the military, and for the colleges, it represents first year attrition. The armed forces obviously have the highest drop out rate, and four year colleges have the least. It should be noted that this survey was conducted prior to the exodus of college freshmen at the end of the academic year.

Note also that the figures in column 3 are based on the number of high school seniors who expected to go into each environment. If we

recompute the figures on the basis of how many actually did go on to these environments, the differentials become even greater. If we estimate attrition on the basis of the total of columns 2 and 3, the rates are 5 percent for four year colleges, 9 percent for two-year colleges, and 27 percent for the military.

The fourth column of Table 3 indicates the percent with each expectation in high school who have not yet done what they expected to, but still think that they will. The lowest figure here is for two-year colleges, reflecting the facts that over half of the men with this expectation had in fact attended such schools (columns 2 and 3), and over one quarter had changed their minds (column 1). The figures for vocational schools, military service, and four year colleges are roughly equal. Follow-up surveys will reveal how subsequent behavior fits with these continued expectations. The fact that over one quarter of the people who held these expectations in high school still held them a year later is itself notable.

We have not presented in tabular form the comparable figures for female respondents, since very few women from the class of 1975 entered the military. We have, however, examined these data. Perhaps the most interesting general finding was the virtual absence of gender differences in the fit between expectation and experience for those women who had aspired to two-year or four year college educations. We suspect this would not have been the case a decade ago, and find here evidence that gender equality can be achieved in social institutions that at one time were regarded as male bastions.

The vocational/technical school data did show gender differences. Women were more likely to decide not to go to vocational school than were men subsequent to their senior year in high school. However, they were also more likely to attend the year after graduation than were men, and were more likely to still be in school at the time of the follow-up survey.

The pattern regarding the armed services revealed even greater differences between the genders, and reflects, at least in part, continued differential treatment by the armed forces. Over sixty percent of the women who, in their senior years had expected to serve in the military had changed their minds a year later. That is, the pre-enrollment drop-out rate was 50 percent higher among women than among men. It should be noted that the percentages for women in the military are based on relatively small n's, and we do not have reliable estimates of the number of women who entered military service and left within the first year.

In our discussion of the Youth in Transition data, we indicated that three-quarters of the young men in the class of 1969 who had planned to go to college by their senior year in high school had done so, and that the comparable figure for military service was less than two-thirds. Table 4 presents comparative data for young men in the class of 1975 from Monitoring the Future, as well as additional data on the 1975 plans of these men, and their 1976 views about the military and four-year colleges. For the armed forces, the 1975 figure is much lower than the 1969 figure. Less than one quarter of those who had expected to serve

were doing so. For college students, the fit between expectation and attendance is not quite as high for the class of 1975 as it was for the class of 1969, but we still find that almost 60 percent of those who had expected to go to college did so. Expectations of attending college were fulfilled by behavior more than twice as often as were expectations of military service.

There are some other interesting findings reflected in Table 5 as well. One of the criticisms of the all-volunteer military force has been that it will not attract into the armed forces high quality personnel with college educations (Janowitz, 1975). Indeed, among those members of the class of 1975 who said that they probably or definitely would go to school or college, over 80 percent reported a year later that they would not serve in the military. However, we also find a few cases (less than 5 percent) who were serving in the military in 1976. This figure may include people who enrolled in R.O.T.C. programs or who are combining college and military service, as well as those who are serving in the armed forces to build up G.I. educational benefits to help pay for their college educations. This latter group is probably also reflected among the roughly 10 percent of people who aspired to school or college in 1975, and who in 1976 expected that they would serve in the military. We find evidence of the linkage between the military and higher education as well among the students who in 1975 expected to serve in the military who, in 1976, were attending four-year colleges. Indeed, over half the students who in their senior year in high school expected to enter the military were either enrolled in college, or planned to enroll, a year later. In short, there is some structured flow of young men between post-high school environment. Comparable data for women are not presented because of the great constraint placed on the flow pattern by the minimal number of women currently absorbed by the armed forces. If we are to be concerned with the degree to which our armed services are broadly representative of the youth of America, we must acknowledge at the outset that women are our most dramatically underrepresented group.

DISCUSSION

This paper has presented a very preliminary overview of the high school plans and post-high school activities of the class of 1975, drawn from the Monitoring the Future project. Much recent debate on the attractiveness of the military to members of the ascending generation has focused on the competition between the military and civilian employers for skilled personnel. Some spokesmen for the military have rejected the appropriateness of this characterization because of the institutional nature of military service. We have elected, in this analysis, to compare the military to educational environments, in part because of the structural relationship between the military and educational institutions that expedites and encourages the flow of people from one context to another, e.g. R.O.T.C. and G.I. educational benefits, and in part because we feel that the success of the volunteer force as an army of citizen-soldiers is tied to the ability of the force to develop into a transition institution for large numbers of non-career personnel. Com-

parisons between the military and the civilian labor force are, of course, possible.

The data from Monitoring the Future show that the military is seen by American youth as the least desirable of the post-high school work environments considered. We have not yet had an opportunity to determine whether this is due to the perceived characteristics of military life, but again, such analyses can be undertaken.

We have seen that there are gender differences in expectations and desires for military service, as well as for actual patterns of service. There seem to be more women motivated to serve than actually expect to serve. The opposite relationship holds for men. We have not yet had an opportunity to compare the background characteristics of women who would like to serve but don't expect to have the opportunity, and men who don't really want to serve, but expect to. Such analyses are possible, however.

We have found that the post-high school environments we have studied vary greatly in the fit between high school plans and post-high school activities, in rates of slippage after high school, and in rates of attrition after beginning the activity. Specifically, of those high school seniors who expected to go to four year colleges, we find that one year later, most of them are doing just that, few have dropped out, many who are not yet in school still plan to enroll, and very few have changed their minds about enrolling. For the armed forces by contrast, the plurality of seniors who wanted to serve have changed their minds within a year. Only about one-third of the males follow through on their plans, and a considerable number of these leave in less than a year. The figures for women in the military show even greater slippage, in contrast to four year colleges, which not too many years ago were predominantly male bastions, but where today we do not find large gender differences.

Overall, the Monitoring the Future data seem to show a considerable degree of movement among post-high school environments, particularly in the context of plans formulated in the twelfth grade. Among the environments considered here, however, there is no question but that the greatest slippage is associated with the armed services. Moreover, comparison of the figures from Monitoring the Future with those from Youth in Transition suggests that such slippage is greater in the class of 1975 than it was in the class of 1969.

Footnote

1. We must note that in the 1975 base year survey, our questions regarding the military were toward the end of a very long questionnaire, and we experienced a high non-response rate on these questions due to respondent atrophy. Thus, we feel that our 1975 base year results must be interpreted with some caution. This problem has been corrected in the follow-up survey instruments and in the subsequent base-year surveys.

Table 1. Expectations and Preferences of Five Post High School Activities

	Probably or Definitely Will Do This	Would Like To Do This
Attend Vocational School		
1975	25.8%	29.4%
1976	26.0%	27.3%
Serve in the Military		
1975	14.2%	17.1%
1976	14.5%	15.8%
Graduate from 2 Year College		
1975	30.0%	27.2%
1976	31.6%	24.8%
Graduate from 4 Year College		
1975	54.5%	65.0%
1976	50.2%	53.0%
Attend Graduate School		
1975	33.1%	48.9%
1976	28.5%	33.9%
Total N = 12,627 for 1975, 13,331 for 1976		

Table 2. Gender Differences in Expectations and Preferences Regarding Military Service

	Probably or Definitely Will Serve in the Armed Forces	Would Like to Serve in the Armed Forces
Males		
1975	22.2%	21.6%
1976	22.0%	20.0%
Females		
1975	8.3%	16.5%
1976	7.0%	12.0%

Table 3. Expectations During Senior Year, and Activities
One Year Later (Males Only)

Expected To: (Probably or Definitely)	Probably or Definitely Won't Do This	Doing This Now	Have Done This	Probably/ Definitely Will Do This
Attend Vocational/ Technical School	31%	26%	14%	28%
Serve in the Military	41%	24%	9%	27%
Attend Two-Year College	28%	48%	5%	18%
Attend Four-Year College	8%	60%	3%	29%

Table 4. Expectations and Experiences for Military Service
and Four Year College Attendance (Males)*

Probably/Definitely Will Do This (1975)	Military Service (1976)			
	Probably/Definitely Won't Serve	Now Serving	Have Served	Probably/ Definitely Will Serve
Vocational/Tech- nical School	82.2	5.1	1.9	10.8
Serve in Military	40.9	23.8	8.6	26.6
2 Year College	84.5	2.2	2.9	10.3
4 Year College	84.8	3.7	2.6	8.9

	Four Year College (1976)			
	Probably/Definitely Won't Attend	Now Attending	Have Attended	Probably/ Definitely Will Attend
Vocational/Tech- nical School	74.5	9.3	--	16.1
Serve in Military	48.6	23.8	1.0	26.7
2 Year College	41.2	11.0	--	47.8
4 Year College	7.9	59.9	3.1	29.1

*Percentages computed by rows.

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Individual, Organizational, and Environmental Influences on Turnover

Charles L. Hulin¹

University of Illinois at Urbana-Champaign

Organizational researchers have exhibited a long standing interest in affective responses reflecting job satisfaction, tendencies to leave situations, and recently in attempts to change situations by unionizing or striking. These three sets of responses are assumed to reflect imperfectly the quality of work life of individual members of organizations. Job satisfaction is probably the most frequently observed or inferred response, both because of its importance in its own right and because of its relations with other behaviors of interest. Assessment of job satisfaction also frequently represents the line of least resistance and is one of the more easily and inexpensively observed variables of interest. Assessments and analysis of antecedents of behaviors requires efforts, guarantees of anonymity, and identification of individual subjects which few are able and willing to make.

Even though organizational researchers seem to exhibit a continuing interest in these variables, there is little agreement about those variables assumed to be antecedents to or predictors of these responses. The same set of responses are often "explained" in as many ways as there are researchers with different backgrounds. Thus, in spite of our common interests in a set of responses, our intellectual backgrounds and current environments determine in large part those concepts we use to "explain" observed consistencies in responses.

Consider the topic of this conference--turnover among members of the civilian workforce and attrition among members of the United States military organizations.² An economist might explain trends or levels of turnover in the civilian workforce by reference to national economic conditions or the business

activity cycle. A political scientist might invoke the concept of alienation of members of the working classes because of the efforts of the "establishment" to maintain power while simultaneously denying power to other groups. A sociologist might explain variance in turnover by referring to work values of lower socio-economic classes; these values conflicting with work values held by supervisors and by individuals who design and run organizations. This explanation is often extended to include changing work values of younger workers and other "have nots" toward less and less congruence with the values of supervisors. Such changes would lead to long term trends of increasing conflict and turnover among this segment of the workforce. A psychologist would probably introduce concepts such as job satisfaction and organizational commitment as causes of turnover. It is entirely possible that all of these explanations are basically correct, and in fact, may even reflect the same underlying process; that process leading to turnover or attrition.

One possibility is that during times of economic expansion and upward trends in the business activity cycle, individual workers compare their status to that of others and feel relatively deprived. Relative deprivations might be more acute among members of lower socio-economic groups; groups from which most blue collar workers and military enlisted personnel are drawn. More colorfully phrased:

Discontent is likely to be highest when misery is bearable; when conditions have so improved that an ideal state seems almost within reach. A grievance is most poignant when almost redressed....It is not actual suffering but the taste of better things which excites people.... (Hoffer, 1951)

It is also possible that during periods of increasing business activity, civilian organizations attempt to solidify their relative power through expansion. Perceptions by workers (especially the "have nots" who possess little power) that this happens can lead to changing values. Such changes might well

involve rejection of those things valued by members of the "establishment" such as hard work, restraint, and high quality performance and an adoption of other values placing greater emphasis on leisure, time, money, consuming, and increased individuality. These changes place younger workers in conflict with older supervisors.

Albee (1977) has a somewhat different explanation for the apparently changing values of younger workers. He notes

We find an ironic paradox. Capitalism, in order to sell its goods has had to adopt a strategy that undermines its own ethic-- yield to your impulses, buy labor-saving gadgets, indulge yourself, have fun, spend, don't save. Impulse buying, teenage charge accounts, installment credit--all of these are directly contrary to Franklin's advice and Calvin's ethic. (p.158)

He is arguing that the protestant work ethic which was necessary to generate and promote capitalism was only functional early in the movement. Later it became dysfunctional and had to be influenced and changed. Direct manipulation through the television set and not individuals' responses to expansion by organizations is the reason behind the changing values; changes that are observed and mourned by those in charge of running our complex organizations.

The processes outlined above might result in increased job dissatisfaction among some segments (or perhaps even most) of the non-managerial working population. Increasing job dissatisfaction combined with the ready availability of job alternatives should increase turnover. Thus, the different explanations of the same response tendency outlined above not only may be compatible, they may depend on the same underlying and unobserved construct. Unfortunately, the current state of research on organizational problems precludes us from learning if the different explanations are consistent and compatible. In fact, we may never learn this because researchers from different intellectual backgrounds seldom phrase their research questions and explanations in ways that will allow

the congruence to be discovered.

An alternative view of this process suggests that the different explanations are simply focussing on different states of the same process. Economists focus on very macro-level stimuli--changes in business activity--which trigger increased levels of aspirations among workers. Political scientists focus on responses to increasing business activity made by organizational policy makers. These "organizational" responses (expansion) serve as stimuli for perceptions that induce feelings of alienation. Feelings of alienation may in turn result in rejecting the values of their "exploiters" with the resulting lack of congruence leading to job dissatisfaction, the proximal stimulus for turnover or attrition.

A problem with invoking such a step by step process is that we know that we can hold constant variation in business cycles, variation in organizational expansion, and characteristics of individual workers related to being a "have" or a "have not" and still observe relationships between measures of job satisfaction and turnover. Thus, the different explanations may represent independent processes which, while not necessarily competing explanations, are explaining nonoverlapping portions of variance in turnover or attrition.

In this paper a review of the literature of influences on turnover and attrition will be reported. The focus will be mainly on evidence relating organizational and environmental factors to turnover. Rather than covering the same literature summarized by Porter and Steers (1973), we will only refer to the studies they reviewed when necessary to supplement our own findings.

This literature has proven extremely difficult to integrate--probably because economists, sociologists, and psychologists act and conduct research as they were carefully taught to do by other economists, sociologists, and psychologists. Researchers from these different disciplines seldom make attempts to examine directly effects of their particular set of explanatory variables on assumed intervening variables which other researchers use directly as

explanatory variables. We will be forced to engage in a number of inductive leaps, often involving invocations of "faith validity" more often than we would like. The resulting statements will be burdened with caveats.

Another problem for integration is that researchers have defined their dependent measure--turnover of one form or another--consistent with their backgrounds. We have turnover assessed as an individual response, aggregated to the level of the work group, departments, plants, organizations, industries, and on some occasions to the level of entire nations. Clearly, such wide differences in definition and assessment of the "same" dependent variable can only introduce noise and problems into attempts at any synthesis. To say that individuals' satisfactions are related to subsequent turnover, when both satisfaction and turnover decisions have been assessed at the level of the individual, is somewhat different than saying that turnover and strikes are related to business activity when both are assessed at the level of an entire nation.

The macro-level literature relating characteristics of the economy to turnover will be reviewed first followed by a review of organizational effects and finally by a review of individual factors relating to turnover. Finally, a section attempting integration of the trends and findings will be presented.

Some Assumptions

Absenteeism and Turnover Both Reflect the Same Process

In order to bring some order to the nearly limitless number of studies which have examined personnel attrition--both turnover and absenteeism--the assumption has been made that excessive absenteeism and turnover both represent forms of job withdrawal behaviors. Absenteeism is regarded as a milder form of withdrawal that serves as an indication of a decision to leave an organization is imminent.

I clearly am not implying that these two forms of behavior are identical in terms of their antecedents, meanings or consequences. The best analogy is

perhaps with behaviors exhibiting different degrees of aggression. Being verbally abusive represents a milder form of aggression than a physical act of attacking another person. No one should equate the two in terms of antecedents, consequences, or meanings. Yet the occurrence of the milder verbal form of aggression often serves as a cue that a stronger physical form of aggressive behavior is likely to occur. If it is determined empirically that the same variables that predict verbal aggression are unrelated to behavioral aggression, this does not seriously question the similarity of the two constructs since we are far from having a deterministic model that specifies a complete set of antecedents of both constructs. What *would* be damaging would be if the occurrence of one was unrelated to the other.

The precise relationship between the two measures will depend on the costs of the two behaviors to an individual. If an organization imposes costs in the form of reduced wages, then absenteeism will have a somewhat different meaning than in a situation where employees are on a salary and incidental absenteeism is ignored. Similarly, the costs of turnover are imposed by local job markets, family responsibilities, and individual factors relating to ease and probability of obtaining another job at a comparable wage rate. Turnover among workers who can obtain a comparable job with little cost represents much different decisions than those made by older, unskilled workers with heavy financial obligations to their families.

The assumption that absenteeism and turnover represent different forms of withdrawal behavior has received some mixed empirical support in the literature. Behrend and Pocock (1976) found among a sample of manual workers that individuals who subsequently leave a job have a higher level of absences (both total amount and spells) than those who remained on the job at the end of the comparison period. They also determined that the rank order correlations between absence spells for two consecutive three year periods was +.56. Not only was absenteeism related to subsequent turnover, it is also related to

subsequent absenteeism. Absenteeism in this group of workers seems to be a relatively stable form of withdrawing from work.

Waters and Roach (1971) found that a measure of satisfaction with the work done assessed by the work scale from the Job Descriptive Index (Smith, Kendall, and Hulin; 1969) predicted both turnover (.24) and absenteeism (-.28). Overall satisfaction was similarly related to both behaviors while turnover and absenteeism frequency had a correlation of .32. In this study negative attitudes or low levels of satisfaction were related to turnover and high frequency absenteeism; high frequency of absenteeism was related to subsequent turnover. Waters and Roach (1973) replicated this study with two additional samples of female clerical workers in the same and in a different insurance office. They determined that satisfaction with actual work done, assessed by two different procedures, and overall satisfaction were related to both temporary withdrawal (absenteeism) and permanent withdrawal (quitting) from this particular work situation. Two years elapsed between questionnaire administration and termination of the study.

Burke and Wilcox (1972) found subsequent quitting was not significantly related to total absences but it was related to incidental absences, defined as any absence period lasting less than 7 days. This relationship was regarded by the investigators as a form of psychological withdrawal culminating in permanent job withdrawal by termination. Lyons (1972) concluded following a literature review that although there were only a few common predictors of absenteeism and turnover, the two variable behaviors were related to each other and there was a progression of behavioral withdrawal from absence to termination. The few common predictors seem to be job attitudes (job satisfaction).

Attitudes Predict Behavior

Another assumption which seems reasonable in this area of research is that attitudes are related to subsequent behaviors under specified conditions. These

specified circumstances are that the attitudes assessed should be the most salient of the large number of attitudes which could be assessed and that validated measures of attitudes be used. It makes little sense to inquire, using a one item scale, about the satisfaction individuals have with the color of the walls of their work place and use this attitude to predict any behavior (with the possible trivial exceptions of wearing dark glasses or blinders at work.) This particular attitude does not seem important or salient to much of anything.

A second important condition is that the behavior be under the control of the individual rather than under control of other members of the work group, technology, or external environmental conditions.

The several decades of research attempting to establish a link between satisfaction and productivity illustrates in part the failure to consider the relevance of the second circumstance. The large number of studies using unvalidated measures of satisfaction attempting to predict behaviors, generally with marginal success at best, illustrates a failure to consider the salience and psychometric properties of measures of job attitudes used as predictors. In spite of their popularity, it is not true, in general, that any home grown set of Likert scales will yield *valid* measures of multiple dimensions of affect toward one's job.

A recent study by Getmen, Goldberg, and Herman (1976) illustrated the benefits of the joint occurrence of a consideration of both circumstances. These investigators found that company and union attitudes which existed prior to the start of the 30 day campaign period could be used to predict the union or non-union vote for approximately 81% of the workers studied in 33 different NLRB sanctioned union representation elections. The cross-validated multiple correlation was .67. Of perhaps even greater significance than the overall findings are the relationships between the measures of individual's satisfaction

with different characteristics of their jobs and voting behavior. Satisfaction with pay, security, and treatment of individual workers, things which could be changed by the presence of a union, were more strongly related to voting behavior than was satisfaction with the type of work, a characteristic which could not be changed by the presence of a union as a third party negotiator. The decision to vote one way or the other was completely under the control of the individual worker in these NLRB conducted elections.

Another example is a study by Smith (1977) in which attendance at work on a day of a severe and unexpected snow storm in Chicago was related most strongly to satisfaction with supervision although significantly related to satisfaction with other characteristics of the job. In this situation, non-attendance at work carried no penalties either in the form of reduced wages or sanctions since the severity of the storm precluded any rational sanctions since the employees were all managerial personnel. Further, the particular aspect most closely related to work attendance, satisfaction with one's supervisor, seems (admittedly in retrospect) to be the characteristic most likely to generate feelings of loyalty to attend even under hardship conditions. The investigators in both of these examples used measures that had been carefully constructed with known measurement properties.

It needs emphasis that these results do not imply a relationship between satisfaction and absenteeism on any randomly selected day since the base rate and, hence, the variance in absenteeism would very likely be too low for a meaningful relationship to be observed. However, if absenteeism were accumulated over a significant period of time to increase variance or if the observation of absenteeism were restricted to a particular day during which attendance at work required special effort (to increase the base rate and allow individual predisposition to be reflected) the relationship would be expected to be observed.

Economic Factors and Job Withdrawal

The available empirical evidence indicates consistent relationships between indicators of economic activity or business cycle and voluntary turnover. This finding has been documented in the United States as well as in the United Kingdom. The form of the relationship is that changes in the business cycle reflecting expanding opportunities and employment are related to increases in voluntary turnover. Changes in the business or economic cycle reflecting decreased activity and employment predict decreases in voluntary turnover. In one of the earlier studies based on Bureau of Labor Statistics data, Brissenden and Frankel (1922) examined the influence of the prevailing business and industrial situation during the period from 1910 to 1918. They found high mobility rates (turnover) during 1913 and 1917-18 when the economy was active. Lower mobility rates were observed during 1914-15 when the economy was inactive. Woytinsky (1942) extended this earlier study to cover the period from 1910 to 1940. Voluntary turnover throughout this period was strongly related to economic conditions. Particularly dramatic was the extreme reduction of turnover in 1928 and 1929 as economic conditions approached near collapse. Reynolds (1951) further extended the period analyzed from 1945 to 1949. Voluntary quit rates in 39 companies declined steadily from 5.3% in 1946 to 2.0% in 1949. During this same period, the economy steadily contracted while the cost of living increased from an index of 100 in 1945 to 130 in 1949. Thus, the interpretation of business activity cycles and turnover in this study is confounded by an increase in the cost of living accompanying a business contraction. Palmer (1954), in an inquiry into the underlying process, has presented evidence from a sample of 4000 individuals in each of 6 major cities that suggests when employment is at a high level, voluntary job changes outnumber involuntary changes. Moreover, such changes reflect an improvement in economic positions and in the knowledge and skills of workers.

Armknacht and Early (1972) following a detailed analysis of business and

turnover cycles have noted that quit rates in manufacturing is one of the better indicators of business cycles. It has been a smooth well behaved series that has consistently led the business cycle by 15 months at its peak and nearly coincided with it (lag of one month) at the trough. No overall trend in quit rate was found. Moore (1975) on the other hand, has noted an increasing trend in overall quit rate from 1960 to 1973 after removing irregularities due to strikes and sampling errors and correcting for seasonal variations. Moore also noted that a sharp decrease in quit rate accompanied every recession or depression from 1952 to 1973.

Armknacht and Early expanded their predictive model to include changes in the new hire rate in the same and preceding quarter to index availability of alternatives and bank savings rate to reference "expectations about the condition of the labor markets." This model accounted for 78% of the variance in quit rate. Armknacht and Early concluded that quit rates seem to be largely caused by changes in economic factors as well as expectations about future changes. Among industries, level of earnings (probably reflecting skill and training levels and thus availability of alternative employment) and net hire rate were most important in predicting quit rate. This suggests that situations in the particular industry and plant employing a worker are important in addition to the overall business cycle. The results of Armknacht and Early also suggest an increase in the importance of earnings (inferred by an increase in the size of the B-weight) during the 1959 to 1971 period.

Gilroy and McIntire (1974) studied relative numbers of job losers, job leavers, and job entrants as a function of industrial production indices. While there were increases in the number of unemployed in all groups corresponding to decreases in economic activity, the smallest increases were found in unemployment among job leavers. This was interpreted as consistent with workers' reluctance to leave their jobs when the economy is weakening.

Thomas (1953) and Behrend (1953) have both presented evidence extending these relationships to labor mobility in Great Britain. Behrend reported significant reductions occurred in 25 of 30 factories for males and in 15 of 18 factories for females corresponding to a worsening of the economy during a two-year period (1951-1952). Moreover, regional differences in turnover were significantly related to regional differences in economic conditions. This latter finding is important since cross-sectional analyses as well as longitudinal analyses confirm the importance of economic factors. The authors conclude that "The data presented here thus suggest that labor turnover as well as absenteeism are primarily determined by economic forces, namely, the level of unemployment."(p.79)

These economic activity and behavioral relationships can perhaps best be summarized by noting Eagly's (1965) article. This article reported the correlation between voluntary turnover rates in the United States and economic conditions indexed by means of unemployment rates in the United States for the years 1931 to 1962. A correlation of $-.84$ explaining approximately 70% of the between year variance in turnover rates was obtained. Pre- and post-war analysis indicated that the correlations from these two periods are equivalent.

The similarity of the business cycle/turnover relationship and the business cycle/strike activity relationship cannot be overlooked in this discussion. While perturbations have been introduced into the business cycle/strike relationship by the entry of the United States into wars, the passage of the Taft-Hartley bill, and our exit from wars, the relationship seems stable and general. Strike activity leads at peaks of the business cycle by approximately five months and lags at troughs by six months (Rees, 1952). If strike activity and job withdrawal are seen as attempts to change unpleasant situations, or reduce the psychological costs of being in such situations, then concepts relating the attractiveness of an alternative situation to the psychological "closeness" of

the desired alternative are relevant. Just as prisoners attempt to escape near the end of their terms and oppressed classes riot and revolt only after their conditions have been improving and they are approaching the status of their oppressors, then workers may introduce change--either by striking or withdrawal--only when the business cycle may be improving their situation significantly. This is not the only explanation for the relationships discussed since improving economic conditions also signal increased alternatives for individual workers as well as increased vulnerability of companies to strike tactics of unions. This point will be returned to following the discussion of the relationships between job attitudes and job withdrawal. The relevance of unions and strikes for non-civilian organizations may not be obvious but it does not strain credibility to argue they are indeed relevant for consideration.

Organizational/Environmental Factors and Job Withdrawal

The most striking characteristic of empirical literature relating organizational/environmental factors to job withdrawal is its scarcity. A related factor is the somewhat myopic view of the world reflected by a lack of diversity of environmental and organizational factors considered as predictors of job withdrawal. We will also note as a *caveat* to the readers at this point that no examples of studies were found in which effects on job withdrawal due to employee characteristics were removed before examining the effects of more molar organizational/environmental factors on job withdrawal. To the extent that employee characteristics covary with more molar characteristics, unequivocal interpretations of trends and effects are impossible. Realizing we may be on thin ice, we will skate fast and discuss only briefly the few studies in this area.

Katzell, Barrett and Parker (1961) presented an analysis of data from 72 comparable but geographically decentralized warehousing divisions. These data were subsequently reanalyzed by Cureton and Katzell (1962). Five variables reflecting unit performance including quantity and quality of performance,

profitability, and turnover were included. Five additional variables summarizing unit and environmental characteristics (unit size, community size, wage rate, unionization, and proportion of male workers) were also assessed. The results revealed the presence of two oblique factors (cosine of reference vectors = $-.44$) that could explain the interrelationships among these 10 variables. The first factor was associated negatively with division and community size and positively with productivity and profitability. The second was associated inversely with wage rate, unionization, and proportion of male employees and positively with turnover. The oblique angle between the two factors suggests that turnover, while most strongly related to the variables indicated, is also a function of division and community size. Divisions whose situational characteristics are in the direction of the small town culture pattern typically have lower rates of turnover.

Kerr, Koppelmair, and Sullivan (1951) reported data from 892 workers aggregated to the departmental level (29 departments). These data suggest that departments with a high degree of turnover were characterized by having many employees, low unexcused rates of absenteeism, incentive work structure, and little opportunity for conversation among workers. However, there are a number of problems with these data that suggest the analyses are internally inconsistent. The reported negative relationship between absenteeism and turnover is not damaging to the hypothesis that these two variables are manifestations of the same underlying process of the analyses are incorrect.

Baumgartel and Sobel (1959) related absenteeism and a number of organizational factors including number of employees assigned to the organizational unit, job classification, and average seniority within the job classification. They found within a sample of 3900 nonsupervisory airline employees that size of the work location (number of employees assigned to the location), and job classification were the two most important factors in absenteeism. These

effects of job classification were supported even after dividing workers into male, female, white collar and blue collar groupings. Unfortunately, the size of the work location very likely covaries with the number of other molar environmental factors including population of the area, degree of urbanization, cultural heterogeneity, and race and religion of the population. Job classification is confounded with characteristics of the workers placed in the different classifications. Thus, interpretation of these findings as supporting the influence of environmental and organizational influences on absenteeism is tenuous.

Evan (1963) examined the effects of being an isolate or member of a dyad as opposed to having at least two peers assigned to the same work location on turnover of science and engineering trainees. Trainees with two or more peers had a turnover rate of 10% while those with no peers or only one peer had turnover rates of approximately 50%. Controlling for departmental membership and scholastic achievement had no effects on the trends.

Talacchi (1960) hypothesized that organizational size influenced attitudes and behavior through the process of division of labor and status differentiation. The causal sequence was hypothesized to be size leading to dissatisfaction leading to job withdrawal. Satisfaction levels in 93 organizations could be predicted by company size, city size, and economic activity. The size of the organization was the primary contributor to the observed R^2 of .67 with a partial correlation between company size and satisfaction of -.75. However, satisfaction levels within departments were unrelated to departmental turnover levels. The explanation for this unexpected finding was that no correlation was observed because where individuals perceive alternative employment readily available they are less likely to express dissatisfaction. Unfortunately, the explanation offered is opposite

to the empirically established relationship. On an individual level of analyses, satisfaction and absenteeism were inversely related as expected. The possibility of size being confounded with a number of other variables clouds interpretation of these results. In a study controlling job classification and city size, Hulin (1966) found no relationship between work group size and satisfaction among a sample of 1000 offices.

Goodman and Salipante (1976) and Salipante and Goodman (1976) have presented evidence on the effects of counseling and training on the hard core unemployed. Job skills training was positively related to retention while attitudinal training was negatively related to retention across a sample of 130 training programs in 114 firms. There were also interactions present in the data. When there was no counseling, longer training programs led to less retention. When counseling was used, there was no relationship between length of training period and retention. Participation in Job-skills training was seen as more likely to provide the trainees with cues that a job is available after training. Similarly, success in job-skills training strengthens the belief that the individual can perform the required job. Attitudinal training through role playing would not provide experiences that would permit the trainees to infer anything about the existence of a job nor their ability to perform successfully on the job. Longer training programs were assumed to generate negative feelings generalized from probable negative experience in schools. Goodman and Salipante (1976) also determined that the level of pay and structure of pay raises positively affected retention of the hard core unemployed trainee. Early raises were assumed to influence decisions to stay because they affected the trainees' feelings of distrust, beliefs that coming to work led to rewards, and increased the attractiveness of coming to work.

Ley (1966) and Argyle, Gardner, and Cioffi (1958) have presented evidence that authoritarianism of supervisors is related to absenteeism and turnover. Ley found that authoritarian ratings by superiors of 18 plant foremen accounted for approximately 50% of the variance in turnover rates among the work sections. Argyle, Gardner, and Cioffi found absenteeism was less under democratic foremen but turnover was not related to aspects of supervision. Since economic conditions and costs of job withdrawal in the two studies are unreported, interpretations of the discrepancy in these findings is difficult.

Individual Factors and Job Withdrawal

Job Attitudes

The literature reviewed previously by Porter and Steers (1973) seems consistent and reasonably well integrated. Job attitudes, usually in the form of job satisfaction or organizational commitment, are related to subsequent withdrawal behaviors by individuals. Literature which has appeared since the publication of their review has not significantly changed the overall interpretation. Rather, recent studies have attempted to specify the general conditions under which one could expect the relationships between attitudes and behavior to be significant. Herman (1973), Getman, Goldberg, and Herman (1976) and Smith (1977) have discussed the part played by situational constraints on behaviors in determining observed attitude-behavior relationships. Briefly, Herman (1973) has presented an argument based on freedom of individual choice as a determiner of attitude-behavior relationships. In situations where individuals are free to behave as they wish, attitudes indeed predict behavior. Smith (1977) tested this hypothesis using work attendance on a particular day as his dependent variable. We cannot expect attitudes to be related to withdrawal behaviors universally. Under appropriate conditions however, the relationships should be observed.

Background Factors

Information contained in completed standard biographical information blanks or application blanks seems to have been one of the more popular topics studied in attempts to predict job withdrawal. The results have generally been significant although cross-validation attempts are rare and the results frequently appear to be strongly situationally bound and may lack any generalizability.

The trends which emerge from this research can be briefly summarized. The composite picture of the ideal long tenure employee for many organizations could probably be described as married with children, older rather than younger, not college educated, infrequent job changes in the past, frequent participation in activities related to work activities on present job, referred to the company by a present employee of the company and living close to the place of work. It must be stressed that most of these data were obtained from samples of clerical workers and are not terribly exciting psychologically. For representative studies see Buel (1964), Robinson (1972), Kirchner (1957), Kriedt and Gadel (1953), Minor (1958), and Mosel and Wade (1951). Schwab and Oliver (1974) have presented some arguments suggesting the usefulness of biographical information blanks may be overestimated in the literature.

Personality Factors

Hodberg and Baxter (1957), Robbins and King (1961), and Sinaiko (1954) have all presented generally discouraging evidence relating personality factors to job withdrawal. Hines (1973) in a study conducted in New Zealand did find positive correlations between need for achievement and labor mobility. The general results from this particular area of research reveal minimal levels of association between most personality factors and job withdrawal behavior.

Implications and Conclusions

The literature surveyed in this area seems consistent in at least two specific research areas. Relationships between indicators of economic activity or business cycles are consistently related to job withdrawal, and strike activity. When economic activity is high, turnover and strike activity is high. Both job withdrawal and strikes appear to lead the business cycle at the peak and either coincide or lag slightly at the trough. Economic indicators, aggregated by year account for 70% of the variance of voluntary turnover, also aggregated by year, in the United States (1931-1962). We have also observed consistencies between measures of job attitudes and job withdrawal behavior. Workers and managers who are satisfied are less likely to leave their jobs, to be absent, or to attempt to introduce change in the work situation by voting for union representation.

The large amount of variance in job withdrawal apparently controlled by economic factors comes as bitter medicine to one who is identified with the individual differences branch of psychology. With the expected unreliability of any behavior, explaining 70 percent of the variance in aggregated turnover by aggregated economic measures might be assumed to explain all of the non-error variance. However, this cannot be the entire picture since within any fixed time period, and thus fixed economic conditions, we can note inter-industry differences in job withdrawal, organizational differences within industry and time, and individual differences within organizations, industries, and short time periods. Individual differences in attitudes predict approximately 15 percent of the differences in job withdrawal holding several relevant individual characteristics (sex, age, marital status, cultural background) as well as organizational factors constant (Hulin, 1966). The 70 percent variance in aggregated turnover data

explained by economic conditions very likely is redundant to a certain extent with the variance explained by job attitudes and organizational factors.

The literature relating organizational characteristics to labor turnover is much more mixed in its results and the range of variables explored is more limited. In addition, the very strong possibility of confounding among macro and micro-level variables must be dealt with. The most consistent organizational variable related to labor turnover is organization, sub-unit, or work group size. It is likely that work group size is confounded with type of work. Organizational sub-unit size may be confounded with city size and other variables. Organizational size may be confounded with industry differences. In short, unequivocal interpretation of size-turnover relationships are not possible given the literature surveyed.

Finally, there appears to be a relationship between biographical background factors and job withdrawal. The biographical data seem to be tapping which might be labeled as a "hobo factor" or the tendency to be restless and change jobs frequently--past and present stability predicts future stability and past job changes predict future job changes. The presence of the hobo factor may also be inferred by noting that even in 1932, voluntary turnover was not zero in the civilian work force.

March and Simon (1958) have proposed a model which attempts to reflect contributions of both local labor market factors and individual factors. Turnover is seen as a function of ease of leaving, determined by economic factors such as availability of jobs and individual factors relating to employability, and desirability of leaving, determined by the attractiveness of the current job assessed by a measure of job satisfaction. Economic conditions are seen as

influencing turnover through availability of other jobs while individual factors influence turnover both through availability of other jobs and through job satisfaction. Unfortunately, while this model seems relatively straightforward, we have evidence indicating that local economic conditions have a direct effect on employees' job satisfaction (Kendall, 1963; Hulin, 1966) as well as an inferred effect on their perceptions of the ease of leaving their current job. Individual factors of age, sex, race, education level, job level, and tenure also covary directly with satisfaction (Hulin and Smith, 1964; 1965) as well as influencing perceived ease of leaving the present job. Thus, the two explanatory factors used by March and Simon share many of the same antecedents. Disentangling the independent contributions to turnover is difficult. To date we have seen no successful empirical support for the model.

Any attempt at synthesis in this area should take into consideration three factors: The effect of the economy on job withdrawal, the relationship between job satisfaction and job withdrawal, a "hobo factor" which is probably present in different amounts in all of us. Organizational factors are assumed to effect job withdrawal through their effects on job satisfaction. The economic factor is perhaps the most complex. We do not have the data to determine if the economy influences job withdrawal directly by providing more and better jobs for individuals to choose from. The perception of an abundance of other jobs may result in workers attempting to upgrade their economic or job status. Alternatively the economic conditions may influence job withdrawal indirectly by influencing job satisfaction. We also have evidence of the influence of job satisfaction on job withdrawal independent of the influence of economic conditions. The large number of studies summarized by Porter and Steers (1973) that were conducted in one location and over a short period of time provides

this latter evidence since fixing location and time also holds economic conditions constant. The indirect explanation of the effects of the economy on job withdrawal would argue that external events (economic conditions) are perceived and responded to by workers. These external events that become translated into different affective responses appear to influence job withdrawal but the direct or proximal causes are individual differences in job attitudes.

A third explanation is that economic factors act to enhance or moderate the relationship between job satisfaction and job withdrawal as well as having a direct effect. This explanation would suggest that during times of recession the relationship between job satisfaction and job withdrawal will be low but still significant and negative. During times of economic expansion the relationship will be much stronger since it is easier for individuals to translate small differences in satisfaction into behaviors. However, during times of economic expansion the level of job withdrawal would be higher (and satisfaction will be lower) as well as the relationship between job withdrawal and job satisfaction being stronger. These three variations of the complex relationship of the causal factors can be combined into one model. The probably relationships are as shown in Figure 1.

Insert Figure 1 About Here

The "hobo factor" is taken into consideration by hypothesizing that even during times of severe depression, the rate of job withdrawal does not drop to zero and job satisfaction is still negatively related to job withdrawal. The tendency to migrate from job to job or from city to city would act to place a floor under the voluntary job withdrawal rate.

The negative slope from back to front is intended to be steeper than the negative slope from left to right. The slope at the back of the figure during times of high economic activity is intended to be steeper than the slope at the front of the figure to allow for a moderating effect of the economy on relationships between attitudes and turnover. The negative relationship between economic conditions and job attitudes is not shown.

Some portions of this explanatory model are resting on firm empirical bases. As noted earlier, job satisfaction has consistently been shown to be related to job withdrawal independent of economic influences. Economic factors have been shown to be related to job withdrawal but whether these are direct effects or are mediated through the effects of economic factors on job satisfaction is unknown. The presence of the hobo factor is based on an extrapolation of the findings from analyses of biographical information blanks and noting non-zero valuation in 1931 and 1932. It must be stressed that the *entire* model has not been tested empirically. Note also that the model cannot be tested by collapsing across individuals and examining turnover rates in different industries, locations, or time periods. This would not allow for the examination of both the direct and mediated effects of economic factors on job withdrawal. It must be tested either across time or locations or industries by nesting individuals within different economic conditions and analyzing the effects of both environmental and individual influences on behaviors as well as examining effects of environmental characteristics on affective responses made by individuals.

Footnotes

1. The author would like to thank Lori Weiss, Ralph Katergerg, and Peter Hom for their assistance during the literature search phase of preparing this paper. They also read and commented on an earlier draft of this manuscript. Their assistance materially improved the final product. This work was supported under provisions of an Office of Naval Research Contract N000 14-75-C-0904, NR170-802 with the University of Illinois, Charles L. Hulin, principal investigator.
2. For the purposes of discussion I am willing to argue that turnover or attrition in a civilian workforce and among members of a military organization are end results of the same process--gradual job withdrawal. Further, differences between an all volunteer military organization and a civilian workforce may be more apparent than real when the necessary empirical data relating to organizationally important processes are available for examination.

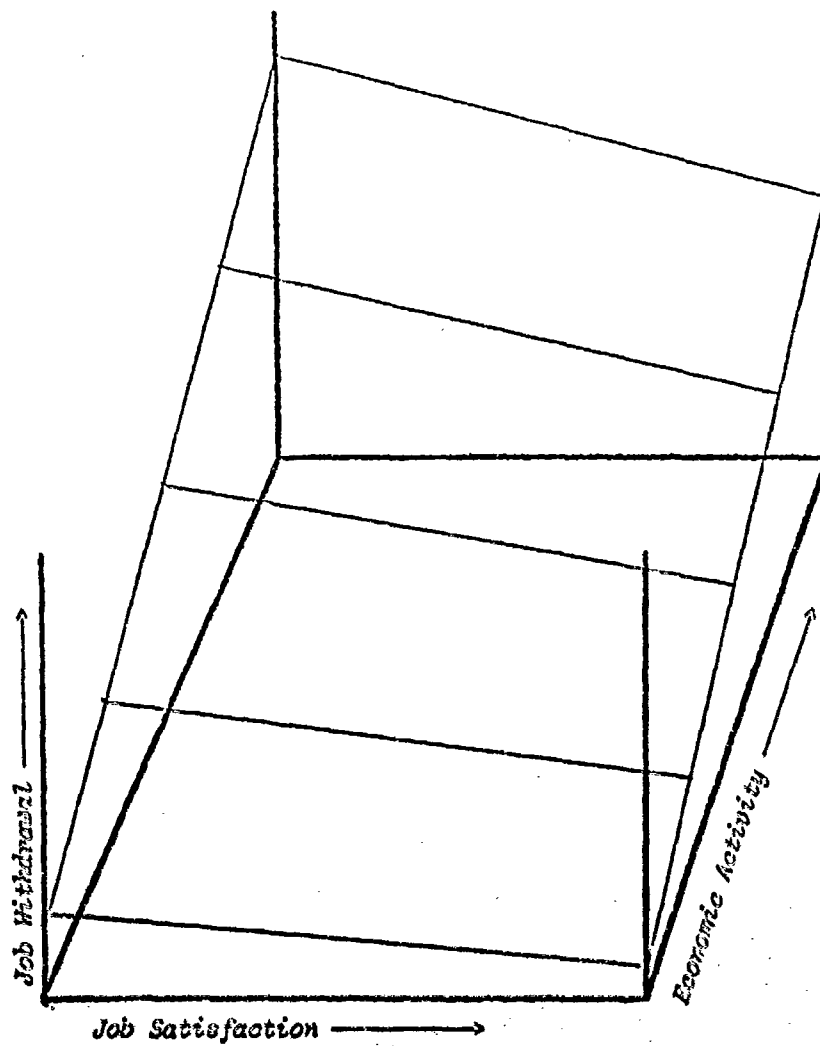


Figure 1. Hypothesized relationships among job satisfaction, job withdrawal, and economic activity.

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A LONGITUDINAL STUDY OF ENLISTED PERSONNEL ATTRITION IN THE
U.S. MARINE CORPS: PRELIMINARY RECRUIT TRAINING RESULTS

William H. Mobley, Herbert H. Hand, and John E. Logan
University of South Carolina

MANAGEMENT SUMMARY

This paper summarizes the preliminary results of an analysis of individual and organizational correlates of Marine Corps recruit training attrition. The primary analyses were based on 1,960 August 1976 Parris Island accessions.

What do new recruits (prior to recruit training) find desirable/undersirable in a work role? The six highest ranking items were: learn new skills that will help me later in life; insurance and medical benefits; a job which gives me pride in myself; job that pays well; good financial benefits; working for an organization that fulfills its promises. The lowest (most undersirable) characteristics were: job that interferes with marriage-family plans; long separations from home and family; co-workers who use drugs; job with little responsibility.

In order to enhance the attraction of the Marine work role, manpower managers should, to the extent feasible, seek to maximize the attainment of desirable characteristics and minimize undersirable characteristics.

What are new recruits' expectations regarding completing obligated service? Some 83% of the new recruits believed they had better than a 50-50 chance of completing their first term enlistment, the other 17% were less sure. (As will be noted later, this variable, perceived chances of completing, is one of the better

predictors of intention to complete and of actual attrition.) Only 42% of the new recruits saw a greater than 50-50 chance of finding an acceptable civilian job now. It is well to note that as the economy improves, the expectancy of finding an acceptable civilian job will probably increase.

Since these expectancies have been shown to be related to behavioral intentions and withdrawal behavior, they should receive the attention of manpower managers. Military manpower managers cannot influence expectations regarding finding an acceptable civilian job. However, strategies for enhancing expectancies of completing the first term enlistment should be explored. One possibility, to be explored later, would be the experimental evaluation of a one or two day "orientation-pre-socialization" program prior to the start of recruit training.

What are new recruit behavioral intentions regarding completing obligated service and reenlistment? Some 80% of the recruits said they intended to complete their obligation. The remaining 20% (a figure which closely parallels historical recruit training attrition rates) said they were uncertain or did not intend to complete. 28% of the new recruits say they plan to reenlist.

Given the increasing body of evidence indicating that behavioral intentions are among the better predictors of subsequent behavior, manpower managers and planners should be aware of these intentions and the variables associated with these intentions.

What variables are associated with new recruit intentions to complete their obligated service? Among the variables associated with intention to complete were: perceived chances (expectancy) of completing ($r = .43$); expectancy of finding an acceptable civilian job ($r = -.17$); sum of the chances of attaining 50 work role outcomes by being a Marine ($r = .32$); education ($r = .08$); AFQT Mental ($r = .13$); internal motivation ($r = .28$); expected leader structure ($r = .21$).

What variables are associated with actual recruit training attrition? At the time analyses for this paper were conducted, 11% of the sample had become recruit training attrites. Among the variables associated with recruit training attrition were: education ($r = -.17$); AFQT Mental ($r = -.05$); expectancy of completing obligated service ($r = -.19$); Marine role attraction ($r = -.11$); internal motivation ($r = -.09$).

What are the self-reported reasons for recruit training attrition? The reasons which had the highest average rating were: I missed my family/friends back home; lack of personal freedom; too much pressure on me; health reasons; rules and regulations too rigid; superiors treated me unfairly. Comparison of self-reported reasons and administratively recorded reasons for attrition is not yet completed.

What variables are associated with recruit training graduates' intentions to complete their obligated service? Of those who

graduated from recruit training, 87% said they now intend to complete, 31% said they intend to reenlist. Among the post-recruit training variables associated with intention to complete were: AFQT Mental ($r = .10$); expectancy of completing ($r = .25$); leader structure ($r = .19$); overall satisfaction ($r = .24$); pay satisfaction ($r = .20$); leader satisfaction ($r = .19$); internal motivation ($r = .18$); Marine role attraction ($r = .21$).

Summary:

How do graduates and attrites differ on the pre-recruit training measures? It is evident that pre-recruit training differences do exist between subsequent graduates and attrites. New recruits who subsequently graduate have, on the way into recruit training: higher expectations of completing; higher intentions of completing; are more attracted to the Marine role; are moderately higher on the AFQT and mean education; expect more leader structure; and have higher internal motivation.

How do eventual graduates change from the pre to the post measure? Eventual graduates are more satisfied than they expected to be; increase their expectancies of completing and their intentions to complete; described leaders as being slightly more considerate and less structured than expected; and perceived slightly less skill variety, task significance, and dealing with others than expected. How these and the other variables change as a function of further time

and experience in the Marines and how the variables relate to subsequent attrition will be dealt with in the continuation of this longitudinal research.

Possible Management Implications.

Because the results are still preliminary, caution must be exercised in drawing generalizations and implications. However, implications that may follow from the completed, cross-validated, and replicated analyses include the following.

1. Recruiting. Provide recruiters with profiles and or expectancy charts of the job outcome desirability rating and outcome and organizational expectancy ratings that characterize "successful" vs. unsuccessful recruits. Armed with this sort of information, recruiters could help clarify expectations for potential recruits. (Given the pressure on recruiters to meet quotas, this "expectancy clarification" process might best be handled by a parallel "counseling" function.)

2. Advertising. Provide advertising agencies with role outcome desirability and expectancy data characterizing successful recruits to supplement the agency's own market research data.

3. Initial Recruit Depot Orientation. Evaluate the cost-effectiveness of a one or two day low stress orientation at the very beginning of recruit training. Included in the orientation would be presentation of materials designed to clarify expectations as

well as enhance perceived chances (expectancy) of completing. A detailed proposal for such an experiment is being prepared.

4. Review recruit training policies, practices, and procedures in terms of perceived role outcome contingencies that differentiate graduate and attrites and/or that characterize attrites. If, for example, perceived pressure and stress is a major contributor to attrition, could such pressure and stress be scheduled and managed in such a way as to facilitate military and learning objectives yet minimize undue attrition.

5. Leadership, group, and job content implications await further analyses and data collection on the longitudinal sample.

A Longitudinal Study of Enlisted
Personnel Attrition in the U.S. Marine Corps:
Preliminary Recruit Training Results

Introduction

The results reported in this paper are based on the first phase of a study of pre-EAOS attrition among first term male enlisted personnel in the U.S. Marine Corps. The study possesses the following characteristics:

1. Seeks to identify individual and organizational variables associated with pre-EAOS attrition;
2. Longitudinal design;
3. Multivariate analysis;
4. Seeks to evaluate and synthesize "process" models of the organizational choice process, the withdrawal decision process, and the socialization process;
5. Seeks to identify manpower management and further research implications of results.

Preliminary results from the recruit training phase of the study are presented in this paper. The results are termed preliminary because a number of individuals in the longitudinal sample have yet to become attrites or to graduate from recruit training and complete demographic and criteria data from the master file are not yet available.

The objective of this paper is to briefly summarize the available recruit training results in a manner most useable by a management audience. Detailed theoretical, methodological, and statistical materials are presented in a separate technical report to be distributed next month.

METHOD

Basic Design

The basic longitudinal design is summarized in Figure 1. Survey measures were administered at the beginning of basic recruit training, again at the end of recruit training, near the end of advanced training, on subsequent duty station, or at the time of attrition.

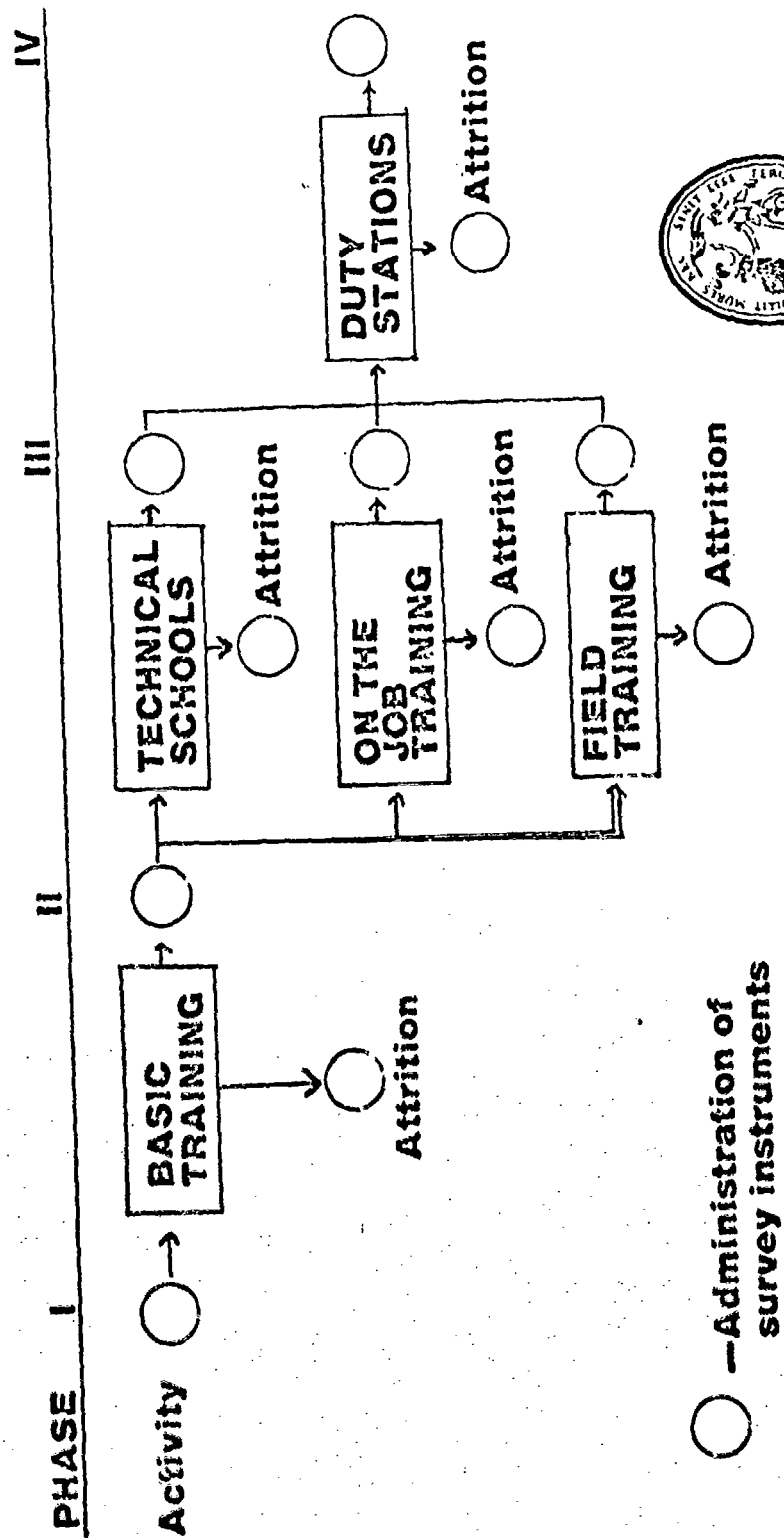
The portion of the longitudinal study reported here deals with the pre and post-recruit training measures and attrition during recruit training.

Sample

The longitudinal (tracking) sample is composed of Parris Island male first-term enlisted accessions. The pre-recruit training measure was administered to new recruits from August 7 to August 28, 1976. The post-recruit training measure was administered during graduation week to those in the tracking sample who completed recruit training. The post-recruit training data were collected from mid October to the end of November, 1976. The recruit training attrite measure was administered from August 7 to December, 1976.

Although the basic design is longitudinal, the survey measures have been administered to individuals who were not in the tracking sample. For example: the attrite measure was given to all Parris Island attrites from early August to the beginning of December; the post recruit training measure was given to all recruit training graduates completing at the

FIGURE 1
BASIC LONGITUDINAL DESIGN



same time as individuals in the tracking sample; the measure being given in the formal schools is being completed by all individuals in a school where one or more of the tracking sample is enrolled. Inclusion of individuals not in the tracking sample offered a cost-effective procedure for substantially raising sample sizes at each phase of the research and will facilitate subsequent comparative analysis.

A distinction is made between tracking sample and total sample in subsequent analyses and results. The tracking sample refers to the August 1976 accessions being tracked longitudinally. The total sample refers to all individuals measured at a given phase, whether or not they are in the tracking sample.

Sample sizes relevant to the recruit training phase of the study are:

Pre-recruit training tracking sample, N = 1960

Post-recruit training tracking sample, N = 1476

Post-recruit training total sample, N = 1764

Recruit training attrites, tracking sample, N = 219 (incomplete)

Recruit training attrites, total sample, N = 926

Measures

The measures being used in this study are summarized in Figure 2. The individual level variables of age, mental, education, race, marital status, and number of dependents are being collected from the RAMS computer file.



FIGURE 2

MEASURES

INDIVIDUAL

- AGE
- MENTAL GRADE
- EDUCATION
- RACE
- DEPENDENTS
- ROLE ATTRACTION—
MARINE
- ROLE ATTRACTION—
CIVILIAN

ORGANIZATIONAL

- LEADERSHIP (LBDQ)
- CONSIDERATION
- STRUCTURE
- GROUP (GDDQ)
- HOMOGENEITY
- PERMEABILITY
- STABILITY
- HEDONIC TONE
- PLUS 9 OTHER
DIMENSIONS
- JOB (JDS)
- SKILL VARIETY
- TASK SIGNIFICANCE
- FEEDBACK
- PLUS 7 OTHER
DIMENSIONS

CRITERIA

- INTENTIONS
- EAOS
- RE-ENLISTMENT
- PRE-EAOS ATTRITION
- ADMINISTRATIVE
REASONS
- SELF-REPORT
REASONS
- PERFORMANCE
- SELF-REPORT
- MASTER FILE
- Individual Recruit Training
Performance

The "role attraction" measures were collected via survey and include several components:

- (a) Enlisted personnel were presented a list of 50 role outcomes and asked to rate them on a +2 to -2 scale of desirability-undesirability. The role outcomes, generated from previous research and interviews, include such things as "learning career skills," "separation from family," "responsibility," etc. The term "outcome" refers to rewards, costs, and conditions possibly associated with a job or role.
- (b) Role outcome expectancies: Marine: for each of the 50 role outcomes, enlisted personnel were asked to rate, on a scale of 0 to 1.0, their chances of attaining that outcome by being a Marine.
- (c) Role outcome expectancies: Civilian: for each of the 50 role outcomes, enlisted personnel were asked to rate, on a scale of 0 to 1.0, their chances of attaining that outcome by being in a civilian job.
- (d) Role expectancy: Marine: enlisted personnel were asked to rate their chances of successfully completing their first term enlistment.
- (e) Role expectancy: Civilian: enlisted personnel were asked to rate their chances of finding an acceptable civilian job right now if that were their goal.

Based on these component ratings, several composite index variables are generated.

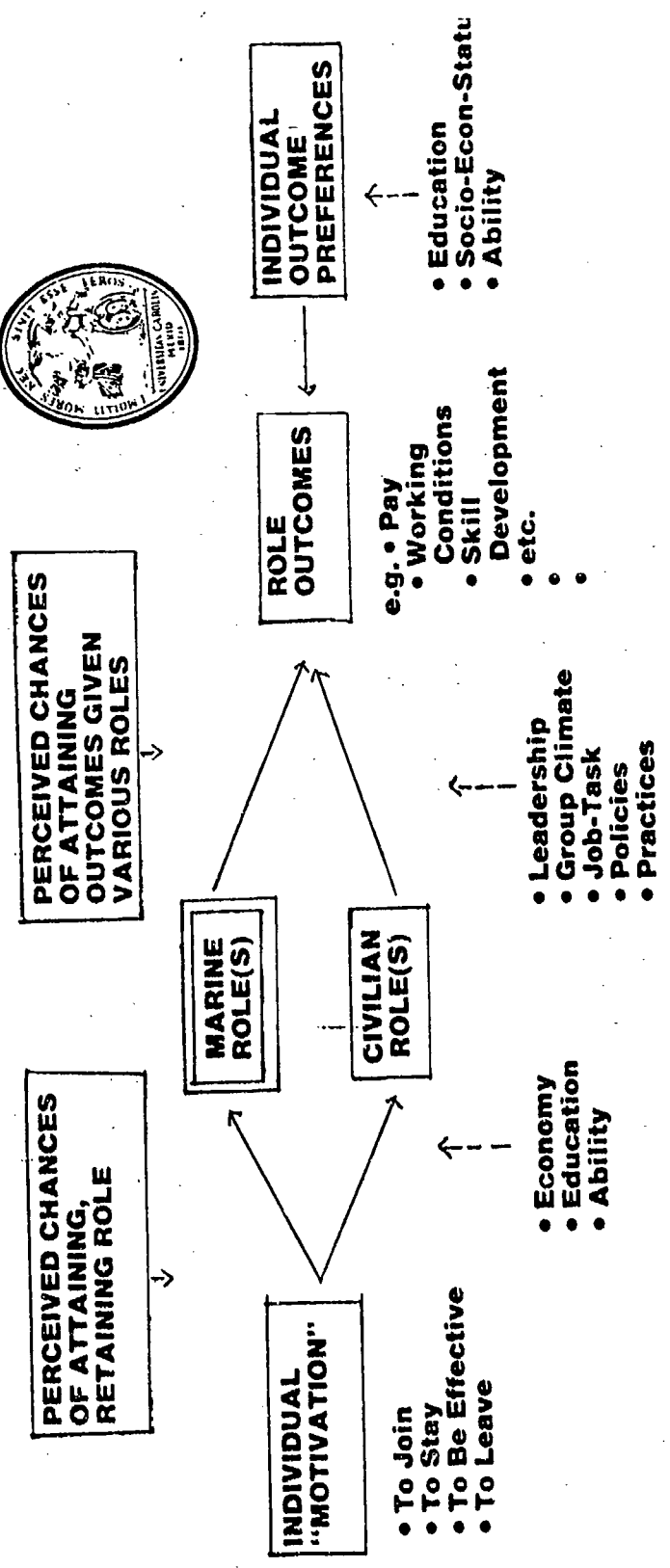
- (f) Role attraction Marine is the sum of the cross-products of the 50 role outcome and Marine role-outcome expectancy ratings.
- (g) Role attraction Civilian is the sum of the cross products of the 50 role outcome and civilian role-outcome expectancy ratings.
- (h) Role Force Marine is the Marine role attraction index weighted by expectancy of successfully completing the first term enlistment.
- (i) Role Force Civilian is the civilian role attraction index weighted by expectancy of finding an acceptable civilian job.

Figure 3 summarizes the generalized role attraction model.

The organizational level variables, as perceived by enlisted personnel, were assessed with standardized survey measures. The Leader Behavior Description Questionnaire (Stogdill and Coons, 1957) assesses perceived leader Consideration and Initiating Structure. The Group Dimension Description Questionnaire (Hemphill, 1956) assesses 13 dimensions of groups including such things as homogeneity, stability, and hedonic tone. The Job Diagnostic Survey (Hackman and Oldham, 1974) assesses various dimensions of job content, e.g. skill variety, task significance, feedback, etc. (This measure also includes job satisfaction scales and individual level measures of internal motivation and growth need.)

For the pre-recruit training administration of the survey measures, personnel were instructed to respond to the leadership, group, and job content measures in terms of what they expected. Subsequent administrations called for a descriptive rather than expected response set.

Criteria data collected via survey included behavioral intentions to complete first term enlistment, behavioral intentions to reenlist, performance goals, and in the case of attrites, self-report ratings on reasons for their attrition. Criteria data being collected from the HMC master file included administrative reasons for attrition and re-cycle information.



A GENERALIZED MODEL OF MARINE ROLE ATTRACTION

FIGURE 3

RESULTS

The preliminary results reported in this paper address the following questions.

1. a) What is the demographic description of the August, 1976, Parris Island recruit training longitudinal sample?
b) How does this sample differ on the demographic variables from the previous 12 month Marine Corps accessions?
2. a) What role outcomes do new recruits consider desirable/undersirable?
b) What role outcomes do new recruits expect to attain by being a Marine? By being in a civilian job?
3. a) What expectations do new recruits have regarding their ability to successfully complete their first term enlistment?
b) What are new recruits intentions regarding completing their first term enlistment and intentions regarding reenlistment?
4. What individual and expected organizational variables are related to new recruit intentions to complete their first term enlistment?
5. What pre-recruit training measures, individual and expected organizational, are related to actual recruit training attrition?
6. What are the self-reported reasons for recruit training attrition?
7. What individual and perceived organizational variables are related to post-recruit training intentions to complete first term enlistment?
8. What changes are evident in the pre and post-recruit training measures?

Reporting of the results will be organized around each of these questions.

Sample Composition

The pre-recruit training measures were administered to 1,960 new

recruits at Parris Island between August 7 and August 28, 1976. Table 1 provides a demographic description of the sample along with comparison to the previous 12 month Marine Corps male recruit accessions. Although some of the differences are statistically significant, (due to the large sample sizes), most of the mean values are quite similar. The Parris Island tracking sample is slightly better educated, has slightly higher verbal, arithmetic, mechanical, radio and shop mechanic scores. Overall, the tracking sample may be of slightly higher quality than the previous year's accessions, but the differences are not dramatic.

TABLE I
 DEMOGRAPHIC COMPARISONS BETWEEN PARRIS ISLAND TRACKING
 SAMPLE AND PREVIOUS YEAR MARINE CORPS ACCESSIONS

Variable	(a) Tracking sample Parris Island		(b) Marine Corps Accessions, Previous Year		(a vs b) t
	Mean	SD	Mean	SD	
Age	18.89	1.45	19.00	1.81	2.21*
Yrs. High School	3.62	0.72	3.30	0.98	-12.08**
Dependents	0.06	0.27	0.08	0.32	1.30
Mental (AFQT)	60.28	19.12	59.98	18.19	-0.61
ACB Scores					
Verbal	103.67	16.99	102.53	17.14	-2.43*
Arithmetic	98.02	17.89	96.60	17.71	-2.94**
Pattern	104.97	18.58	104.97	18.40	-0.00
Classification	102.61	22.80	102.33	23.63	-0.44
Mechanical	105.05	16.20	102.40	15.83	-6.14**
Clerical	98.51	16.88	99.35	16.74	1.84
Radio,	86.98	23.33	82.53	24.28	-6.73**
General Infor.	96.21	16.32	95.88	15.50	-0.78
Shop Mechanics	99.96	15.12	99.09	15.63	-2.04*
Automotive	99.22	16.10	99.66	16.17	1.00
Electrical	93.59	21.46	92.54	20.97	-1.84
% Caucasian & N	77%	1,396	79%	41,248	

*p<.05 two tailed, pooled variance
 **p<.01 two tailed, pooled variance

Source: RAMS File
 Printout A-10
 See Technical Note 1.

Pre-Recruit Training Role Outcome Desirability and Role Outcome
Expectancy Ratings

The attraction of a work role, be it military or civilian, is thought to be a function of the extent to which the work role is seen by incumbents, or possible incumbents, as associated with the attainment of desired outcomes and not undesirable outcomes. If this is so, it is necessary to ask several questions of incumbents or possible incumbents, in this case new recruits. Specifically, what outcomes (rewards, costs, conditions) do new recruits consider desirable or undesirable in a work role? What are new recruits perceived chances (role-outcome expectancies) of attaining the outcomes by being a Marine or by being in a civilian work role. Data bearing on these questions are presented in Table 2.

It is instructive to look at the outcomes which have the highest and lowest average desirability ratings. Among the work role outcomes with the highest (most desirable) mean ratings are:

- Learning skills that will help me later in life
- Insurance and medical benefits
- Job which gives me pride in myself
- Job which pays well
- Good financial benefits
- Organization that fulfills its promises
- An exciting job
- Job where good performance is recognized

TABLE 2
MEAN ROLE OUTCOME AND ROLE EXPECTANCY RATINGS
FOR PRE-RECRUIT TRAINING MARINE RECRUITS

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Phase I

TABLE 2

Outcomes	Outcome Desirability (1)			Chances of Attainment Marine (2)		Chances of Attainment Civilian (2)	
	Rank	Mean	SD.	Mean	SD	Mean	SD
1. Being part of an effective team	12	1.40	.84	.87	.21	.58	.30
2. Respect from friends and relatives	11	1.41	.81	.86	.21	.68	.27
3. Learning new skills	7	1.44	.77	.86	.20	.63	.28
4. Having an exciting job	8	1.44	.84	.75	.25	.57	.30
5. Having a dangerous job	43	-0.03	1.10	.60	.30	.44	.31
6. Being in a job where discipline is strictly enforced	42	0.03	1.08	.78	.28	.47	.31
7. A job that pays well	4	1.55	.81	.72	.26	.61	.29
8. Long separations from home and family	49	-0.93	1.00	.61	.32	.28	.32
9. A job that is important to the country	37	0.92	.90	.79	.26	.46	.34
10. Fair treatment from superiors	16	1.32	.93	.65	.29	.60	.30
11. Working with people I like	15	1.35	.86	.67	.25	.65	.27
12. A job where good performance is recognized	9	1.42	.82	.74	.26	.65	.28
13. A job that includes extensive travel	40	.53	1.14	.66	.27	.37	.31
14. A job where duties and orders are clearly defined	35	.98	.88	.81	.23	.62	.28
15. A job which gives me pride in myself	3	1.59	.78	.84	.23	.62	.31
16. A job where poor performance is penalized	41	.27	1.08	.75	.31	.53	.31
17. Sufficient leisure time to pursue your own interests	22	1.26	1.03	.54	.30	.68	.29
18. A job with little responsibility	46	-0.59	1.05	.31	.29	.46	.29
19. Superiors who are concerned about me as an individual	25	1.21	.92	.60	.31	.55	.30
20. Learning skills that will help me in later life	1	1.67	0.71	.80	.24	.59	.31
21. Good financial benefits	5	1.55	.79	.77	.25	.58	.30
22. Being in control of your own activities	29	1.14	0.91	.50	.31	.63	.30
23. Freedom to make your own	28	1.14	0.96	.48	.32	.62	.31

Phase I (Con't)	Outcome Desirability			Chances of Attainment		Chances of Attainment	
	Rank	Mean	SD	Marine		Civilian	
				Mean	SD	Mean	SD
24. Doing a real man's job	19	1.27	.80	.79	.24	.62	.28
25. Being part of a well-disciplined organization	34	1.07	.94	.87	.21	.52	.32
26. Being part of an efficient organization	24	1.23	.86	.85	.23	.60	.29
27. Physically demanding work	39	0.56	.93	.74	.25	.59	.28
28. Specific kinds of training I want	26	1.18	.84	.66	.27	.51	.31
29. Work under good leadership	14	1.35	.79	.79	.23	.62	.28
30. Working closely with people of another race	38	.58	.90	.78	.24	.59	.29
31. Being in control of your own life	10	1.41	.91	.55	.34	.72	.30
32. A high degree of job security	21	1.26	.89	.76	.25	.54	.30
33. Good insurance and medical benefits	2	1.57	.77	.87	.21	.56	.32
34. Interferes with marriage/family plans	50	-1.02	1.51	.54	.33	.33	.31
35. An organization flexible enough to meet my changing	36	.95	.92	.50	.31	.51	.30
36. Having clear work goals	33	1.09	.82	.73	.25	.61	.28
37. A high degree of personal freedom	30	1.12	.93	.48	.32	.65	.29
38. A job where you can "get your head together"	20	1.26	.90	.69	.28	.58	.29
39. A job where I can become a real man	23	1.24	.87	.80	.24	.58	.30
40. Getting away from a bad home situation	44	-0.11	1.23	.53	.37	.38	.31
41. A job involving potential physical violence	45	-0.20	1.18	.61	.32	.37	.31
42. Training opportunities that will contribute to my long term career plans	17	1.28	.86	.74	.26	.54	.31
43. A chance to see different parts of the country or the world	27	1.16	.98	.74	.26	.40	.34
44. Making a lot of new friends	32	1.12	.86	.80	.24	.61	.29
45. An organization that fulfills its promises to you	6	1.47	.85	.69	.28	.58	.29
46. Having a leader who is consistent	31	1.12	.91	.77	.24	.60	.28

Phase I (Con't)	Outcome Desirability			Chances of Attainment		Chances of Attainment	
	Rank	Mean	SD	Marine		Civilian	
				Mean	SD	Mean	SD
47. Working closely with people who use drugs	48	-.93	1.14	.29	.29	.45	.32
48. Having a leader who is well qualified	13	1.39	.82	.82	.23	.65	.27
49. A repetitive job with little responsibility	47	-.65	1.10	.37	.30	.47	.29
50. Rapid promotional opportunities	18	1.27	.87	.59	.28	.49	.29

CODING NOTE:

- (1) Outcome Desirability Scale: -2.0 = very undesirable to 2.0 = very desirable
- (2) Outcome Expectancy Scale: 0 = No chance of attainment to 1.0 = 100% chance of attainment.

Max N = 1,960 New Recruits

Source: O.N.R./U.S.C. Phase I Data
August 1976 Parris Island Accessions
Printout A - 1

Being part of an effective team.

Being in control of own life.

Respect from friends and relatives.

The lowest (least desirable) mean outcome desirability ratings included:

Job interferes with marriage-family plans

Long separations from home and family

Having co-workers who use drugs

Job with little responsibility

Among the outcomes with more neutral mean desirability ratings were:

A job that includes extensive travel

A dangerous job

A job that is important to the country

Knowledge of what outcomes recruits (and possible recruits) consider desirable and undesirable should be of value in recruiting, counseling, and selection (Schneider, 1976). However, it is also necessary to know the individuals' perceived chances of attaining the various outcomes in military or civilian roles. Such role outcome expectancies are included in Table 2. For each of the outcomes having the highest mean desirability ratings, the new recruits saw a higher chance of attainment by being in a Marine role rather than in a civilian role. However, for several of the outcomes considered undesirable (e.g. interferes with marriage and family plans, long separations from home and family) the new recruits saw a higher chance of occurrence by being in a Marine role rather than

in a civilian role. This, of course, detracts from the relative attraction of the Marine role.

For each individual, it is possible to generate an overall role attraction index for the Marine Role and for the civilian roles. This is done by taking the sum of the cross products of the outcome desirability rating and the role outcome expectancy ratings. When this is done for the new recruits, the mean Marine role attraction index is 37.26 while the mean civilian role attraction is 29.16. This difference is statistically and practically significant. As might be expected, new recruits see the Marine role as more attractive than a civilian role.

We will subsequently be analyzing whether these role attraction indexes, along with other individual and organizational variables, are related to behavioral intentions to complete the first term enlistment, intentions to reenlist, and actual withdrawal behavior. We will also analyze how the Marine and civilian role attraction indexes and their components, change as a function of time and experience in the Marine Corps.

Role Expectancies, Behavioral Intentions

In addition to role attraction, it is hypothesized that perceived chances of attaining or retaining a work role is a determinant of role choice, behavioral intentions, and withdrawal behavior. Also, it is hypothesized that behavioral intentions are related to subsequent behavior (Kraut, 1975; Mobley, 1977; Locke, 1975).

Table 3 summarizes pre-recruit training expectations regarding chances of successfully completing the first term enlistment and chances of finding an acceptable civilian job. Some 83% of the new recruits see a greater than 50-50 chance of being able to successfully complete their first term enlistment. Only 42% saw a greater than 50-50 chance of being able to find an acceptable civilian job. Later we will want to assess the extent to which these two role expectancy variables are related to behavioral intentions and actual withdrawal behavior.

Also included in Table 3 are summaries of the pre-recruit training behavioral intentions to complete the first term enlistment and intentions to reenlist. It is well to note that 80% of the new recruits say they intend to complete their first term enlistment. Some eight percent do not intend to complete and 12% are uncertain. Turning to intentions to reenlist, 28% of the new recruits say they intend to reenlist.

Subsequently, we will be analyzing the correlates of both types of intentions, how these intentions change as a function of time and experience in the Marine Corps, and how these intentions relate to actual withdrawal behavior. There is evidence in the literature (see e.g. Kraut, 1975; Locke, 1975; Mobley, 1977) that intentions are predictors of subsequent behavior.

TABLE 3

PRE-RECRUIT TRAINING ROLE EXPECTANCIES
AND BEHAVIORAL INTENTIONS

Variable	%	Mean	SD
Marine Role Expectancy (Perceived chances of successfully completing first term enlistment) ¹		.85	.23
Less than 50-50 chance	5%		
50-50 chance	12%		
Greater than 50-50 chance	83%		
Civilian Role Expectancy (Perceived chances of finding an acceptable civilian job) ¹		.54	.33
Less than 50-50 chance	35%		
50-50 chance	23%		
Greater than 50-50 chance	42%		
Behavioral Intention to Complete First Term Enlistment ²		4.30	1.02
No	8%		
Uncertain	12%		
Yes	80%		
Behavioral Intention To Reenlist ²		2.99	1.07
No	25%		
Uncertain	47%		
Yes	28%		

¹Scale goes from 0 (no chance) to 1.0 (certain)

²Scale goes from 1 (definitely not) to 5.0 (definitely yes)

Source: August, 1976 Parris Island Accessions, Max N = 1,960, Printout A-1

Individual and Organizational Correlates of Pre-Recruit Training Intentions to Complete First Term Enlistment

Table 4 summarizes the correlations between the various pre-recruit training measures and behavioral intentions to complete the first term enlistment. Of the demographic variables, only education and mental scores were significant.

A number of the role attraction indexes were significantly and fairly strongly related to intention to complete the first term enlistment. Perceived chances of successfully completing the enlistment (Marine role expectancy) was the strongest single correlate of intention to complete ($r = .43$). Marine role attraction ($r = .30$); Marine role force, role attraction weighted by role expectancy ($r = .38$); and the difference in Marine role force and civilian role force ($r = .36$), also were among the stronger correlations.

Both dimensions of the expected leader behavior measure were significantly related to intention to complete. Expected leader structure was the stronger correlate ($r = .21$).

On the job content scale, expected task significance and feedback from the job were the highest correlates. The individual level dimensions from this scale, growth need ($r = .16$) and particularly internal motivation ($r = .28$) exhibited moderate correlations with intention to complete.

Table 4

PRE-RECRUIT TRAINING CORRELATES OF
INTENTION TO COMPLETE FIRST TERM ENLISTMENT

Variable	Correlation	Variable	Correlation
<u>Demographic</u>		<u>Job Content</u>	
Marital Status	.01	Skill Variety	.11**
Number Dependents	-.02	Task Identity	.10**
Age	.01	Task Significance	.17**
Education	.08**	Autonomy	.09**
Mental	.13**	Feedback From Job	.16**
		Feedback From Others	.10**
		Dealing With Others	.14**
		Internal Motivation	.28**
		Growth Need	.16**
<u>Role Attraction</u>		<u>Group</u>	
Sum Outcome Desirability Rating	.27**	Control	-.05*
Sum Outcome Expectancies: Marine	.32**	Stability	-.10**
Sum Positive Outcome Expectancies-Negative: Marine	.29**	Intimacy	.07**
Sum Outcome Expectancies: Civilian	-.08**	Stratification	-.03
Sum Positive Outcome Expectancies-Negative: Civilian	-.01	Hedonic Tone	.10**
Role Attraction: Marine	.30**	Autonomy	.07**
Role Attraction: Civilian	.07**	Potency	.13**
Expectancy of Completing First Term	.43**	Viscosity	.12**
Expectancy of Finding Civilian Job	-.17**	Permeability	-.11**
Force: Marine Role	.38**	Participation	.09**
Force: Civilian Role	-.04	Polarization	.07**
Difference in Force: Marine-Civilian	.36**	Flexibility	-.08**
Difference in Attraction: Marine-Civilian	.28**	Homogeneity	-.05*
Difference in Expectancy: Marine-Civilian	.20**		
		<u>Sociometric</u>	
		Attraction	.15**
		Proficiency	.12**
<u>Leadership</u>			
Consideration	.13**		
Initiating Structure	.21**		

Source: August 1976 Parris Island Accessions,

Max N=1960, Printout A-11.

* p < .05

** p < .01

Most of the expected group and sociometric dimensions were significantly correlated with intentions but at rather modest levels.

How do the various variables combine in the prediction of behavioral intention to complete the first term enlistment? Table 5 summarizes the stepwise multiple regression. The multiple correlation is .51 with four variables and increases very slowly to .54 with the addition of the thirteenth variable, education. Expectancy of completing the first term enlistment, expected satisfaction, sum of the role outcome desirability ratings, and expectancy of finding an acceptable civilian job (negative weight) were the first four variables to enter the prediction equation.

Individual and Organizational Correlates of Actual Recruit Training Attrition.

This section deals with the prediction of actual recruit training attrition from the pre-recruit training measures. As noted earlier, these results are preliminary since all attrition data is not yet in. At the time of the analyses reported here, 11% of the tracking sample (219/1960) were known to have become an attrite during recruit training. Another 13% had either: not graduated from recruit training or became an attrite due to a variety of reasons including health problems, legal problems, VA, extended re-cycle, etc; or had an ID number that did not match with the HMC computer file. Thus, the results reported here deal with the prediction of the known 11%.

TABLE 5
STEPWISE MULTIPLE REGRESSION OF INTENTION TO COMPLETE FIRST
TERM ENLISTMENT ON PRE-RECRUIT TRAINING MEASURES

VARIABLE	r	R	R ²
Expectancy of completing first term enlistment	.43	.43	.181
Expected overall general satisfaction	.32	.48	.228
Sum outcome desirability ratings	.27	.50	.246
- Expectancy of finding acceptable civilian	-.17	.51	.256
Sum role outcome expectancies: Marine	.32	.51	.263
- Expected group stability	-.10	.52	.268
Role force: Marine	.30	.52	.272
Internal motivation	.28	.53	.276
Difference role attraction: Marine-Civilian	.27	.53	.280
Difference role force: Marine - Civilian	.36	.53	.283
- Expected group permeability	-.11	.53	.285
Expected leader structure	.21	.54	.287
Education	.08	.54	.289

Source: August 1976 Parris Island Accessions, N=1143, Printout A-17.

attrition out of the possible maximum 24% attrition. The subsequent technical report will provide updated and more complete analyses.

As points of comparison, Parris Island recruit training cohort attrition was 16.9% for calendar year 1974; 23.1% for 1975; projected 15.7% for 1976.

Table 6 summarizes the correlations between the pre-recruit training measures and actual attrition. The attrition variable was coded 0 (non-attrite) and 1 (attrite). Thus, a negative correlation should be interpreted as the higher the value of the predictor variable, the lower the attrition.

Several of the demographic variables were significantly, but modestly, correlated with recruit training attrition. The strongest correlate was education, with higher levels of education associated with lower attrition. Marital status (single less likely to attrite) and mental score (higher less likely to attrite) exhibited weak but significant correlations.

Of the role attraction variables, expectancy of completing first term enlistment ($r = -.19$) Marine role force ($r = -.15$), and the difference between Marine role force and civilian role force were among the relatively stronger correlates of actual recruit training attrition.

Again, most of the expected leadership, job content, and group variables were significantly correlated with actual attrition but at rather modest levels.

TABLE 6

PRE-RECRUIT TRAINING CORRELATES OF RECRUIT TRAINING ATTRITION

VARIABLE	CORRELATION	VARIABLE	CORRELATION
<u>Demographic</u>		<u>Job Content</u>	
Marital Status	.06*	Skill Variety	-.07**
Number Dependents	.03	Task Identify	-.04*
Age	.01	Task Significance	-.07*
Education	-.17**	Autonomy	-.05*
Mental	-.05*	Feedback from Job	-.09**
		Feedback from Others	-.05*
		Dealing with Others	-.05*
		Internal Motivation	-.09**
		Growth Need	-.06**
<u>Role Attraction</u>		<u>Group</u>	
Sum Outcome Desirability Ratings	-.09**	Control	.06**
Sum Outcome Expectancies Marine	-.09**	Stability	.04
Sum Positive - Negative Outcome Expectancies: Marine	-.03**	Intimacy	-.06**
Sum Outcome Expectancies: Civilian	.04*	Stratification	.04
Sum positive - Negative Outcome Expectancies: Civilian	-.02	Hedonic Tone	-.08**
Role Attraction: Marine	-.11**	Autonomy	-.02
Role Attraction: Civilian	-.03	Potency	-.08**
Expectancy of Completing First Term	-.19**	Viscosity	-.06**
Expectancy of Finding Civilian Job	.10**	Permeability	.01
Force: Marine Role	-.15**	Participation	.02
Force: Civilian Role	.03	Polarization	-.05*
Difference in Force: Marine-Civilian	-.15**	Flexibility	.05*
Difference in Attraction: Marine-Civilian	-.09**	Homogeneity	.93
Difference in Expectancy: Marine-Civilian	-.12**		
<u>Leadership</u>			
Consideration	-.05*		
Initiating Structure	-.05*		
<u>Sociometric</u>			
Attraction	-.06**		
Proficiency	-.03		

Source: August Parris Island Accessions Max N=1960 Printout A-15
 *p < .05 **p < .01

When the predictor variables are submitted to a stepwise multiple regression, they enter in the order summarized in Table 7. The picture being painted by this analysis is as follows. Recruits who, on their way into recruit training, see a higher chance of completing their first term enlistment, have more education, expect the Marine Corps to lead to more positive than negative outcomes, see a lower chance of finding an acceptable civilian job, have a greater difference in Marine role force and civilian role force, and expect to be more satisfied, turn out to be lower attrition risks.

Self-Reported Reasons for Recruit Training Attrition

Table 8 summarizes the self-reported reasons for attrition from the total recruit training attrite sample. Reported beside each possible reason is: the mean rating on a scale of 1 (strongly disagree) to 5, (strongly agree); the rank order of the mean; and the percentage of attrites who agreed or strongly agreed this was among the real reasons for their leaving the Marine Corps. The highest ranking reasons included:

I missed my family/friends back home.

Lack of personal freedom

Too much pressure on me

Health reasons

Rules and regulations were too rigid

Superiors treated me unfairly.

TABLE 7
 STEPWISE MULTIPLE REGRESSION OF RECRUIT TRAINING ATTRITION
 ON PRE-RECRUIT TRAINING MEASURES

VARIABLE	r	R	R ²
- Expectancy of completing first term enlistment	-.19	.19	.035
- Education	-.17	.24	.060
- Sum of positive minus negative role outcome			
expectancies: Marine	-.13	.26	.067
Expectancy of finding acceptable civilian job	.10	.27	.073
Difference in role force: Marine - Civilian	-.15	.28	.075
Difference in Expectancies (Marine-Civilian)	-.12	.28	.079

Source: August, 1976 Parris Island Accessions, N=1143, Printout A-17a

TABLE 8
 SELF-REPORT REASONS FOR RECRUIT TRAINING ATTRITION

<u>Mean Rank</u>	<u>Mean</u>	<u>% Agree</u>	<u>I am leaving the Marine Corps because of:</u>
4	3.09	43%	Physical health reasons.
14	2.79	34%	Mental health reasons.
23	2.61	25%	The poorly trained leaders I had.
25.5	2.58	26%	The inability to make friends with other Marines.
16	2.75	30%	Family problems back home.
2	3.21	45%	The lack of personal freedom as a Marine.
24	2.60	26%	Other enlistees picked on me.
20	2.67	29%	I had trouble learning.
15	2.78	33%	Inability to complete a training school.
8	2.95	35%	A good job opportunity as a civilian.
17.5	2.72	29%	Inability to get promoted.
12	2.85	33%	Being a Marine is too physically demanding.
9	2.90	34%	The assignments were too boring.
6	2.97	34%	Superiors treated me unfairly.
3	3.19	43%	There was too much pressure on me.
1	3.29	45%	I missed my family/friends back home.
27	2.52	24%	Getting in trouble was the only way I could get out of the Marines.
5	3.02	35%	The rules and regulations were too rigid.
28	2.49	23%	There wasn't enough discipline.
11	2.86	33%	I want to get married.
22	2.62	27%	I just couldn't stay out of trouble.
13	2.80	31%	A change in my religious values.

<u>Mean Rank</u>	<u>Mean</u>	<u>% Agree</u>	<u>I am leaving the Marine Corps because of:</u>
20	2.67	28	Minorities are discriminated against.
20	2.67	29	I didn't get the location I wanted.
17.5	2.72	28	I didn't get the training I wanted.
29.5	2.44	26	I got hung up on drugs.
25.5	2.58	26	I couldn't get along with members of other races.
7	2.96	36	There were too many "Mickey Mouse" rules and regulations.
10	2.89	36	I was treated like a little child.
29.5	2.44	18	I couldn't get in the unit I wanted.

Source: August-November 1976 Parris Island recruit training attrites Max N=960, Printout A-16 Scale = 1, Strongly Disagree to 5, Strongly Agree.

Self reported reasons for attrition are, of course, susceptible to considerable response bias. However, if these are the reasons attrites communicate to others, e.g. other potential recruits back home, it is important to know these reasons. Comparison between self-reported reasons and administrative reasons will be reported in the subsequent technical report.

Post Recruit Training Correlates of Intentions To Complete First Term Enlistment.

This section deals with those who successfully completed recruit training and their behavioral intentions to complete the first term enlistment. Table 9 summarizes the percentage distributions: 87% of the graduates indicated they intend to complete their enlistment; 31% indicated they intend to reenlist; 92% saw a greater than 50-50 chance of completing their first term enlistment; and 45% saw a greater than 50-50 chance of finding an acceptable civilian job now.

Table 10 summarizes the correlations between the post-recruit training measures and intentions to complete the first term enlistment. Table 11 summarizes the stepwise multiple regression. The multiple correlation is .38 with five variables; expectancy of completing first term enlistment; overall satisfaction; difference in Marine and civilian role attrition; leader structure; and pay satisfaction.

TABLE 9

POST RECRUIT TRAINING BEHAVIORAL INTENTIONS AND EXPECTANCIES

Variable	Tracking %	Total %	Mean	SD
Intention to complete first term enlistment:			4.51 ⁽¹⁾	.90
% No	4	(4)		
% Uncertain	9	(9)		
% Yes	87	(87)		
Intention to reenlist:			3.17 ⁽¹⁾	.98
% No	17	(16)		
% Uncertain	50	(49)		
% Yes	33	(35)		
Expectancy of completing first term enlistment:			.92 ⁽²⁾	.19
Less than 50-50	3	(3)		
50-50	5	(5)		
Greater than 50-50	92	(92)		
Expectancy of finding an acceptable civilian job now:			.57 ⁽²⁾	.33
Less than 50-50	32	(31)		
50-50	23	(24)		
Greater than 50-50	45	(45)		
Max N	1476	1764		

¹Scale = 1 (definitely not) to 5 (definitely yes)

²Scale = 0 (no chance) to 1.0 (certain)

Source: Post Recruit Training, Parris Island graduates, Printouts A-9,A-3

Table 10

POST-RECRUIT TRAINING CORRELATES OF INTENTION
TO COMPLETE FIRST TERM ENLISTMENT

Variable	Correlation	Variable	Correlation
<u>Demographic</u>		<u>Job Content</u>	
Marital Status	-.06*	Skill Variety	.09**
Number Dependents	-.07**	Task Identity	.12**
Age	-.08**	Task Significance	.10**
Education	.03	Autonomy	.11**
Mental	.10**	Feedback from Job	.16**
		Feedback from Others	.13**
		Dealing with Others	.14**
		Internal Motivation	.18**
		Growth Need	.13**
<u>Role Attraction</u>		<u>Satisfaction</u>	
Sum Outcome Desirability Ratings	.17**	Overall Satisfaction	.24**
Sum Outcome Expectancies: Marine	.19**	Pay Satisfaction	.20**
Sum Positive-Negative Outcome Expectancies: Marine	.19**	Security Satisfaction	.17**
Sum Outcome Expectancies: Civilian	-.12**	Interpersonal-social satisfaction	.16**
Sum Positive-Negative Outcome Expectancies: Civilian	-.06**	Leader Satisfaction	.19**
Role Attraction: Marine	.21**	Growth Satisfaction	.17**
Role Attraction: Civilian	.03		
Expectancy of Completing First Term	.26**	<u>Group</u>	
Expectancy of Finding Civilian Job	-.09**	Control	.02
Force: Marine Role	.25**	Stability	-.03
Force: Civilian Role	.00	Intimacy	.06**
Difference in Force: Marine-Civilian	.22**	Stratification	.06**
Difference in Attraction: Marine-Civilian	.21**	Hedonic Tone	.12**
Difference in Expectancy: Marine-Civilian	.11**	Autonomy	.03
		Potency	.07**
		Viscosity	.11**
		Permeability	-.01
		Participation	.03
		Polarization	.04
		Flexibility	-.12**
		Homogeneity	-.11**
<u>Leadership</u>			
Consideration	.07**		
Initiating Structure	.19**		
<u>Sociometric</u>			
Attraction	.14**		
Proficiency	.15**		

Source: October-November Parris Island
Graduates, Max N=1764
Printout A-12

*p < .05
**p < .01

Table 11
 STEPWISE MULTIPLE REGRESSION OF INTENTIONS TO COMPLETE FIRST
 TERM ENLISTMENT ON POST-RECRUIT TRAINING MEASURES

Variable	r	R	R ²
Expectancy of completing first term enlistment	.26	.26	.069
Overall satisfaction	.24	.34	.112
Difference in role attraction: Marine-civilian	.21	.36	.130
Leader structure	.19	.37	.138
Pay satisfaction	.20	.38	.142
-Age	-.08	.38	.146
Autonomy	.11	.39	.149
Mental	.10	.39	.151
Sum of positive-negative role outcome expectancies	.19	.39	.153

Source: October-November 1976 Parris Island Graduates; N=1068, Printout A-18.

Correlates of End of Recruit Training Satisfaction

On the end of recruit training measure, 75% indicated they were satisfied with the Marine Corps, 18% were neutral, and 7% dissatisfied. Table 12 summarizes the end of recruit training correlates of overall satisfaction. Table 13 summarizes the step-wise multiple prediction of overall satisfaction.

As can be seen, growth satisfaction, internal motivation, the motivating potential score from the Hackman job content measure, and security satisfaction, taken together lead to a multiple correlation of .60.

Comparison of Variable Means for Pre-Recruit Training,

Post Recruit Training, and Attrites

This section summarizes the variable means for various phases and subgroups. Table 14a summarizes the means for the role attraction and expectancy variables, Table 14b the satisfaction, leadership and job content measures. Looking first at the differences between graduates and attrites on the pre-recruit training measure in Table 14a, it can be seen that eventual graduates, on their pre recruit measures, had a higher expectancy of completing the first term, lower expectancy of finding an acceptable civilian job, had a higher attraction to the Marine role and civilian role, and had a higher intention to complete the first term and to reenlist.

Table 12

POST-RECRUIT TRAINING CORRELATES OF
OVERALL SATISFACTION

Variable	Correlation	Variable	Correlation
<u>Component Satisfactions</u>		<u>Job Content</u>	
Pay Satisfaction	.37 **	Skill Variety	.34 **
Security Satisfaction	.41 **	Task Identity	.26 **
Interpersonal Satisfaction	.45 **	Task Significance	.38 **
Leader Satisfaction	.42 **	Autonomy	.25 **
Growth Satisfaction	.51 **	Feedback from Job	.35 **
		Feedback from Others	.27 **
<u>Role Attraction</u>		Dealing with Others	.21 **
Sum Outcome Desirabilities	.17 **	Internal Motivation	.46 **
Sum Outcomes Expectancies:		Growth Need	.26 **
Marine	.33 **		
Sum Positive-Negative Outcome Expectancies: Marine	.25 **	<u>Group</u>	
Sum Outcome Expectancies: Civilian	-.01	Control	-.03
Sum Positive-Negative Outcome Expectancies: Civilian	.02	Stability	-.05 *
Role Attraction: Marine	.29 **	Intimacy	.17 **
Role Attraction: Civilian	.12 **	Stratification	-.01
Expectancy of Completing First Term	.14 **	Hedonic Tone	.20 **
Expectancy of Finding Civilian Job	-.09 **	Autonomy	.01
Force: Marine Role	.30 **	Potency	.18 **
Force: Civilian Role	.04	Viscosity	.25 **
Difference in Force: Marine-Civilian	.25 **	Permeability	-.18 **
Difference in Attraction: Marine-Civilian	.23 **	Participation	.19 **
Difference in Expectancy: Marine-Civilian	.08 **	Polarization	.04
		Flexibility	-.18 **
		Homogeneity	-.15 **
<u>Leadership</u>		<u>Sociometric</u>	
Consideration	.22 **	Attraction	.27 **
Initiating Structure	.21 **	Proficiency	.23 **
<u>Demographic</u>			
Marital Status	-.01		
Number Dependents	-.02		
Age	-.02		
Education	.04		
Mental	.06 *		

* p<.05

** p<.01

Source: October-November 1976 Paris Island Graduate
Max N = 1764, Printout A-12

TABLE 13
 STEPWISE MULTIPLE REGRESSION OF OVERALL SATISFACTION ON
 POST - RECRUIT TRAINING MEASURES

VARIABLE	r	R	R ²
Growth satisfaction	.51	.51	.257
Internal motivation	.45	.57	.320
Motivating potential score	.42	.59	.344
Security satisfaction	.41	.60	.356
Group viscidty	.25	.60	.363
Skill variety	.34	.61	.369
Interpersonal satisfaction	.45	.61	.374
Difference in role force: Marine-Civilian	.25	.62	.379
Group hedonic tone	.20	.62	.382
Sum role outcome expectancies: Marine	.33	.62	.384

Source: October-November 1976 Parris Island graduates, N=1068, Printout A-18.

As confirmed by the correlations presented earlier, eventual recruit training graduates and attrites differ on their way into recruit training in expectancy of completing, in attraction to the Marine role, and in intentions to complete.

Comparing the recruit training graduates pre-measures to their end of recruit training measures in Table 14a, it can be seen that there is an increase: in expectancy of completing the first term and in finding an acceptable civilian job; in the role attraction of both Marine and civilian roles but relatively more than in Marine role attraction; and in intentions to complete the first term and to reenlist.

Thus, eventual graduates experience an increase in expectancy of completing, in Marine role attraction, and in intentions to complete and to reenlist over the course of recruit training.

Comparing the pre and post measures on eventual attrites, just the opposite occurs.

Table 14b summarizes the satisfaction, leadership, and job content measures. Comparing graduates and attrites on the pre-measure, it can be seen that eventual graduates expect to be more satisfied, expect more leader consideration and structure, expect more on the job content measures, and are higher on internal motivation and growth need than attrites.

Comparing the eventual graduates' pre and post measures, there

was; an increase in satisfaction; the leader was more considerate and slightly lower on structure than expected; slightly less skill variety, task significance, and dealing with others; and slightly more autonomy and feedback from others than expected.

Summarizing these comparisons, eventual recruit training attrites do differ on their way into recruit training in terms of their expectancies, attractions to the Marines, intentions to complete, expected satisfactions and expected leadership and job content measures. Further, recruit training graduates exhibit higher expectancies of completing, greater Marine role attractions, higher intentions of completing, more job satisfactions, and changes in perceived leadership and job content over the course of recruit training.

Management Implications and Additional Analyses

The preliminary nature of the results dictates caution in interpreting and drawing manpower management implications from the results. However, the preliminary results, together with the conceptual model upon which the study is based, do permit several tentative conclusions and possible manpower management implications. These were summarized in the Management Summary section of the paper and will not be repeated here.

Among the additional analyses being conducted are: inclusion of a recruit training performance criterion; a platoon level of

analysis during the recruit training phase; continued tracking of the longitudinal sample through advanced training and onto duty stations. The individual and organizational correlates of behavioral intentions and attrition will be analyzed at each step, changes in the variables as a function time and experience in the Marine Corps will be analyzed, as will the consequences of such changes.

TECHNICAL NOTES

1. Complete demographic data is not yet available. At the time the RAMS file was searched for demographic data on recruits in the tracking sample, 1,395 cases were located. A second search of the computer file is in progress in an attempt to complete the demographic data on the remainder of the individuals in the sample.
2. In any large survey study, the quality or fidelity of the responses is of concern. In the present study, 15 consistency checks were included in the survey. For each individual, a consistency variable was generated. For the first wave of criterion related analyses, data were accepted from individuals with three or less consistency violations. Subsequent analyses will compare the impact on results of different levels of consistency and will explore the correlates of consistency.
3. Recruit training attrite data are incomplete. At the time the analyses reported in this paper were conducted, 11% of the tracking sample were known to have become an attrite. Another 13% either: had neither graduated or become an attrite, due to health reasons, legal reasons, UA, extended re-cycle, etc.; or had an ID number that was not matched on the first search of the HMC computer file.

TABLE 14 a
SUMMARY OF ROLE ATTRACTION AND EXPECTANCY
VARIABLES BY PHASE AND SUBGROUP

Variable	Pre Recruit Total	Training Grad	Training Attrite	Post Recruit Tracking	Training Total	Attrite Tracking	Total
Expectancy:Marine Role	.85	.87	.69	.92	.91	.41	.47
Expectancy:Civilian Role	.54	.53	.63	.57	.57	.69	.68
Attraction:Marine Role	37.26	38.13	30.23	43.34	43.42	24.17	25.47
Attraction: Civilian Role	29.16	29.43	26.69	32.39	32.42	25.52	26.34
Force: Marine Role	32.46	33.78	23.11	40.69	40.54	10.76	13.10
Force: Civilian Role	16.51	16.58	16.70	19.81	19.78	19.13	19.36
Force Difference: Marine-Civilian Role	16.25	17.51	7.15	20.90	20.75	-9.29	-6.08
Differences in Attraction	8.25	8.78	4.33	10.85	10.90	-1.62	-.92
Differences in Expectancies	.33	.39	-.02	.35	.35	-.34	-.19
Intention to Complete First Term	4.30	4.40	3.79	4.51	4.52		
Intention to Reenlist	2.99	3.03	2.71	3.17	3.22		
Max N	1960	1476	219*	1476	1764	219*	926
Printout	A-1	A-8	A-8	A-9	A-2	A-20	A-3

* = incomplete

TABLE 14 b
SUMMARY OF SATISFACTION, LEADERSHIP, AND JOB CONTENT MEANS
BY PHASE AND SUBGROUP

	Pre Recruit Training			Post Recruit Training		Attrite	
	Total	Grad	Attrite	Tracking	Total	Tracking	Total
Overall Satisfac- tion	3.38	3.43	3.05	3.59	3.59	2.90	3.05
Pay Satisfac- tion	3.50	3.53	3.28	3.66	3.66	3.21	3.27
Security Satisfac- tion	3.67	3.73	3.40	3.80	3.79	3.16	3.28
Interpersonal Satisfaction	3.56	3.59	3.43	3.71	3.71	3.31	3.35
Leader Satisfac- tion	3.40	3.44	3.14	3.66	3.67	3.18	3.30
Growth Satisfac- tion	3.57	3.60	3.33	3.67	3.68	3.18	3.28
Leader Consi- deration	43.60	43.65	41.66	50.64	50.81	43.96	45.09
Leader Structure	63.85	64.35	62.28	63.00	62.73	58.17	55.27
Skill Variety	3.27	3.31	3.10	3.20	3.20	2.90	3.00
Task Identity	3.23	3.26	3.11	3.27	3.28	2.95	3.08
Task Signifi- cance	3.70	3.76	3.46	3.60	3.60	3.01	3.14
Autonomy	2.57	2.58	2.48	2.86	2.86	2.76	2.89
Feedback from Job	3.40	3.43	3.19	3.47	3.46	3.12	3.14
Feedback from Other	3.06	2.90	3.09	3.36	3.36	3.01	3.05
Dealing with Other	3.90	3.93	3.75	3.80	3.80	3.42	3.33
Internal Moti- vation	3.87	3.91	3.60	3.92	3.90	3.33	3.36
Growth Need	3.78	3.83	3.59	4.00	3.99	3.46	3.27

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EXPLORATORY DEVELOPMENT RESEARCH
OF
U.S. NAVY MARINE CORPS PERSONNEL
PHASE 1
FACTORS AFFECTING ATTRITION

Marshall G. Greenberg and Gerald McConeghy
Booz · Allen & Hamilton, Inc.

I. STUDY OBJECTIVES

This report summarizes the results of a survey of approximately 1,000 enlisted men and 100 non-commissioned officers in the Marine Corps and Navy. The survey was an exploratory research into the causes of attrition of first-term enlisted men. The research aimed at the following objectives:

- Identify factors, especially military organizational features, that influence attrition.
- Determine if the causes for attrition are the same among recruits and men in operational units (regular duty).
- Determine why some groups, like non-high school graduates and blacks, have higher rates of attrition than other groups.
- Compare the views of attriters and supervisors concerning attrition.
- Evaluate the reaction of attriters and supervisors to suggested organizational changes aimed at reducing attrition.

II. A BRIEF OVERVIEW OF METHODOLOGY

Confidential personal interviews were conducted at military bases by trained civilian women using a structured questionnaire. Information about experiences before and after enlisting, attitudes about various features of the military, and demographic characteristics of respondents were obtained. The interviews lasted approximately one hour.

Altogether, there were eight groups of enlisted men interviewed. Recruits and men on regular duty (i.e., in the fleet or in operational units) were interviewed in each service. Within each of these groups, attriters and non-attriters were interviewed.

The survey results were summarized and cross-tabulated with several key variables. A stepwise multiple regression analysis was also used to determine the relative influence of each variable and the cumulative influence of several variables. The results presented throughout the report are formatted in conventional cross-tabulation type of tables. The more sophisticated multiple regression is presented in the Appendix. The two presentations are, of course, consistent.

III. A SUMMARY OF MAJOR FINDINGS

A. General Findings Concerning Attrition

It should be noted that these findings and all others cited in this report are based on data from the sample. Since certain constraints were placed on the number and location of respondents, the resulting data are similarly limited.

- Recruits and regular duty men attrite for different reasons. Recruits are often unable to cope -- academically, psychologically, and physically. Attriters from the fleet do not get what they wanted out of the service. They see no benefit to, and feel no obligation for, remaining in the service.
- There are many more similarities than differences between Marine and Navy attriters. The differences that exist apply principally to training and work assignments.
- Attrition from regular duty rarely results from a single problem or experience. Rather, it follows from continually increased levels of dissatisfaction.

- Among recruits, attrition involves first an involuntary element and then a voluntary element. Most recruits accidentally get into trouble, but after being reprimanded or punished, they decide they want to leave the service. Regular duty men usually cause their own attrition by deliberate misconduct.

- Many attriters are salvageable. A large number said they would be willing to stay if certain changes were made. About 15% do not want to be attrited, even under present conditions.
 - Most enlisted men now view their service commitment as a contract. If they do not receive what they had expected, they feel justified in not keeping their contractual obligations.

 - Blacks and recruits show a higher interest in remaining in the service than other attriters.

- There are high levels of dissatisfaction in the service among both attriters and non-attriters. They complain about similar problems. Their experiences in the service are slightly different. What determines that one will attrite while the other remains adjusted seems to involve both a personality characteristic and some minor differences in the amount of dissatisfying experiences.
 - Although the study did not involve the use of psychographics, there are some data that indicate attriters tend to be more impulsive and have more difficulty communicating their needs and problems in an authoritarian setting.

- Differences in attrition rates of educational and racial groups are not accounted for by any one or even a few organizational variables. Blacks and non-high school graduate attriters are not affected differently than whites or high school graduate attriters; rather, they are affected a little more by each of the many factors causing attrition.

- No single organizational factor accounts for a major portion of attrition. The most important organizational factors are:
 - Supervisor-enlisted man relationships
 - Complaint procedures
 - Regimentation
 - Training school attendance
 - Job assignment

- Non-military factors, such as family problems and the social life available, are as important, or more important, than any organizational factor examined.

- Supervisors and attriters agree on the importance of several factors in influencing attrition. There is disagreement between them, however, on the importance of the supervisor's demeanor. The attriters interviewed often said harassment from supervisors is a major cause of their dissatisfaction and subsequent attrition. Supervisors, on the other hand, do not believe harassment is an important factor.
 - However, many supervisors in the fleet do acknowledge that inadequate supervision and leadership are a cause of problems. This, they believe, results from insufficient leadership training.
 - Supervisors of recruits generally feel their peers are adequately trained and perform well.

- Supervisors appear receptive to many suggested changes aimed at reducing attrition. They stress the need for better recruiting, training, and job assignments.
 - However, they are not receptive to suggestions of a positive reinforcement approach, which is the preference of attriters.

- Counseling programs are not widely used by attriters. If counseling is available, most men are either not aware of it, or they do not consider it worthwhile.
- However, those men who did have counseling consider it helpful.

B. Specific Causes

1. Demographic characteristics

- Younger men have higher rates of attrition in the fleet, but among recruits older men have higher rates.
- Blacks are more likely to attrite than whites. Some of this difference is accounted for by differences in pre-service factors.
- Less educated men have higher rates of attrition in recruit training and in the fleet.
 - Level of educational achievement is important for three reasons:
 - (1) It reflects a personality characteristic that involves an "impulsive" element.
 - (2) It limits the choice of service occupation opportunities.
 - (3) It is related to the ability to effectively communicate needs and problems.
- Men from small towns have lower attrition rates than men from large cities.
- Sailors in the fleet who are married have significantly higher attrition rates than their unmarried peers. In the Marines, marital status is not related to attrition.

- Although there is no evidence indicating that civilian employment opportunities influence attrition, attriters are slightly more likely than adjusted men to have been employed prior to entering the service. They also feel their opportunities for civilian employment are good.
- Compared to adjusted men, attriters are more likely to come from a lower socioeconomic background.
- Even when compared to adjusted men having the same level of education, attriters appear to be more deficient in academic skills.
 - About 21% of recruit attriters but only 2% of recruit adjusted have difficulty reading.
- Pre-service arrests are more common among attriters (27% vs 19%).

2. Pre-service preparation

- Adequate planning and preparation for the service is a very important factor differentiating attriters and adjusted men.
 - Attriters are much more likely to enlist impulsively. Most do not give more than a month of forethought to their decision.
 - Compared to adjusted men, attriters receive less information from recruiters about what to expect in the service.

- Men who participate in the Delayed Enlistment Plan are less likely to attrite than non-participants. This is true regardless of the amount of forethought to enlisting, or the level of school completed.
- Enlistment on the Buddy Plan reduces the probability of attriting during recruit training.
- Attriters are more likely than adjusted men to say they were unsure at the time of enlistment whether they would complete their enlistment.
- Attriters and adjusted men have similar reasons for enlisting. To learn a skill or trade is the primary reason given by both.
- There is no difference between adjusted and attriters in the encouragement to enlist that they received from family and friends.

3. Organizational factors

- The factor cited most often by attriters as a cause of dissatisfaction and attrition is supervisors' behavior.
 - Harassment, frequent criticism, false accusations, and favoritism are the aspects of the supervisors' behavior causing the most problems.
 - Complaints are usually directed at NCO's, rather than officers.
- Most attriters feel the military justice system is unfair. They feel the system is biased toward career men and also discriminates against enlisted men.
 - Most men, but especially attriters, feel it would be useless to complain about the misconduct of a supervisor.

- Most men would prefer to take their problems and complaints directly to a commanding officer rather than use the chain of command.
- This perception of an unfair system of justice frequently provides attriters their justification for attriting.
- Regimentation causes more dissatisfaction among seasoned men in the fleet than among recruits.
- The recruit training program causes problems for many recruits because they are not prepared for it. The features of recruit training causing the most dissatisfaction and leading most often to attrition are:
 - Fast pace
 - Regimentation for what is perceived as trivial matters
 - Supervisors' behavior and attitudes
 - Classroom pressures (in the Navy)
- Physical training, strict rules of authority, and having personal requests denied cause some dissatisfaction but rarely enough to lead to attrition.
- Among marines, men who attend a training school are less likely to attrite than men who do not.
 - Attending a "Class A" school in the Navy apparently does not affect likelihood of attriting.
 - Not receiving the training that was expected or promised is a frequent cause of dissatisfaction and attrition among sailors.

- Attriters, more often than adjusted men, are dissatisfied with the school training they received, but this, in itself, is rarely a primary reason for attriting.
- Dissatisfaction with duty assignment is not usually a cause of attrition.
 - The duty assignment experiences and work schedules of attriters and adjusted men are similar.
 - Concerning the effect on satisfaction, the most important aspect of a duty assignment is the supervisor's attitudes.
 - Married attriters in the Navy frequently report their attrition is caused, at least in part, by being at sea too often.
- The only group that expresses strong dissatisfaction with rank and pay is regular duty Marines, but they do not mention this as a reason for attriting.
- Attriters, as well as adjusted men, feel that medical care is important, and satisfaction with this is generally high.
- Interpersonal conflicts with other enlisted men are not a major cause of dissatisfaction or attrition.
- Administrative problems, such as not receiving proper pay, are only occasionally cited as causes of attrition.

4. Non-military factors

- Family problems are a major cause of attrition. this includes problems with wife as well as problems with parents and siblings.

- Many attriters said they went AWOL to assist their family in an emergency situation.

- According to the men interviewed, most spouses and girlfriends are not favorable toward the service, and many actually encourage their husband or boyfriend to try to leave the service.
- The social life available around the base or in the service generally is a cause of great disappointment for most men. However, this is not often an immediate cause of attrition.
- Drugs or alcohol are involved in about one out of six cases of attrition.

C. Factors Differentiating Attriters and Adjusted Men in Each Segment

Results in this section are based on the stepwise multiple regression analysis. For each sample segment, the three or four variables that have the largest independent effect in differentiating between adjusted men and attriters are presented. The cumulative variance accounted for by these variables is also listed.

1. Marine Recruits

<u>Factors Differentiating Adjusted Men and Attriters</u>	<u>Cumulative Variance Accounted For</u>
● Attriters more often believe that if they complain about misconduct of a drill instructor, they themselves would be harassed and nothing would happen to the drill instructor	.12
● Attriters less often participate in the delayed enlistment program	.16
● Attriters less often have fathers who are employed in higher level occupational positions such as managers	.20

2. Marine Regular Duty

<u>Factors Differentiating Adjusted Men and Attriters</u>	<u>Cumulative Variance Accounted For</u>
● Attriters are less educated	.09
● Attriters more often believe they would be harassed if they complained	.16
● Attriters less often attend training school	.20
● Attriters less often participate in the delayed enlistment program	.23

3. Navy Recruits

<u>Factors Differentiating Adjusted Men and Attriters</u>	<u>Cumulative Variance Accounted For</u>
● Attriters more often believe they would be harassed if they complained	.33
● Attriters less often sign up for a training school	.45
● Attriters less often participate in delayed enlistment program	.50
● Attriters more often have reading difficulty	.53

4. Navy Regular Duty

<u>Factors Differentiating Adjusted Men and Attriters</u>	<u>Cumulative Variance Accounted For</u>
● Attriters give less forethought to enlisting	.12
● Attriters more often believe they would be harassed if they complain	.20
● Attriters are less educated	.25
● Attriters are more often married	.27

IV. RECOMMENDATIONS FOR FURTHER RESEARCH

The study clearly indicates a connection between a number of organizational factors and attrition. During the study, however, certain other factors which appear to be tied to attrition came to light. These issues could not be examined further since they are outside the scope of the study. Since their relationship to the attrition problem is evident, it seems that further research into these factors would be productive in the construction of a data base from which the Navy can develop management options to gain control of the early attrition problem. These areas recommended for further study are outlined below.

- The study indicates that many first-term enlisted personnel consider the information they received from the recruiter about prospects for personal success in the Navy/Marine Corps environment to be incomplete and/or misleading. They also say that they were inadequately prepared for the rigorous training and discipline they encountered during recruit training. In some cases, the serviceman believes that a breach of promise was made. He therefore feels this is sufficient moral justification for not completing his obligated service.
 - The current recruit information and orientation programs should be closely examined to determine exactly what information and/or impression are being conveyed.

- Approximately 60 to 70 percent of the attriters interviewed did not receive counseling when the difficulties which led to their attrition first arose. Of this group, nearly half feel counseling would have been helpful.
 - Research should be conducted into the availability, administration, and use of counseling programs. Specifically, the differences in the type and amount of programs between the units with low attrition rates and those with high rates should be compared.

- The research should include an analysis of the attitudes of men subsequent to receiving counseling to determine the effectiveness of counseling relative to reducing early attrition.
- The Navy and Marine Corps do not maintain specific and readily available data banks of information on attriters relative to both the perceptions of the individual and his supervisors as to the root cause of his early attrition. This information would be helpful in developing management options to gain control of the early attrition problem.
 - A standardized questionnaire should be developed and administered to attriters who are about to be separated from the service as part of the exit procedure. The questionnaire should inquire into the causes of the attrition and what both the attriter and his supervisor feel might have been done to preclude his attrition.
 - The data from the questionnaire should then be compiled and summarized to indicate common areas of difficulty, etc.
- The study clearly indicates that conflicts with NCO supervisory personnel contribute to first-term early attrition. What are commonly identified as personality conflicts frequently involve disagreements over values, goals, and especially, norms.
 - Research should be conducted to determine the sources of the conflicts, their cognitive elements, and the perceptions of both groups as to appropriate methods of resolution.
- The study indicates that in many instances the inability of the serviceman to effectively communicate his needs or problems to his supervisor/instructor is a catalyst to the attrition process.
 - The issue of the communication gap between servicemen and their supervisors should be studied further to determine exactly what types of communication problems exist. Are the men afraid to express their

problems/questions? Are they overly aggressive in their relationships with authority figures? Are the supervisors themselves open to listening to problems and questions?

- Once the specific problem areas have been ascertained, an approach to tailoring a communication workshop specifically to the needs of the people involved should be researched.
- Attriters, both married and unmarried, frequently feel that resolving family financial problems takes priority over their obligation to complete their enlistment.
- Research should be conducted to determine how adjusted men with similar problems handle their finances.
- In addition, counseling programs should be evaluated in terms of their ability to help both the serviceman and his spouse when financial problems arise.

Job Changing Behavior of Young Men in the Civilian Labor Market

Andrew I. Kohen
Madison College

I. An Eclectic Conceptual Framework

The analysis of job mobility by young men in the civilian labor market may be based on any one of several distinguished traditions in economics.¹ On the one hand, there is the well established model of neoclassical micro-economic theory in which workers are theoretically motivated to move (between employers, occupations or areas) primarily (if not exclusively) by the existence of wage differentials. As a counterpoint, there is the more "institutionalist" school of labor market analysis that explicitly acknowledges the role of nonwage (noneconomic) factors in stimulating and facilitating job movement by workers. Closely allied to the first approach is human capital economics in which the mobility decisions and behavior of workers are conceptualized as (analogous to) decisions and actions of investors. That is, the decision to change jobs, occupations, or areas is viewed in terms of (the present value of) its costs and returns.²

Still another relevant perspective on the job changing behavior of young men may be drawn from the attempt to understand the contemporary simultaneous occurrence of the macroeconomic problems of unemployment and inflation. This area of inquiry spawned considerable interest in the micro-economics of job search behavior.³ Finally, there is the ongoing debate among economists about the existence and operation of segmented or dual labor markets in which worker mobility is a central issue.⁴

Believing that each of the foregoing approaches has something of value to contribute to understanding the mobility of young men, this paper employs an eclectic framework. At the outset it is important to emphasize that my focus is upon voluntary job shifts, i.e., those to which the theoretical approaches are most directly applicable. This is not to say the involuntary job separations by young men are either uninteresting or of no policy relevance. In addition, while it is possible to engage in lengthy debate about the meaning of "voluntary" job separations, use of the term in this paper adheres to the conventional one employed by the Bureau of Labor Statistics in defining quits.⁵

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1. For a general review of recent literature on labor mobility see Parnes (1970).
 2. See Becker (1964).
 3. See, for example, Lippman and McCall (1976) and Parsons (1975).
 4. See, for example, Andrisani (1973), Cain (1976), Doeringer and Piore (1970), and Edwards et. al. (1975).
 5. For an example of the substantive issues involved in defining voluntary separations see Hall (1972) and Kohen et. al. (1977), Chapter 5.

In the most general terms one can conceive of a young worker's likelihood of making a voluntary interfirm shift as being the result of an interplay between his propensity to make such a shift and his opportunities for doing so. Both a worker's propensity and his opportunities for changing jobs are, in turn, functions of characteristics of the individual, characteristics of the job that he holds, and characteristics of the labor market. For example, a worker's propensity to move should be expected to be inversely related to tenure in his current job. First, longer service provides a degree of protection against involuntary separation (layoff) and often represents a build up of rights to certain fringe benefits (e.g., vacation time). Second, "... it is reasonable to believe that the social and psychological bonds to a particular work place become stronger with the passage of time."⁶ From the opportunity perspective it may also be argued that increasing tenure is immobilizing to the extent that it represents a build up of job-specific skills which, by definition, are not transferable to other firms.⁷

Other personal characteristics that might be expected to affect the propensity to quit and the opportunity to do so successfully are various measures of the skills (or human capital) of a worker. Thus, on the one hand, it may be argued that age should inhibit a young man's propensity to quit by reducing the payoff period for a job change. On the other hand, it seems reasonable to expect that typical employer preferences along with child labor laws will make quitting less risky when a youth is in his twenties than when he is a teenager. Education is another trait whose theoretical impact on the likelihood of a voluntary job separation is ambiguous. Although more schooling enhances a young man's attractiveness to other employers, it also may represent greater skill in selecting a first job and greater costs of job search in terms of foregone earnings. Alternatively, if labor market segmentation theorists are correct in their assessments, voluntary shifts may be relatively more prevalent among both the very well educated and the very poorly educated.

Poor physical health also should be expected to impact on voluntary mobility by inhibiting the propensity to move because "... the risk of a leap into the unknown, which characterizes a job change under any circumstances, would seem to be more pronounced for men with impairments than for those enjoying good health."⁸ Additionally, health problems should reduce the opportunity to move by making a young man less attractive to alternative employers.

Finally, a young man's race may be expected to affect both his propensity and opportunity to change employers voluntarily. First, despite the proliferation of laws and some changes in social mores, hiring preferences of employers doubtless still favor whites. Second, the perception of racial discrimination in the labor market (irrespective of the accuracy of the

6. Parnes et al. (1975), p. 82.

7. Although of minor relevance to young men, tenure may, *ceteris paribus*, represent deterioration of job-search skills which both reduces a worker's propensity to move and limits the opportunities that he discovers.

8. Parnes et al., (1975), p. 83.

perception) may operate to reduce the proclivity of young blacks to quit their jobs, other things being equal.

Apart from the personal traits of a young man, the context in which he finds himself may be expected to influence the likelihood of his voluntarily changing jobs. First, there are characteristics of the specific job such as (1) whether the wages and working conditions are the result of a collective bargaining agreement, (2) the specific occupation, especially insofar as the occupation is incongruent with the worker's education and training, and (3) the wage rate itself. The latter should be expected, *ceteris paribus*, to be inversely related to the probability of quitting because it represents the cost of search (and/or the reservation wage).

Second, the "tightness" of the general labor market should affect both a worker's propensity to move by influencing his estimate of the availability of alternative jobs and by influencing his "true" opportunities to move.⁹ Thus, all other things being equal, we should have observed lower quit rates in 1975 than in, say, 1973. The hypothetical effect of the local area unemployment rate is rather more ambiguous. On the one hand, young workers in areas with high unemployment rates surely face fewer opportunities to change jobs and, therefore, may be more reticent to consider quitting. On the other hand, young men in these contexts may have relatively greater incentives than those in tight labor markets to leave the local area which almost inevitably implies a change of employers.

II. The Published Evidence

Turning to a consideration of published empirical evidence on the job changing behavior of young men unfortunately reveals only fragments of information, and even these are often only tangentially related to the central issue of why young men leave their first jobs. While the chroniclers of labor mobility all cite the higher rates of mobility among young men,¹⁰ there are almost no indepth studies that carefully test the hypotheses included in the framework outlined above.¹¹ Thus, the empirical findings presented here are (1) an amalgamation of results from different sources, (2) not necessarily consistent with one another, and (3) indicative of the need for more research.

Although it is a well known "fact" that very few young men remain with their first post-school employer throughout their work lives, relatively little is known with confidence about when the separation typically occurs or what the likelihood of its being voluntary is. Using data from the National Longitudinal Surveys (NLS) on men 20-24 years of age in 1966 who were out of

9. See Lippman and McCall (1976), p. 384-85.

10. See, for example, Gallaway (1969) and Parnes (1970).

11. For example, Ornstein (1971) analyzes the duration of a young man's first job rather than the probability of his voluntarily leaving it. While Andrisani (1973) studies the probability of young men leaving their first jobs, his research focuses on intersectoral mobility rather than on interfirm movement and does not distinguish between voluntary and involuntary shifts. Although Kohen and Andrisani (1973) do focus on interfirm shifts according to voluntariness, they employ rather crude statistical tools and do not restrict the analysis to moves from first jobs.

school, Parnes et al. estimated that about two-fifths of them had left their first employer by 1966 and of this group 77% had moved voluntarily.¹² Unfortunately, these data are less useful than they might at first appear because the time span during which the worker could have left his employer ranges widely from less than one year to as much as 10 years. Ornstein's analysis of men 30-39 years old in 1968 (whose first jobs were taken as early as 1945 and as late as 1961) indicates that about 85% of those who had left their first job by 1968 had done so voluntarily.¹³

In a study of young male workers in five companies in a large Northeastern city, Freedman found that about 70% of the movers left the companies (not necessarily the first jobs) voluntarily.¹⁴ Using the NLS data on men who were 17-27 years of age in 1969 and had been out of school for at least 3 years, Kohen and Andrisani found that about two-fifths had voluntarily left their 1967 jobs (not necessarily the first jobs) by 1969 and that voluntary movers constituted about 80% of all the job changers.¹⁵ Finally, a study of jobseeking behavior based on data from a supplement to the January 1973 CPS revealed that of those who had changed jobs during the year between January 1972 and January 1973, 65% of those 16-19 years of age and 62% of those 20-24 years of age moved voluntarily.¹⁶ It must be noted, however, that these figures refer to all young persons, irrespective of school enrollment status and sex.

The hard evidence on the correlates of voluntary job shifts by young men is equally fragmentary. Parnes et al. found no racial differences among 20-24 year olds in the probability that leaving the first job was voluntary, but they did find that increased education was associated with a higher likelihood that a young worker had quit his first job (given that he had left it). The latter association prevailed both among those whose first jobs were in white collar occupations and among those whose initial jobs were as blue collar workers. Further, the ratio of voluntary to involuntary separations was over 6-to-1 for white collar workers whereas it was only 3-to-1 for blue collar workers.¹⁷

Consistent with the reasoning described in earlier pages, the study of 17-27 year olds in 1969 by Kohen and Andrisani revealed that tenure with an employer substantially reduces the likelihood of a quit. For example, among those young white men whose 1967 job was in a nonprofessional white collar

12. Parnes et al. (1969), pp. 108-109.

13. Ornstein (1971), p. 345. It should be noted that Ornstein's definition of a job is rather peculiar in that it includes both the employer and the occupation. Thus, promotions within a firm are counted as separations from the first job.

14. Freedman (1969), p. 19.

15. Kohen and Andrisani (1973), p. 63.

16. Calculated from Rosenfield et al. (1975), Table A-1, p. 19.

17. Parnes et al. (1969), pp. 108-109.

occupation 50% of those with less than one year's tenure (as of 1967) had quit by 1969, as compared to only 16% of those with three or more years of tenure. This relationship also prevailed when race, beginning occupation group, and education were controlled. Thus, the quit rate among white operatives without high school diplomas was 59% if they had been on the job less than a year and 42% if they had been on it 1 year or more.¹⁸

However, in contrast to the findings of Parnes et al. cited above, voluntary separations were found to be less likely among high school graduates than among dropouts, controlling for occupation, race and tenure. This led the authors to suggest that "... less-skilled youth may be more venturesome in their labor market behavior and perhaps more attentive to alternatives for improving their economic position."¹⁹ Another interpretation of the finding is that education serves as a proxy for wage level and, therefore, (1) the opportunity costs of quitting and searching were lower for the less well educated and (2) the probability of improvement in wages for this group was greater. While Ornstein's data indicate that education and length of service on first job are positively correlated,²⁰ it is not possible to infer an inverse relationship between education and the likelihood of a quit. That is, this finding may very well result exclusively because the rate of involuntary movement is higher among less educated young men. Clearly, these less than completely compatible findings indicate the need for additional research.

Finally, the only study (as yet unpublished) using multivariate methods to analyze job changing by young men treats voluntary mobility somewhat peripherally in focusing on unemployment experience.²¹ Utilizing the job as the unit of observation (rather than the individual), this study's results indicate that during 1970-71 the probability that a young (19-29 year old) man's job would terminate in a quit was inversely related to the wage rate, tenure, having a work-limiting health problem, being married, residing in an area with a low unemployment rate, and to education. (The latter two traits were not significant among blacks). Many technical and methodological features of this study make it difficult to generalize the findings, although most of them are consistent with the conceptual framework described earlier.

III. Preliminary Findings from a New Study

In response to the dearth of confident conclusions that could be drawn from existing published research and data, a study focusing directly on the correlates of the probability of a young man quitting his first post-school job was begun. The study uses the NLS data and concentrates on young men

18. Kohen and Andrisani (1973), p. 63.

19. Ibid., p. 130.

20. Ornstein (1971), p. 336.

21. Kohen et al. (1977), Chapter 5.

who took their first jobs after 1966 and before 1970. A variety of technical problems related to computer processing have prevented the study from being completed at this writing. However, some of the preliminary results are presented and discussed below.

To begin with, it appears that racial differences in the likelihood of quitting the first post-school job do exist (Table 1). On the one hand, the most poorly educated black youth do appear less likely than their white counterparts to quit, perhaps reflecting the persistence of discriminatory treatment in what is often referred to as the secondary labor market. By contrast, the civil rights movement and/or heightened enforcement of equal employment opportunity laws seem to have led to a situation wherein young blacks with high school diplomas or college training were more willing and able to leave their first jobs voluntarily than were corresponding young whites.

Another apparent implication of these data is that there is an inverse association between the level of educational attainment and the probability of voluntarily leaving the first job within four years, although the association is more regular among white than among black youth. However, the data also indicate the complexity of the interaction among various personal characteristics. It can be seen that concluding that there is an inverse association may be too facile a generalization--i.e., the association is not independent of the occupation of the first job. Indeed, these data suggest that the inhibiting effect of education on quits operates only as long as there is not major incongruence between a worker's skills and the skill requirements of his job. Thus, increases in the quit rate may be observed among operatives as education increases from 12 to 13-15 years and among laborers as education increases from 9-11 to 12 years. By contrast, the quit rate declines monotonically with rising education among those whose first job was as a craftsman.

Also indicating the complex causal network are the data that demonstrate an association between hourly wage rate on first job and the likelihood of quitting that job. Among white high school graduates the association is regular and inverse, as would be suggested by the conceptualization of wages as the cost of quitting. However, among black high school graduates only an irregular inverse association appears, and among white high school dropouts there is no association evident. The data in Table 1 similarly suggest a complex relationship between the age at which a young man takes his first post-school job and the probability that he quits that job within the ensuing few years.

In order to identify more confidently the determinants of voluntary separations from first jobs, the data are being analyzed with multivariate statistical techniques. Results of the initial application of multiple (OLS) regression are discussed here, although more refined versions of the model are in the process of being tested. In order to allow for some of the nonlinearities suggested by the cross-tabular results, some of the explanatory variables are specified in dummy variable form. For example, educational attainment is included in the form of three binary variables representing completion of less than 9 years of formal schooling, completion of 9-11

Table 1. Probability of a Young Non-College Graduate Male Voluntarily Leaving His First Post-School Employer in the Late 1960's, by Race and Selected Characteristics^a

Characteristic	Whites		Blacks	
	Total Number (000's) ^b	Percent Voluntary Quits	Total Number (000's) ^b	Percent Voluntary Quits
Total	1,526	45.8	271	60.8
<u>Education</u>				
Elementary	101	60.3	39	58.3
H. S. Dropout	345	59.1	69	80.7
H. S. Graduate	751	42.1	131	54.1
College Dropout	329	35.6	31	48.3
<u>Wage on First Job</u>				
Under \$1.50	433	53.3	141	64.5
\$1.51 - \$2.00	294	51.4	65	72.4
\$2.01 - \$3.00	607	40.8	45	46.6
\$3.01 +	192	29.8	20	29.5
<u>Education and Wage on First Job</u>				
H. S. Dropout				
Under \$1.50	131	62.3	48	86.3
\$1.51 - \$2.00	73	65.3	c	c
\$2.01 - \$3.00	107	63.3	c	c
H. S. Graduate				
Under \$1.50	220	52.5	58	56.1
\$1.51 - \$2.00	153	42.2	34	66.2
\$2.01 - \$3.00	300	37.3	27	42.1
\$3.01 +	79	31.3	c	c
<u>Education and Occupation on First Job</u>				
H. S. Dropout				
Craftsman	57	78.0	c	c
Operative	153	61.1	c	c
Laborer	60	45.6	c	c
H. S. Graduate				
Clerk	70	50.8	c	c
Craftsman	91	43.0	c	c
Operative	261	32.6	41	46.6
Laborer	123	49.7	20	52.3
College Dropout				
Craftsman	63	18.9	c	c
Operative	57	41.0	c	c

(Table continued on next page)

Table 1 (Con't)

Characteristic	Whites		Blacks	
	Total Number, (000's) ^b	Percent Voluntary Quits	Total Number, (000's) ^b	Percent Voluntary Quits
<u>Education and Age began First Job</u>				
H. S. Dropout				
17	69	71.8	c	c
18	235	49.4	49	78.1
H. S. Graduate				
17	130	43.7	c	c
18	281	38.7	67	55.2
19	141	43.4	23	44.5
20-21	117	46.7	c	c
22+	83	42.5	c	c

Source: National Longitudinal Surveys

- a. Universe consists of males 19-29 in 1971 who took their first jobs between 1966 and 1970, were older than 14 at the time of taking the first job, had completed less than 16 years of formal schooling, and were employed in 1971.
- b. Analyses were based on weighted sample cases. For details on sampling and weighting see Kohen (1977), Appendix D.
- c. Figures not shown where category contains fewer than 15 sample cases.

years, and completion of some college, respectively. Thus, the reference group is high school graduates who did not attend college and the regression coefficient for each dummy variable is interpretable as the net difference between being a graduate and being in that particular education category.

The other variables included in the regression model considered here represent both the personal and contextual characteristics hypothesized to affect the likelihood of quitting the first job. Those representing personal traits are as follows: a binary variable for race,²² a (continuous) measure of the age at which the youth took his first job,²³ and a (continuous) measure of general ability/labor market information.²⁴ The variables representing contextual factors are as follows: the hourly wage rate on the first job²⁵ and two binary variables representing incongruence between the youth's education and the education "required" by the occupation that he held on his first job.²⁶ The first is coded "1" if the worker was "overeducated" and the second is coded "1" if he was "undereducated."²⁷ Finally, the model contains dummy variables representing the year in which the first job was taken, in order to control for the relationship between the likelihood of a quit and the length of time allowed for it to occur.

The results of the regression analysis provide support for some, but not all, of the hypotheses suggested in the conceptual framework presented above (Table 2). There is strong evidence that the probability of quitting is negatively related to the major monetary cost of search--i.e., the wage -- even controlling for other factors. Specifically, a 50¢/hour (or about 25 percent) increase in hourly pay decreased the likelihood of a quit by about 4 percentage points. There is also confirmation that, ceteris paribus,

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22. The variable is coded "1" for whites. Although the NLS data contain a limited sample of nonwhite-nonblacks, they have been eliminated from this analysis.
 23. Those who took their first jobs prior to age 15 have been eliminated from the analysis.
 24. The variable is the score on a labor market information test administered to the NLS panel in 1966 and has been shown to be highly correlated with an independent measure of mental ability. See Parnes and Kohen (1975).
 25. The wage rate has been adjusted to reflect constant (1966) dollars by deflating it by the CPI for the year in which the first job was taken.
 26. The education "required" is identified as the GED rating of the Census three-digit occupational category.
 27. Alternative definitions of over- and under-educated are being tested. The definition used here is based on the absolute difference between education and education required being greater than 0.4 years.

Table 2. Regression Results - Determinants of the Probability of Voluntarily Quitting the First Post-School Job Between 1966 and 1970

(Coefficients shown in percentage points)

Variable ^a	Coefficient and absolute value of t-ratio	
ELEMENT	3.1	(1.36)
HSDOUT	12.5**	(2.55)
COLDOUT	5.3	(0.76)
ABILITY	0.7*	(2.20)
RACE	-13.8**	(2.39)
WAGEFST	-8.8**	(3.48)
AGEFST	-0.5	(0.00)
FSTJ66	29.4**	(4.86)
FSTJ67	18.8**	(2.75)
FSTJ68	6.6	(0.85)
FSTJ69	10.0*	(1.79)
INCONHI	1.6	(0.34)
INCONLO	6.5	(0.39)
CONSTANT	39.9	
R ² (adj.)	.124	
Number of Sample Cases	607	

Source: National Longitudinal Surveys

a. For details on variables see text, text footnotes and Appendix Table.

** Significant at the .01 level

* Significant at the .05 level

young men with greater mental ability/more information are more likely to leave their first job voluntarily. By contrast, the net impact of formal schooling is not monotonic -- i.e., high school dropouts are significantly more likely than graduates to quit, but neither those with only elementary schooling nor those with some college are significantly different from the diploma holders. This parallels the findings presented in the cross-tabulations.

The results also indicate that in the late 1960's there was a significantly lower likelihood that a white youth would quit his first job than would his black counterpart, other things being equal. This suggests that the buoyancy of the economy and the civil rights activity of the period outweighed the real and/or perceived racial discrimination in the labor market decisions of young black men.²⁸ Furthermore, there is no support for the hypothesis that the older a young man is upon entering his first job the less likely that he is to quit. Additionally, the measures of incongruence between the worker's skills and the skill requirements of his job are not statistically significant. However, more refined and different measurements of the concepts are being tested prior to abandonment of the hypothesis.

IV. Implications for Attrition from the Volunteer Armed Forces

All in all, the present state of our knowledge about voluntary job separations by young male civilians offers only a few implications for those concerned with manpower policy for the volunteer armed forces. There is some evidence that improved opportunities in the civilian labor market for better educated young black men may exacerbate the attrition problem of the armed forces. That is, the relative attractiveness of military service as an escape--even if only temporary--from racially discriminatory treatment may well have declined. Indeed, in the late 1960's young black workers were more likely than their white counterparts to quit first civilian jobs, all other things equal. Second, there is some evidence that mismatching the skills of a youth and the skill requirements of his job assignment lead to an increased likelihood of his quitting. This may imply that greater care in assessing the occupational abilities (and interests) of young entrants to military service could reduce voluntary attrition. In addition, while there is no apparent reason for armed forces recruiters to focus on any particular age category of youth, data on civilian job changing do support the emphasis on attracting high school graduates. Interestingly, the civilian data would also support efforts to recruit from a group that is currently relatively neglected, namely college dropouts (and/or graduates of junior colleges). Finally, to the extent that military rates of pay are "too low," there are definite incentives to opt out of the armed forces.

28. Of course, the race variable may still be representing unmeasured characteristics (e.g., socio-economic background) that influence quit behavior, and the inference in the text is therefore speculative.

V. A Brief Postscript

In reflecting upon the issues raised during the conference and those addressed in this study, there seem to be two that merit further comment. First, several of the conferees emphasized the role of attitudes in the causal nexus underlying the decision to quit a job. While job dissatisfaction and/or unrealized expectations may be causes of quits, it seems equally plausible to argue that such attitudinal measures are mainly intervening variables that represent the real cause, namely inadequate or misinformation. The preliminary empirical results of the study reported here certainly support the important role of information. However, more conclusive results must await examination of analyses that contain both measures of information and attitudes. Furthermore, it is important to bear in mind that a strong propensity to quit (e.g., in the form of a strong assertion of dissatisfaction) will not necessarily eventuate in a quit if the opportunities for improvement do not exist or are not perceived.

Second, there does seem to be the potential for a true crisis in the availability of human resources for the U.S. armed forces resulting from the joint effects of "high" first term attrition and a secular decline in the population base from which recruits typically have been drawn. However, the growing civilian labor force participation of young women and the apparent change in fertility expectations (plans) may augur well for this problem, if many armed forces occupations can be made to be seen as viable options for young women. Of course, this would require some restructuring of the internal organizations of the armed forces along with a substantial reorientation of recruiting strategies and techniques.

Appendix Table: Means and Standard Deviations of Variables Used in the Regression Model to Explain Voluntary Quitting of First Post-School Jobs by Young Men

Variable Name	Unit of Measurement	Mean	S.D.
QUIT	Binary (1 = quit first job)	0.481	0.50
ELEMENT	Binary (1 = less than 9 years of school)	0.08	0.27
HSDOUT	Binary (1 = 9-11 years of school)	0.23	0.42
COLDOUT	Binary (1 = 13-15 years of school)	0.20	0.40
ABILITY	Test score	33.4	7.4
WAGEFST	Dollars	2.09	0.96
AGEFST	Years	19.1	2.0
RACE	Binary (1 = white)	0.85	0.36
FSTJ66	Binary (1 = first job began 1966)	0.52	0.50
FSTJ67	Binary (1 = first job began 1967)	0.13	0.33
FSTJ68	Binary (1 = first job began 1968)	0.08	0.26
FSTJ69	Binary (1 = first job began 1969)	0.10	0.30
INCONHI	Binary (1 = overeducated)	0.78	0.41
INCONLO	Binary (1 = undereducated)	0.15	0.36

Source: National Longitudinal Surveys

Note: For more details on variable construction see text and footnotes to text.

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TURNOVER - One Company's Approach

William C. Belknap
Xerox Corporation

My reason for being here is to share with you what one company's approach is to understanding and correcting a turnover problem--in our case, Sales Rep turnover.

From what I have heard in both the formal presentations and in the informal discussion sessions, American industry shares many of the same issues as does military in dealing with turnover. These issues are realistic job expectations, the work itself, quota pressures, performance, quality hires, marginal performers, and management asking us to create "the answer" to solve the turnover problem.

WHAT IS TURNOVER? Turnover is anyone who leaves Xerox. This is obviously a macro-definition; however, it is important to look at the macro-definition first for a couple of reasons:

1. For manpower planning purposes in order to plan hiring activity and training activity.
2. To force ourselves to deal with the total cost of turnover.

HOW DO WE TRACK TURNOVER?

- We track voluntary turnover and involuntary turnover in much the same way you do.
- We also look at turnover by Government Job Category. This means we look at Officials and Managers as one category; Professionals as another; Technicians as a third; and Salespersons as a fourth, etc.
- We also track turnover by job title. This tells us what kind of Sales Rep is leaving. Is it an Area Sales Rep--which is our new recruit? Is

it a Senior Sales Rep or a Sales Exec--one of our more experienced people? This helps us to take a rifle shot approach to the problem job.

- We also look at key demographics such as location; i.e., is one part of the country having a more serious problem than another?
- We look at it by sex. Are females leaving at a greater rate than males?
- We look at it by race. Are there minority groups that are turning over faster than non-minority groups?
- We also look at tenure. And by this we mean both Xerox tenure (how long have they been with the company?) and job tenure (how long have they been in their current assignment?).
- We look at performance--are we losing good performers?
- We also look at age. Are a disproportionate number of older employees leaving versus younger employees?

Fortunately, we are able to get this tracking data fairly easily from our computerized Personnel Information System.

OTHER SOURCES THAT GIVE US FEEDBACK ON TURNOVER.

Our Exit Interview Process. Although it is after the fact, we try to determine at the time of the exit interview, what some of the key issues were that influenced an employee to leave the business. For our sales territories, we send out a questionnaire thirty to sixty days after they leave the business. This 30-60 day "cooling off period" helps to eliminate what might otherwise be biased responses. The questionnaire, like the exit interview, is geared to give us the "real reasons", if you will, for the person deciding to leave the business. We have also done some work with phone interviews, but have not found this to be particularly productive because people are difficult to locate and the work has to be done in the evenings.

We also have a National Trend Attitude Survey which is an ongoing attitude survey process in which we not only measure the attitudes of our employees; but we ask them directly whether they plan to be with Xerox a year from now.

Now let's talk a little bit about why sales people have been leaving Xerox?

First, the selection process. We find one of the biggest problems in the selection area is that the sales job is frequently oversold to the applicant.

The second key problem is one we call orientation. And within the orientation issue is not only how was the employee oriented into the company--welcomed, if you will, (first 30-60 days); but also how was the orientation into the job. With the selling job, it's very important that a new Sales Rep be able to sit down with the previous Sales Rep in the territory he or she is about to receive and go over in great detail the kinds of accounts, the key contacts, what opportunities exist and what are the major problems, in order to have a successful orientation.

The third area is the work environment. The key point here is peer group acceptance. How quickly is a person accepted in the "tennis clique" or "golf clique"--the more qualitative aspects of the job. This seems to be a particularly strong issue with minorities and females who leave the business. And what comes back to us is the fact they never felt like they were really accepted by the informal peer group, even though they may have received excellent orientation into the job and into the company.

The fourth area is success in training. This boils down to how well did they do while they were here at Leesburg. To the extent they have a good training experience, they are not nearly as prone to leave as those who who did not feel their experience prepared them for their job.

The fifth area is performance. For our Sales Reps this boils down to "am I selling and how well."

The sixth area is communications. Here the concern centers around whether the employee hears more through the grapevine than he does from his manager.

The seventh is management practices. This means how does my manager treat me as a person. Is he or she supportive? Are my objectives clearly stated? Does he or she listen with understanding? And is my performance appraisal fair? And that's an interesting one because it's not an issue of whether the performance appraisal was a good one, but whether it was fair. And that loops back to whether there were clear standards of performance spelled out for the employee. If there were clear standards of performance spelled out and the employee doesn't do well against them, he or she is less likely to feel negative than if the standards were not clearly spelled out and the employee was surprised by a lower than anticipated performance appraisal rating.

The last major area is career opportunities. How good a job does my manager do of discussing the management and non-management opportunities; whether or not I get proper career counseling; or said more simply, how well does he or she communicate my chances of progressing within the organization and what will the requirements be if, indeed, I want to move out of the sales ranks into a management or staff assignment.

The last thing we really want to talk about is what are some of the things we have done to correct the turnover problem.

- The first is that we are going to experiment with a video tape that addresses the realistic job preview issue. This will be a tape that covers both the good points of the selling job and the bad points. The objective of this realistic job preview is to allow applicants to select themselves out prior to the final decision to hire and therefore prevent future turnover.

- The second action has been to concentrate on improving the interviewing skills of the managers who conduct the interview.

- The third area deals with management development and training. Here, we have developed our management practices program which is specifically geared to deal with those areas that our people tell us our managers have difficulty with. For example, setting performance standards and objectives, being able to give positive as well as negative feedback to an employee, or how to explain affirmative action, etc.

- The fourth action has been in the area of career planning support. Here, we have created our Career Information Center which includes resources at the subordinates' disposal to help them do a better job of understanding their strengths and weaknesses and devising action plans to build on strengths and weaknesses. It also contains a video tape library where an employee can see and hear the manager of a particular area explain the kinds of responsibilities and career paths in that area and what the requirements are for coming into the area.

- The last key corrective action has been the implementation of our Metro-Personnel Manager in seven major metropolitan areas. This is a full-time person devoted to supporting the branch in the area of selection and retention of quality Sales Rops.

Organizational Effectiveness and Military Personnel Attrition:

DOD Management, Policy, Research Issues,

and Some Military Service Alternatives

Ralph R. Canter, Ph.D.

Chief, Personnel Accessions and Utilization Technical Area

U. S. Army Research Institute for the Behavioral and Social
Sciences

This paper discusses some consequences of DOD management, policy, and research in the volunteer force time period, and probable effects on attrition and retention of military enlisted personnel.

I am attempting to determine if military personnel attrition is an increasing problem because DOD is not very effective as an organization in dealing with such problems. My perspective is that DOD is a management system, which has certain "system consequences" as a result of how it performs its organizational functions. I look at first-term enlisted attrition as a system problem, and therefore as a problem which should be examined in the context of how DOD functions.

I am using the concept of organizational effectiveness as a kind of a rough model for making this examination.

Organizational Effectiveness

What, then, is meant by organizational effectiveness? OE generally refers to a process involving a set of procedures used to solve organizational problems or attain improved performance. (Chart 1) The procedures generally are: diagnosis or assessment of an organizational problem, planning a course of action, implementing the action, and evaluation of the outcome.

The OE process frequently makes use of diagnostic instruments--such as survey questionnaires on attitudes, job problems, barriers to proper

CHART 1

ORGANIZATIONAL EFFECTIVENESS

A SYSTEMATIC PROCESS:

- * DIAGNOSIS/ASSESSMENT OF AN ORGANIZATIONAL PROBLEM
- * PLANNING A COURSE OF ACTION (INTERVENTION)
- * IMPLEMENTING THE ACTION
- * EVALUATION OF OUTCOMES

organizational functioning, and the like. The OE process also involves intervention strategies, that is--what alternative actions are possible and then the selection of one or more to implement. Examples are job enrichment, redesign of jobs policy changes, reorganization, etc. OE evaluation means comparing the outcomes or effects against independently developed objectives or goals or criteria.

Let me first sketch out some of the variables, dimensions, and parameters of my concept of the system problem, using the OE process as a kind of a rough model

The Mentality of Economic Incentives

In the all-volunteer force period we have seen the rise of what I call the mentality of economic incentives. The immediate OSD and Congressional reaction with the advent of the volunteer force was to decide that enlistment bonuses were necessary to attract sufficient "quality" of personnel. In OE terms, there was a diagnosis, an intervention, and implementation. Let me now show you a viewgraph displaying one analysis which was performed in 1973 with survey data collected in 1972 (Chart '2).

This display presents a alternative diagnosis of a part of the problem. You will note that the bonus attracts no "A" students, but "D" students are definitely attracted by dollars. Thus, as such, it seems rational, sensible from what we know about the psychology of able, high-quality youth. Unfortunately, the "economic incentive mentality" that has dominated in OSD strongly resisted this diagnostic statement of the problem and pushed hard for combat arms bonuses on the order of \$2500 to attract "quality." In our OE framework, the bonus operated as an "intervention." The facts of first-term attrition show that millions of dollars of bonus money has been lost; attrition due to failure is heaviest among the lower aptitude youth. Thus, one kind of evaluation would be that the intervention did not solve the "quality" problem. If it had, few bonus receivers would be found in the attrition group.

Of course, the bonus has other objectives, such as attracting sufficient numbers of applicants so that selection can operate. And indeed I believe this may be the case given that--by and large--no serious shortfalls occurred during the first three years of the all-volunteer force. But the cost has been large.

Thus, as usual, the story of a problem, an intervention, and an evaluation makes a mixed picture.

CHART 2

GILBERT YOUTH SURVEY - NOVEMBER 1972

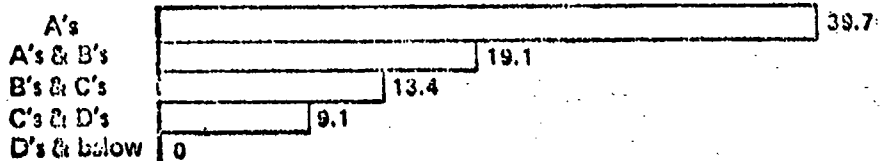
INCENTIVE THAT WOULD MOST LIKELY INDUCE ENLISTMENT, ANALYZED
BY AVERAGE GRADES IN HIGH SCHOOL

INCENTIVE

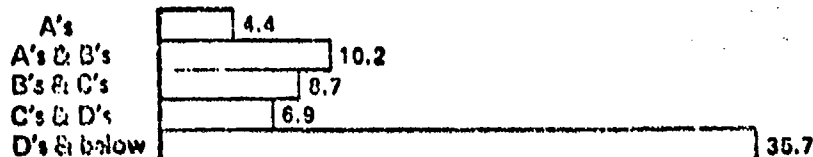
MALES STILL IN HIGH SCHOOL

(RANK ORDER BY LARGEST % CHOICE)

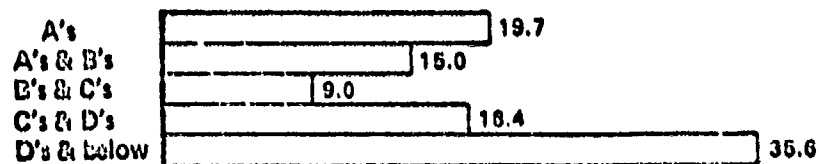
① GOV'T PAYS FOR UP TO 4 YRS COLLEGE IN RETURN FOR 4 YRS SERVICE



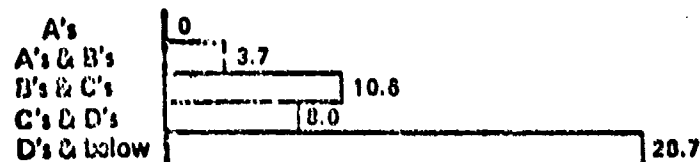
② WOULD PROVIDE TRAINING IN A CIVILIAN SKILL



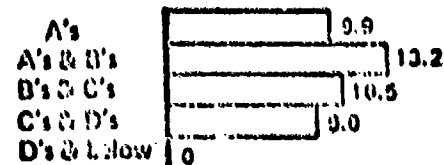
③ GOV'T PAYS UP TO \$200 A MONTH FOR UP TO 4 YRS COLLEGE



④ BONUS UP TO \$3,000 FOR ENLISTING 3 YRS



○ NONE



Low Aptitude

Let us look at some other issues. In connection with an OSD-funded research project (Project UTILITY) contracted with the Human Resources Research Organization in the 1967-1970 time frame, we had an analysis made of aptitude data in relation to a job performance standard, and eligibility for reenlistment.

Project UTILITY administered on-the-job performance examinations and obtained solid evidence of job proficiency of Category IV personnel compared with Category I, II, and III personnel in 4 Army MOS's. The next two charts (Chart 3, Chart 4) present these results.

Several results should be noted in Chart 3. About half the Category IV men are performing satisfactorily, and about two out of three of the Category I, II and III men. Little difference existed between the high and low IVs in job performance. However, a larger proportion of high IVs were eligible to reenlist.

Chart 4 presents the same data displayed by reenlistment eligibility against the job performance pass-fail criterion. Here one notes that Category IV personnel are about equally divided in the cells. But note that--in this 1969 time period--about one-third of those eligible to reenlist across all the aptitude category breakouts were judged as not performing satisfactorily on the job. (We were not able to find out who did attrit and who did reenlist but assuredly some did).

One concludes that our aptitude measure will tell us who is a Category IV; it will not tell us which one of two is going to go to perform successfully. We will do about as well by flipping a coin to make the decision.

In regard to the research stemming from Project 100,000 in the 1966-72 time frame, some of us discussed what factors were involved in Category IV performance, especially those who did not complete high school. They appeared to have very poor work habits, did not know or understand what is expected of them, did not know what it is they do (what behavior) that gets them into trouble, have had little or no success experience in school and with written materials. Yet they seemed to vaguely know they wanted to belong to something, wanted to contribute, and wanted to succeed.

Again, we had a diagnosis. It appeared that a new kind of intervention was required by means of research and development to find ways to sort out these Category IVs, predicting who can succeed and who cannot. I will return to this point later.

CHART 3

PROJECT UTILITY DATA

APTITUDE IN RELATION TO JOB PERFORMANCE
AND RE-ENLISTMENT ELIGIBILITY

% MEN LESS THAN 19 MONTHS ON THE JOB IN 4 ARMY OCCUPATIONS*

DIRECT MEASURE OF <u>JOB PERFORMANCE</u>	LOW <u>IV</u>	HIGH <u>IV</u>	CATEGORY <u>I, II, III</u>
PASSED MINIMUM STANDARD	48%	50%	69%
FAILED MINIMUM STANDARD	53	49	31
ELIGIBILITY FOR <u>REENLISTMENT</u>			
ELIGIBLE	59	79	97
NOT ELIGIBLE	42	20	3

* ARMOR CREWMAN, VEHICLE REPAIRMAN, SUPPLY CLERK, COOK

CHART 4

PROJECT UTILITY DATA

	JOB	LOW	HIGH	CATEGORY
	<u>PERFORMANCE</u>	<u>IV</u>	<u>IV</u>	<u>I, II, III</u>
ELIGIBLE TO	PASSED	29%	41%	67%
REENLIST	FAILED	30	38	30
NOT ELIGIBLE	PASSED	19	9	2
TO REENLIST	FAILED	23	11	1

Retention Philosophy

A persisting philosophy in OSD is that the military services must operate with a constant promotion flow, i.e., "up" or "out". The 1976 Report: Defense Manpower by the Defense Manpower Commission, dealt with this topic as a substantive issue. However, there appears to be a serious lack of emphasis upon examining this philosophy from the viewpoint of those affected. Many scattered comments over the years indicate that a number of non-promotees believed they were performing quite satisfactorily at their grade level and would be happy to continue non-promoted until the age of 60 or so.

For example, E-4 bus or truck drivers leave service to become civilian bus or truck drivers until their retirement. At the present, all I want to do is note a diagnosis of "up" or "out" as a source of attrition. It would appear that differential management of occupations, using different standards and rules, could be developed and tried as an intervention. Intensive and extensive studies of the subject populations would be required, with appropriate evaluation procedures. However, the persisting system operational policy in DOD appears to deny such large-scale research.

The Manpower Requirements Reduction Thrust

Commensurate with the "economic incentive mentality" and the other ways the DOD system functions, is the perennial thrust to reduce manpower requirements. The thrust is to reduce overhead, to reduce so-called non-essential functions, to establish mystical, reified ratios, to create uniformity in operations, to reduce the "teeth to tail" ratio. However, as one general officer expressed it, "if we cut off more of our tail, we are going to fall on our teeth."

A favorite target the last few years has been those positions which imply "counseling." I need not try to describe the kinds of "horror" stories portrayed by the requirements analysts, to make these positions and their duties appear frivolous, non-contributing, unnecessary overhead functions. Yet these same analysts quite vigorously attack the military services for having personnel attrition.

The so-called "counseling-type" tasks are the ones that the military units and organizations call for repeatedly to help in solving personnel problems which are involved in attrition. Counseling, too, is an intervention strategy, and one which the Services have attempted to preserve and use.

The Literacy Question

One particular aspect in counseling comes to mind. A number of efforts have been called for and initiated to help solve the problem of low level of literacy found in many volunteers. Remedial job-related reading training and counseling programs have been established. Efforts are underway to reduce the necessity to use technically-written materials. "hands-on" training and testing methods are being developed and installed.

Again, much of this effort is concerned with "cognitive" aspects of military service. What about the "non-cognitive" aspects of literacy? As observed earlier, we felt that low-aptitude individuals more frequently got into trouble because they did not understand what was expected of them, did not understand what they were supposed to do, and did not understand that the behaviors they exhibited got them into trouble. I suspect that literacy problems lead to a loss of contact with peers and organizational functioning, and a general lack of awareness of what is going on. Is "unsuitability" a literacy problem, more than something else?

Here then, I have a possible example of interventions which are not fully relevant to the problem. Before more interventions - "cognitive literacy training" - are undertaken, a much more comprehensive diagnosis, through a sustained research project, seems required.

Perhaps underneath, this is what the manpower requirements analysts are really talking about.

Measurement of Aptitudes for Military Service

I now wish to return to the problem of measurement of aptitudes for qualification, classification, and assignment of the individual in the military services.

In mid - 1975 the Assistant Secretary of Defense (Manpower and Reserve Affairs) made a management policy determination that the Armed Services Vocational Aptitude Battery in use in the high school testing, counseling, and guidance program in support of the military recruiting system, would be used as the single DOD accessioning qualification, classification, and assignment measure by the military services.

The next chart (Chart 5) provides strong evidence that the ASVAB, which was implemented operationally by DOD directive effective 1 January 1976, could be a faulty instrument which is contributing directly to the problem of attrition. This chart shows for Army MOS.63C (Tracked Vehicle Mechanic)

CHART 5

MOS 63C

(TRACKED VEHICLE MECHANIC)

TIME FRAME	NUMBER STUDENTS INPUT	PERCENT STUDENTS GRADUATED	PERCENT ACADEMIC FAILURES	PERCENT NONACADEMIC LOSSES
<u>CY 75</u>				
Q1	636	93.7	2.2	4.1
Q2	502	86.7	0.8	12.5
Q3	541	90.9	0.6	8.5
Q4	602	91.4	1.8	6.8
TOTAL	2281	90.9	1.4	7.7
<u>CY 76</u>				
Q1	992	93.5	1.3	5.2
Q2	921	76.3	7.9	15.7
Q3	760	79.5	7.2	13.3
Q4	894	89.9	6.5	3.6
TOTAL	3572	85.2	5.6	9.2

the number of students entered into training courses, percent of students graduated, percent of academic failures, and percent of nonacademic losses. This last category includes losses due to disciplinary and motivational problems, administrative expedience (i.e., Trainee Discharge Program, Expeditious Discharge Program), physical reasons, personal problems, and erroneous enrollment. Most nonacademic losses are losses to the Army. Some academic failures are losses to the Army, but most are reclassified.

We observe that the percent of students graduated declined notably from about 91% in 1975 to 85% in 1976. Most of this decline is attributed to a large increase in academic failures from 1.4% in 1975 to 5.6% in 1976. The remainder of this decline is due to a 1.5% increase in non-academic losses.

Note that the academic failure rate for the first quarter of 1976 remained very close to the overall figure for 1975. A huge increase in academic failure rate occurred in the second quarter of 1976 and was sustained throughout the remainder of the year. Since the ASVAB became operational in January of 1976, the first recruits who were administered the ASVAB entered the 63C MOS course in late March or April--the same time frame in which the academic failure rate increased drastically.

The Armor School has indicated that the primary reason for academic failures seems to be a lack of sufficient reading comprehension ability for Army training literature and technical publications, which are written to the eighth grade level. Thus, these data suggest that the ASVAB fails to provide a standardized measure of reading comprehension which was available in the previously operational test battery--the 1973 Army Classification Battery.

In sum, a DOD system need (to have one accessioning instrument) was diagnosed, and an intervention strategy was implemented. This one small data set indicates that an evaluation would show that the ASVAB is probably not now an adequate solution for that and a number of other problems.

The Research, Development, Test, and Evaluation (RDTE) Function in the DOD System

I believe it is normally thought that the R&D function in the DOD system is the means by which such a pervasive system problem (as enlisted attrition appears to be) can be dealt with on a scale that equals the size of the problem. I now want to examine this view.

A subcategory of the RDTE budget provides funds for the Training and Personnel Technology Program, amounting to less than 1% of the total DOD RDTE budget. This R&D program is the only R&D category available for the kind of research I have in mind for dealing with attrition as a DOD system problem. Obviously, in its aggregate, the amount of funding becomes very small given the numbers and sizes of military "people" problems.

With reference to our organizational effectiveness schema, how well can this program serve the various disparate functions of diagnosis, interreaction and evaluation?

First, by historic DOD definition, this R&D program is technology - centered - not problem centered. As a technology it addresses such matters as measures which can be used in diagnosis, in evaluation, and so on. But it does not address something as complex and complicated as attrition - the problem. Here, then, we have that constant serious gap in the interface of R&D with the real world problems. We produce technology pieces - by design; we are unable to organize a direct attack to do "problem" research.

But even within the technology approach constraints, we have problems. Let me elaborate briefly. The Office of the Director of Defense Research and Engineering has promulgated a view that DOD selection and classification technology is "mature" and that little additional R&D is needed. (Yet we can observe that we are very likely suffering from a serious problem with ASVAB')

In the ODDR&E view there appears to be an implicit assumption that another category of funding - Operations and Maintenance funds - would be provided to do test improvement work, new validation studies, development of new forms, and the like. But no DOD organizational implementation (or arrangement for budgeting responsibility) was worked out with the O&M agencies at the DOD or service levels. This leaves the personnel research R&D funding at a questionable level - and the laboratory researchers "in a hole" because the services' personnel managers demand more research on the attrition problem: the extra effort is not available. What is provided is at considerable cost to other projects.

But even more disconcerting is the inability to mount large-scale RDTE field research projects designed to look at the entire personnel management system with controlled experiments to track the variables which operate in real time to produce attrition. Do we think these can be sold at a cost of \$2 or 3 million dollars under the heading of "attrition technology?" We can do small prototype, data-intensive, small sample,

empirical work involving micro-managed peices, but to undertake the major meaningful efforts seems to be out of the question when RDTE funds are involved. Perhaps a possible outcome of this conference could be a major coordinated initiative to launch this kind of large-scale project to directly address the attrition problem with its many system parameters.

In sum, from the perspective of organizational effectiveness the RDTE function of DOD does not appear at present to be very effective in providing the necessary means to improve the DOD system - it appears to be a significant part of the problem.

Other Issues

I now want to list a couple other outstanding issues in the attrition area which the OE schema helps identify.

- * DOD, with OSD as the center-piece and the prototype, functions with all the characteristics attributed to large organizations: rife with organizational paradoxes, with "back-stabbing," with power politics. A consequence may have been the demise of the Office of the Deputy Assistant Secretary of Defense for Education. This office was an active proponent in DOD for maximizing cooperation with the U.S. Office of Education to install and use the "career education" program. Career education is a system approach to the development of skilled youth. As such, it is attractive as an incentive to a large number of non-college youth, including a substantial number of high school graduates. While some comparable efforts have been initiated by the individual services, a DOD-wide program in this area would likely have had a major effect in increasing the attractiveness of enlistments. My point here is that a number of youth say they leave service because they were not getting the "employable skill" training they wanted. Hence, this intervention strategy was lost.
- * Another complex issue involves personnel management by individuals vs. management by units. Briefly, it appears that numerous personnel system management problems can be dealt with more effectively by having centralized control of assignments of individuals. However, a lot of past research and analysis tells us that "belonging to a group" is an important incentive. The disruption caused to the group by constant change in members may be a strong negative for continuation in service. It may be that peers can control attrition, possibly especially of

higher quality enlistees. Here, I proffer an example of a possible inadequate diagnosis of a factor in the attrition problem.

- * Lastly, let me mention simply that we do not have a good understanding of the interaction effects present in the dynamics of manpower and personnel management. There is a serious need to capture and measure these dynamics - which operate in real time - minute by minute - so that we can provide tools to policy formulation. In this case, I am talking again about the ability to diagnose and then to plan, action strategies and programs.

What to do?

Large-scale, well-designed, long-term, and focused field experiments equivalent to the HEW "negative income tax" experiments seem to be needed to capture the basic problems in attrition and to try to reduce these problems. What are possible projects?

One is to find alternative processes for the personnel management system. At the moment I can only suggest some of these possibilities:

- (1) A "fast track" for exceptionally able military-career minded youth which will lead to early leadership training and assignments.
- (2) A precise assignment process for those who know what they want, who qualify handsomely, and who get it.
- (3) A flexible accessioning, training, counseling, and assignment process for those who are uncertain and are searching.
- (4) An "assessment center" process for the "marginal" applicants, with carefully designed "hands-on performance" measures which are predictive of various utilization alternatives.
- (5) An exploration of Reserve Components' units as a process for bringing qualified personnel to active component assignments.

All of the above make a variety of OE assumptions - that these diagnoses, that these intervention strategies - are realistic and can be undertaken. These assumptions - in OE terms will have to be "evaluated carefully" with respect to their possibility of surviving in a climate of "organizational ineffectiveness" that is, therefore, generally hostile.

Minimizing Adjustment Problems and Attrition Rates of
Minority Military First-Term Enlisted Men

Louis E. Jenkins

Pepperdine University

Abstract

The effectiveness of behavior rehearsal as a resocialization strategy with individuals who experience adjustment problems and minimal coping repertoires in military life is explored. Determinants of attrition are discussed in connection with theoretical and empirical research. Special consideration is given to a study that details the use of behavior rehearsal with high-risk college freshmen. Salient findings from this study are related to problems encountered by minority military first-term enlisted men in which emphasis is placed on the implementation of behavior rehearsal.

Frequently, the problems of adjustment and attrition among minority military first-termers have involved inability to develop a broad-based coping repertoire. Several researchers have examined these adjustment problems to acquire sufficient coping repertoires by study of processes of socialization and enculturation. It is within these two processes that the development of coping skills must be understood. To ensure clarity of understanding, the concepts of socialization and enculturation used in this paper are those employed by Friedl (1976), Gilmore (1974), and Slotkin (1952). According to Slotkin, socialization is the process by which traits are individually acquired in response to being reared in certain kinds of social environments in which each individual learns these traits by himself rather than adopting them from others (i.e., the child selects and adopts a given type of behavior). Similarly, enculturation consists of the processes by which traits are learned from others through social interaction because the individual is reared in a social group having a culture. Friedl and Gilmore emphasize socialization to describe the process of learning to be a member of a society, a process slightly different in every society, whereby an individual is "trained" to participate in his social environment.

These concepts of socialization and enculturation suggest two important considerations: (1) that socialization takes place within a particular social setting (e.g., family, ethnic/cultural reference group), and (2) that an individual is expected to function as a member of a society and participate in his social environment (in both micro-macrocosm senses). Given these two considerations, it seems apparent that if an individual's process of socialization prepares him solely to function in a micro-society, with limited or no preparation for the macro-society, his coping repertoire will not be generalizable, but, at best, will be insufficient (i.e., the person may be able to function expertly on his home turf but beyond those boundaries he is confronted by situations in which his coping repertoire is no longer sufficient). What is created by this condition is the "marginal man" syndrome. The marginal man is one who finds himself on the fringe between two reference groups (Stonequist, 1935).

In the case of minority military first-termers, they find themselves between their home community and the military. Conflicts and insecurities are endemic in marginal persons (Kerckhoff & McCormick, 1955) because they are in a situation in which they cannot totally ignore either reference group. If incompatible, the two reference groups place demands upon the first-termers that interfere with their adaptation to the new setting, especially when the coping repertoire necessary to meet the demands of the new setting is minimal, which seems to be the circumstance in a large number of cases.

Making transitions from one setting to another imposes upon an individual certain problems relative to adjustment. The severity of the problems

encountered by an individual is a function of the coping repertoire he possesses. An extended coping repertoire permits easier resocialization, while an insufficient one is problematic.

Acquisition of a coping repertoire and the socialization process is mediated by the socio-economic and the cultural involvement of the person, which, to a great degree, determines what he is able to do (Honigmann, 1967). More pointedly, in order to perform effectively in contemporary society, one must acquire a series of skills, which differ from one social group to another (Inkeles, 1966). In view of these factors, preparation for military life involves acquiring skills necessary to function in a military environment.

Very often the adjustment problems experienced by a person are attributed to the individual (i.e., the problems are presumed to reside within the person). While this is partially true, if accepted in its entirety, important environmental factors would be overlooked. As emphasized by Peterson (1968), the proper study of man is not man alone, not situation alone, but man-in-his-environment. This approach to understanding the adjustment problems and attrition rates of minority military first-terms provides a broader base from which to investigate the interaction effects of person and situation.

Problems of Adjustment and Determinants of Attrition

Unresolved or unsolved problems of adjustment become the determinants of attrition. A difficulty encountered in tracing a problem of adjustment through its identification, as a determinant of attrition, is that an additive effect occurs. That is, the adjustment problem becomes both a situational problem and a psychological difficulty. By the time the "dropping out" phenomena occurs, it is difficult, if not impossible, to isolate any single contributing

factor.

In order to identify some of the problem areas confronting minority first-termers, interviews were conducted with officers and enlisted men on several military installations and with former enlisted men who had dropped out. Although the themes of the problems varied, the problems were the same among the installations. Table 1 shows the areas identified as problems of adjustment.

A closer examination of the items listed in the table shows that the problem areas fall into the nonmilitary domain (i.e., the problems are interpersonal and situational in nature rather than military [e.g., how to perform a tactical maneuver or how to use a weapon or piece of equipment]). If the problem areas listed are an accurate reflection of reality, then it seems reasonable to postulate that while the military is doing its job well in the military domain, it is not managing sufficiently with the nonmilitary aspects of the minority first-termers. As was previously mentioned, when these problems remain unresolved or unsolved they become the determinants of attrition.

As is appropriate with an exploratory investigation, the problem areas obtained from the interviews must be interpreted with caution. Only with replication and experimental study can the determinants of attrition be more precisely specified in an analysis of the salient factors involved. While the problem areas fail to provide any definitive conclusions, they do suggest a direction for research and the need for an established theoretical and empirical framework.

Table 1
Problems of Adjustment

-
1. Inability to meet the demands of military life
 2. Lack of cultural continuity (military life does not relate or incorporate cultural aspects of the individual's experience)
 3. Feelings of alienation and isolation (intensity dependent on the location of the duty station)
 4. Conflict in life styles
 5. Conflict in value systems between the old military personnel (spit-and-polish, R.A. types) and the new military personnel (volunteer peacetime types)
 6. Impulsivity rather than impulse control
 7. Denigration and discrimination on the part of persons in command
 8. Involvement in asocial behaviors
 9. Fear of reprisal, getting the runaround, or "blacklisted" by system if one complains of inequities
 10. Lack of sophistication in dealing with the military system
 11. Distrust of nonreference group members
 12. External pressures and influences from significant others (nonmilitary persons or institutions)
-

Behavior Rehearsal

One approach to minimize the problems of adjustment and attrition involves behavior rehearsal. Behavior rehearsal, being neither new nor revolutionary, is used in a number of different kinds of settings, from clinical treatment to specialized training programs (Moreno, 1958; Lazarus, 1966; McFall & Martson, 1970; Goldstein, 1973; Miller, 1959; Gettelmann, 1965; Belfrage, 1964; Corsini, et al., 1961). Behavior rehearsal has several important aspects that make it a very viable technique: (1) specifies relevant target behaviors to be acquired or modified (Goldfried & Pomeranz, 1968); (2) uses a problem-solving approach through both cognitive and active behavior rehearsal; (3) uses pre- and post-evaluation of the problem-solving strategy; (4) involves a teaching method through modeling and group participation; (5) allows the individual the opportunity to practice his responses before responding in real-life situations (Efran & Korn, 1969; Bauman & Grunes, 1974); (6) serves as an organizing function in the individual's perception of situations (Jones & Davis, 1968); (7) provides both direct and vicarious reinforcement (D'Zurille, 1966; Bandura, 1969); and (8) develops and teaches coping strategies (Boedeker, 1972). Consequently, behavior rehearsal can be conceptualized as a means by which an individual learns to be competent: the possession of knowledge, skills, and options essential for an individual to deal with his environment successfully with a minimum of negative consequences to himself.

According to Gilzore (1974), the coping process consists of three important stages: the ability to perceive a situation accurately, the ability to appraise and to evaluate alternative possibilities, and the ability to make decisions and to arrive at conclusions regarding plans of action. The main focus of behavior rehearsal is to assist the individual in developing more

fully these stages of the coping process; and whatever stages an individual has deficiencies, he has opportunity to identify those deficiencies and to convert them into strengths.

Several attributes for effective coping are discussed by Gilmore: independence, impulse control, ability to organize different pieces of information, persistence, and decisiveness. The resocialization aspect of behavior rehearsal allows an individual to learn or develop more fully these attributes and incorporate them into his coping repertoire. Additionally, as the individual acquires these attributes, he increases his sense of responsibility, his sense of security, and his sense of self-worth as a function of being able to operate effectively in his environment.

In addition to providing substantive content for behavior rehearsal, the stages of the coping process and the attributes for effective coping are noteworthy for two reasons: (1) they provide criteria against which the effects of behavior rehearsal can be documented (i.e., they are specifiable target behaviors and are measurable), and (2) they are variables that permit movement from laboratory research to a naturalistic setting. In summary, these variables provide empirical support with which to determine the efficacy of behavior rehearsal.

The Efficacy of Behavior Rehearsal

When the prebehavior rehearsal conditions are specified from the outset, the technique becomes a very powerful tool in effecting behavioral change. A study was conducted to investigate the effect of behavior rehearsal as a resocialization strategy for high-risk freshmen (Jenkins, 1973; Jenkins & Guthrie, 1976). This research was carried out within the context of a summer

remedial program for freshmen admitted to a large eastern university under a special program. These students came from families who could not provide financial support; they were students whose level of scholarship was below the minimum required for regular admission; and who were unable to support themselves on financial aid ordinarily available to poor but highly promising students. The population consisted of Blacks, Whites, and Puerto Ricans.

A nine-week remedial program in English, mathematics, science, and reading was developed with additional help in study habits. The instruction was calculated to help students reduce some of the deficiencies in academic skills that had accumulated and that interfered with academic performance. The participants were divided into 20 groups of about 15, with a counselor for each group. Ten of these groups, randomly selected, received additional attention in the form of behavior rehearsal of a number of additional skills, the absence of which appeared to interfere with good academic performance.

During the preceding academic year anecdotal material had been collected from students who had been admitted previously as high-risk freshmen, and from faculty and staff concerning problems encountered by these students that interfered with their performance in college. Several problem areas were discovered that indicated that these students did not have, in their coping repertoire, many skills necessary to meet the subtle demands of the college environment; it was not simply a matter of limited academic ability and reading or language problems.

Five specific areas were identified in which it was felt these students needed special training in order to use whatever abilities they possessed. These five areas were not dealt with through the conventional instructional

and counseling services: (1) getting to know professors, (2) setting primary goals and objectives, (3) managing noncampus contingencies, (4) dormitory life, and (5) academic perplexities.

Problem situations, using the specific problem areas, were then formulated to provide the structure and the content within which the behavior training was to be conducted. Ten counselors were selected, based on their experience, background, and orientation toward behavior rehearsal. General procedures were outlined to them, and at that time they were asked not to discuss any of the information with the counselors of the control groups. They were also instructed not to discuss the experiment with their experimental group. Training sessions were conducted for the counselors and all procedures standardized. Weekly meetings were held for the purpose of clarifying or handling any unforeseen difficulties. Counselors were given new behavior rehearsal material each week.

Several steps were outlined for the counselor and the group in the preparation and execution of the behavior training and to serve as a means of standardizing the procedure: (1) each group of 15 students was to be subdivided into three groups of five, (2) the counselor discussed with the total group the problem situation without mentioning or suggesting any solutions, (3) the individual groups of five not to determine steps necessary to solve the problem, (4) the counselor worked with each group in order to ensure the groups did not duplicate identical solutions, (5) the groups evaluated each other in terms of the adequacy of the solution, (6) the counselor rated each group independently, (7) each group was rated by a score, (8) the counselor directed the total group in an evaluation session of the effectiveness or

noneffectiveness of solutions after each group had role-played, (9) each group was provided follow-up assignments to be practiced outside of class in real life, and (10) each counselor discussed and evaluated real-life practice sessions.

The subjects were presented with problem situations and were to arrive at solutions to these problems, using the behavior rehearsal method. The rationale underlying this approach was that the responses necessary for the university setting were minimal or absent in the coping repertoires of the subjects and, through behavior rehearsal, these necessary responses could be acquired. Emphasis was placed on those problem elements considered as nonintellectual factors related to academic success.

Rating forms were provided each group to rate each other. The rating forms consisted of three rating categories: (1) 1: the problem solved with no negative consequences to the individual; (2) 2: the problem solved but with minimal negative consequences, and (3) 3: the solution resulted in dire consequences to the individual. Ratings were given for solutions and not for how well the acting was done. Each counselor was instructed to provide reinforcement, in the form of verbal praise, for effective solutions.

In addition to the behavior rehearsal procedures, the students were provided paper/pencil problem-solving tasks. When these tasks were completed, the counselor directed the group in a detailed evaluation of the problem tasks in terms of solutions and reasonable alternatives.

Several methods were used to evaluate the behavior rehearsal approach and to obtain response measures. The response measures consisted of a self-report questionnaire, anecdotal material, and grade point averages for the

first year of college. Subjects were instructed not to put their names on any of the self-reporting material or anecdotal material in order to increase the accuracy of reporting. A coding procedure was used to identify each subject properly.

An unobtrusive measure was obtained by categorizing students into conformers and nonconformers. Conformers were those who met all the requests of the researcher, and the nonconformers were those who partially met or did not acquiesce to the researcher's requests. The nonconformers were contacted numerous times and in a variety of ways but still failed to respond. It was assumed that students who completed all the requests of the researcher represented those who conformed to the university system by meeting its demands. Conformity was defined to mean voluntary adherence to the requirements and requests of an institution; in this sense, resocialization, adaptation, and conformity are used synonymously.

At the conclusion of the summer program the students enrolled at the main campus or at one of several branch campuses located throughout the state. Follow-up data were collected at the completion of the freshman year. A 2x2x2 analysis of variance design was used which permitted an examination of the effects of treatment, race, main or branch campus, and sex. The dependent variables were grade point average and the dichotomy of whether or not the student remained in college for the entire year. Some of the major findings of the study were:

- (1) the experimental treatment made a significant difference between the experimental and control groups at the main campus but made no significant difference between the two groups on the branch campuses;

- (2) there were no significant differences by race;
- (3) the attrition rate was not significantly higher in the control group than in the experimental group; and
- (4) the experimental group had a higher number of conformers than the control group. The difference between the conformers and the nonconformers was not significant.

The findings of the study suggest that behavior rehearsal is a potentially valuable technique for facilitating the resocialization of high-risk freshmen.

Minority Military First-Termers

In comparison, many minority military first-terminer enlisted men and high-risk freshmen are similar: they come from similar backgrounds and circumstances; they have limited coping repertoires; they encounter a number of adjustment problems; and the probabilities are extremely high that they will drop out when they are unable to solve or resolve their problems. Assuming this comparison is valid, it seems reasonable to assume that the first-termers could be helped similarly by a special program which seeks, through behavior rehearsal strategies, to train them to cope with certain crucial demands of the military world. Special training made a difference with high-risk freshmen, and it seems logical that it would make a difference with first-termers.

Aspects of basic training are a form of behavior rehearsal relative to teaching a person how to cope under different combat conditions (i.e., the exercises are anticipatory in vivo experiences). In addition to the regular first cycle of the basic training program, an additional two weeks, at the beginning of basic training, could be devoted to intensive behavior rehearsal

dealing with the problems of adjustment in order to facilitate the transition into military life and assist in assuring that the individual acquires the extended coping repertoire that will enable him to meet the new demands. Supportive individual counseling and group counseling should be an integral part of the behavior rehearsal program for the purpose of alleviating stress.

It is suggested that behavior rehearsal become an integral part of the training program for everyone. Those who already possess the appropriate coping repertoires can be helpful in modeling and reinforcing specific behaviors as well as learning to understand and be sensitive to the minority first-terminer. Another reason that all first-terminers participate is to eliminate the negative consequences that arise from being singled out and treated differently. With the high-risk freshmen, the behavior rehearsal was conducted within the natural setting in which the subject population was involved so there was no awareness of being different. The literature related to the use of behavior rehearsal seems to suggest that a well-designed behavior rehearsal program will aid to minimize both adjustment problems and attrition rates of minority first term enlisted men.

It must be kept paramount that the military is a society of its own, with a culture and folkways which all enlisted men must master. Minority first-terminers may need special assistance to master the new setting which is usually quite alien to the society and culture of these individuals.

Successes with the use of behavior rehearsal have been confined largely to clinical settings or controlled environments. This is due to the existence of better refined experimental procedures in clinical settings and the lack of experimental refinement in natural settings. When research is

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designed for the natural environment the researcher is confronted with the dilemma of having to sacrifice experimental precision for social relevancy. Although this pitfall is present, it should be treated as a challenge rather than a deterrent. If the challenge to develop rigorous research designs for the natural setting is accepted, it seems reasonable to believe that this goal will, in time, be achieved.

The most important resource the United States possesses is human resource. Every effort must be exerted to develop this resource and minimize its waste. The skills and talents of individuals who drop out are not being utilized, which is an all-encompassing loss. Behavior rehearsal is suggested as a preventative measure worthy of consideration.

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"Psychological Coping Skills and the Reduction of Attrition among Military Personnel"

Irwin G. Sarason¹

University of Washington

One approach to the topic of attrition among military personnel is to begin by identifying training program elements believed to be important in adaptation to the military situation. Three elements seem particularly important from a psychological perspective:

1. The military situation presents trainees with a novel set of social relationships. Trainees live at close quarters under a high level of discipline. For many trainees, their first military experience provides their first job requirements.
2. In their training a variety of intellectual and cognitive skills are needed in surmounting specific hurdles. These include being able to think through problems and make choices among alternatives.
3. Military training is stressful in varying degrees. This is true because the trainees know they are being evaluated. In addition, the trainees evaluate themselves and their own personal resources (e.g., their skills and abilities).

The combination of these factors makes for a situation in which the trainee is expected to reach at least a minimum level of attainment, be task-oriented in solving problems, and deal with the challenges of adult social and work relationships. This combination can be expected to elicit various types of maladaptive behavior in adolescents and post-adolescents who may never before have been away from home. Maladaptation would be especially likely among trainees who come from disadvantaged backgrounds because of the stultifying effects of socio-economic deprivations in childhood.

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If this analysis is reasonable, a logical first step is to search for evidence about how problems created by situational demands (the novel military situation) and predisposing factors (such as disadvantage-ment) can be handled most effectively.

From a psychological standpoint, how someone performs in a given situation depends on his or her response repertory. Response repertory refers to patterns of behavior which an individual is capable of making. This capability is a function of a number of variables including the opportunity to observe how other people deal with situations, practice in dealing with the situations, and the rewards and punishments that followed this practice. A person's response repertory is not limited to domains such as intellectual, mechanical, and motor activity but also includes areas such as social adeptness, assertiveness, and work attitudes.

Strengthening Response Repertoires

Several examples will now be given of efforts to strengthen response repertoires. Common to all of them is that persons were given the opportunity to observe adaptive ways of coping with situations relevant to specific aspects of their lives. The process involved in these observational opportunities is modeling. A response repertory can be strengthened through observing someone deal effectively with a particular problem (for example, how to ask the teacher a question or how to decline a request or demand in a firm, yet tactful manner.) There is reason to believe that modeling is especially valuable with persons (such as disadvantaged) who may have been deprived of opportunities to observe productive behavior

in other persons (parents, friends). I would like now to review some relevant research that may provide useful clues to solving partially the military attrition problem.

Modeling and Juvenile Delinquency

I have carried out a five-year project in which an attempt was made to apply the idea of modeling to the societally important problem of juvenile delinquency. The study was conducted at the Cascadia Juvenile Reception-Diagnostic Center in Tacoma, Washington, an institution for juvenile delinquents. The idea behind the study was that observation and imitation of modeled behavior can play an important role in the acquisition of adaptive behavior. The subjects were boys between the ages of 15 and 18. They observed models enact specific problems and solutions to problems. After observing the models, the boys engaged in role-playing.

The ingredients of most of the modeling situations had been suggested by boys at the institution in response to inquiries about their felt inadequacies and ways in which they would like to be more effective people. These ingredients were incorporated into scripts which were used in the modeling sessions. Each session dealt with a specific problem - e.g., how to present oneself at a job interview, how to cope with peer pressure, how to behave less impulsively and more planfully, and how to relate to authority figures.

The results of the Cascadia study showed that modeling was helpful to the subjects. Not only did the subjects indicate in their own self-reports that they had learned a great deal about social behavior but ratings of their behavior by counselors showed significant improvement in comparisons with boys in a control group. Perhaps most striking were

the results of a six-year follow-up which revealed that the recidivism rate for the modeling group was approximately one-half that for the control group. That is, delinquents who had observational opportunities had a 50% lower probability of committing crimes in the future.

Modeling and the Dropout-Prone High School Student

A modeling experiment whose aim was prevention rather than rehabilitation has also been performed. The subjects were high school students who, using several criteria, appeared to be potential dropouts. Most of the students at the high school at which the study was conducted were disadvantaged members of minority groups. Occupational models with similarities (including ethnic similarity) to the subjects were employed. There were significant positive changes in the subjects' attitudes toward themselves, school and work. Furthermore, teacher ratings confirmed these changes and there were indications of improvement in grade point averages. These findings were consistent with results of other research findings reported in the psychological literature. Available evidence suggests that high school students who observe appropriate social and vocational behavior in others show significant gains in their own behavior in these domains.

What role might modeling and role playing have in educational and training programs? Most generally perhaps, as a medium for communicating information about the world in which the individual lives. Anecdotal evidence abounds suggesting that significant others can often dramatically change the course of the lives of persons who identify with them. A provocative study of successful persons in the Watts area of Los Angeles compared ghetto persons who were able to demonstrate job stability with a

comparable group who did not meet this criterion. In general, the "successfuls" could be described as identifying with mainstream life and the "unsuccessfuls" with street life or gang life. The "successfuls" were more likely than the "unsuccessfuls" to have had desirable pro-social models (including teachers) in their lives with whom they could identify and whose behavior and values they could emulate.

The experimental evidence mentioned above suggests that programs can be devised in which subjects have the opportunity systematically to observe and then imitate the behavior of models. These specially designed programs are promising because they may compensate to a significant extent for the absence of adaptive, pro-social models in the day-to-day lives of many people.

Teaching Cognitive and Social Skills to High School Students

We have seen that programs based on the modeling principle are useful in strengthening the response repertoires of juvenile delinquents and dropout-prone students. For productive or adaptive behavior to be shown in a given situation, it is important that the person be prepared for the specific task requirements. This preparation or training must begin with the opportunity to observe successful adaptation to the situation. Practice is an important second step, and some type of reinforcement for adequate performance can be expected to accelerate progress.

The programs described above involved special training for special populations. Can more general programs be developed and used effectively? That is, can the modeling principle be used systematically in the educational process?

A project designed to answer these questions is now in progress in the Seattle Public Schools with high schools. Special emphasis is being placed on students from disadvantaged backgrounds. The project has proceeded by identifying deficiencies in students' response repertoires. In determining the programs' content extensive interviews were conducted with the students, teachers, employers of the students (most of whom work on a part-time basis). Modules using didactic presentations, modeling and role-playing are being developed in a number of areas, including:

- (1) How one makes a decision, weighing the relevant alternatives;
- (2) Planning one's activities - particularly with regard to long-term goals;
- (3) The meaning of work and meeting job requirements;
- (4) Relationships with peers, particularly with regard to resisting peer pressure;
- (5) Concentrating on the task at hand, avoiding distracting thoughts, focusing on task-relevant talks;
- (6) Performing a task under evaluative pressure (for example, taking a test or giving a talk to a group such as a class);
- (7) Dealing with on-the-job frustrations adaptively (for example, without "blowing up");
- (8) Seeking help (for example, asking questions in class about topics you are confused about).

Parts of these modules include television tapes. This technique is used particularly when the topic involves cognitive activity, that is, what a person is thinking about before, during, and after performing a particular task. A "voice over" procedure is used so that the viewer hears what the TV actor is thinking about. Students in the program are given homework

assignments requiring applications of principles presented in the modules. In addition, the students' knowledge of the principles stressed in the modules is assessed.

All indicators thus far suggest that students find the procedure interesting and that the content is relevant to their perceived needs. Several comparison and control groups are being studied and there will be several follow-ups.

Reducing Military Attrition

It seems likely that military attrition is related to cognitive and social weaknesses similar to those involved in school dropouts and delinquents. It seems reasonable to consider the possibility that training procedures such as those described above can be adapted relatively easily to the military training situation. Training experiments dealing with this topic would reveal whether social and cognitive modules in military training decrease the probability that trainees leave the service prematurely. The available evidence suggests that this type of psychological training can play an important role in preparing trainees for the complex and novel experience of being a member of the military service. Given the economic costs of high attrition rates, it would seem prudent to perform and evaluate experimental training ventures aimed at strengthening the response repertoires of trainees who have remediable psychological deficiencies.

The Problem of Stress

The research described thus far has dealt with certain types of stressful situations. Crime and delinquency often are outgrowths of the failure to cope effectively with stress. Many high school students

drop out of school because of school and family pressures and also because they are unhappy in a situation (school) which they do not see as being relevant to their needs and desires.

There are, of course, many other types of stressful situations that involve danger, time pressure, and compelling job requirements. The concepts of the response repertory and social and cognitive skills apply equally well to these types of situations.

Under a ONR contract, I am exploring the possibility of training people to handle stress as adaptively as possible. My research group and I are working with two types of stress. One is the stress that grows out of one's personal life and which may influence performance in other spheres. We have developed the Life Experiences Survey to assess the composite of stress in a person's life (e.g. death in the family, marriage). Because we define life stress in terms of life events, we have constructed our instrument so as to measure separately presumably desirable life events (marriage, a promotion) and undesirable ones (death in the family, a demotion.) The other type of stress is defined by job characteristics (for example, objectively dangerous tasks which must be performed.)

One of the subject populations we have been studying consists of Seattle police officers. Our method has been similar in some respects to that employed in the work described earlier. That is, we have interviewed police officers and their supervisors about the job pressures that seem most difficult to handle. In addition we have made behavioral observations by driving with police officers as they perform their duties. We have identified a series of specific highly stressful situations, including: (1) responding to a family disturbance; (2) having to search a building at night; (3) situations involving an armed suspect.

In addition to identifying specific stressful situations, we have also focused on specific psychological reactions that are problematic. The two that stand out most clearly are anxiety and anger. Anxiety is engendered, for example, by the need to search a building at night. Anger is frequently elicited by the uncooperative attitude of one or more participants in a family dispute. We are developing a series of training modules aimed at strengthening specific relevant psychological skills. These include (1) planning one's approach on the way to answering a police call; (2) anticipating one's feelings of anger and self-consciously directing one's attention to task-relevant activity (rather than "burning up"), (3) self-monitoring one's behavior and thoughts with the aim of gaining better control over them.

We do not have quantitative results at this point because the work is in progress. Ultimately we hope to study the effects of training in stress coping skills with personnel differing in the amount of stress experienced in their personal lives and on the job. Thus far, we are encouraged because preliminary studies suggest that ability to deal effectively with stress can be learned to a significant degree.

Training in stress coping skills seems especially important for persons engaged in high risk dangerous work. Some major risks are not necessarily what one might anticipate. For example, major dangers of police work include death due to heart attacks and suicide. Police have very high rates of both these causes of death. They also have very high rates of divorce. Coping with stress is not simply a matter of handling isolated challenges. There are long term effects that may be at least as important as the immediate ones.

Conclusions

It is obvious that job performance is a function of skill in performing specific task requirements. But that is by no means the whole story. Specifiable psychological factors also play an important role. There is growing evidence that training in cognitive and social skills can contribute to strengthening inadequate or undesirable response repertoires. With a widening base of scientific knowledge, applications to the military domain - including the training situation and particularly stressful work - would seem propitious at this time.

A METHOD TO SIMULTANEOUSLY REDUCE INVOLUNTARY DISCHARGES
AND INCREASE THE AVAILABLE MANPOWER POOL

Jack R. Dempsey, Jonathan C. Fast and Wayne S. Sellman
Air Force Military Personnel Center

ABSTRACT

The high rate of involuntary attrition that occurs among military personnel is the subject of growing concern at all levels of the Department of Defense (DoD). The Defense Manpower Commission (DMC) in a recent report has noted that DoD incurs an annual cost of approximately 1 billion dollars because one out of every four DoD accessions is involuntarily separated prior to completion of the first term of enlistment.

The services have recognized the problem of attrition for years and have directed much research into developing better methods to select candidates for enlistment. Although previous studies have yielded many valuable insights into the role certain factors play in determining an individual's likelihood of success and many studies have employed sophisticated psychometric instruments, aptitude tests and cutting score combinations, and mathematically intricate weighting schemes, few have been adopted for use. Because in order to effect any meaningful reduction in attrition too many potentially successful applicants would have to be screened out. Thus, the problem reduced to the inability of the personnel research community to develop a screening device capable of adequately differentiating between potential successes and failures.

Traditionally, researchers have attempted to improve the estimation of an individual's probability of success using more classical statistical techniques such as Ordinary Least Squares (OLS) regression, Logit, Probit, correlation analysis et al. However, in order to obtain any meaningful reduction in attrition, using screening systems based on these techniques, too many potentially successful candidates had to be screened out and, consequently, were not used operationally. Therefore, this report closely examines these techniques from a technical viewpoint and describes the conceptual and mathematical development of an alternative statistical technique. The new technique integrates maximum likelihood estimation methods with economic utility theory to achieve better differentiation between potential failures and successes.

The model was initially tested at the United States Air Force Academy. To evaluate the approach in an operational setting, i. e., as a screening device, a prediction system (utility function and indifference point) was estimated using the Class of 1977 and applied to the Class of 1979 a priori. Within six months, 49% of the predicted failures had resigned.

Because the investigations at the Air Force Academy were so promising, the technique was next tested using 15,000 CY72 Air Force enlistees. The technique was used to predict first term involuntary attrition. After estimating and applying a new prediction system, 57% of the group predicted to fail had been involuntarily discharged prior to completing their enlistment. This represented 36% of all involuntary discharges from the sample and reflected a 53% increase over the accuracy of the traditional Air Force selection procedures.

Currently, this report has provided the impetus for a nationwide DoD-wide operational test of the procedure to be compatible with the Army's "REQUEST" system, Navy's "PRIDE" system and the Air Force's "PROMIS" system.

I. INTRODUCTION

Background

The high rate of involuntary attrition that occurs among military personnel is the subject of growing concern at all levels of the Department of Defense (DOD). The Defense Manpower Commission (DMC), in a recent report, has noted that DOD incurs an annual cost of approximately one billion dollars because one out of every four DOD accessions is involuntarily separated prior to completion of the first term of enlistment.^{1/} Other agencies have estimated the cost of involuntary attrition to be both higher and lower than the DMC estimate, but the cost of dollars expended is sizeable and certainly has an adverse impact on DOD manpower, resources, and operational readiness.

The services have recognized the problem of attrition for years and have directed much research into developing better methods to select candidates for enlistment. Previous studies have yielded many valuable insights into the role certain factors play in determining an individual's likelihood of success. Many of these studies have employed sophisticated psychometric instruments, aptitude tests, and weighting schemes. However, few have been adopted for use. The reason for this is that to effect any meaningful reduction in attrition too many potentially successful applicants would have to be screened out. Thus, the problem reduced to the inability of the personnel research community to develop a screening device capable of adequately differentiating between potential successes and failures.

In an unfavorable recruiting environment, where it is increasingly difficult to meet recruiting objectives, the services cannot afford to turn away large numbers of potentially successful applicants and continue to meet manning requirements.

^{1/} Defense Manpower Commission, "Defense Manpower: The Keystone of National Security", (Washington D. C.: Government Printing Office, April 1976), p. 201.

Research Objective

Thus, the purpose of this paper is to describe the development of a more precise enlistment selection device which will reduce the number of involuntary separations and not disqualify an inordinate number of potentially successful applicants.

II. THE MOTIVATIONAL ATTRITION PREDICTION (MAP) MODEL

Background

The MAP model can be compared to weighting schemes which have been proposed in the past to the extent that MAP weights traditional selection criteria such as education level, mental category and so on, but differs from past proposals in the method used to derive the weights. Typically, previous studies have used Ordinary Least Squares (OLS) regression to derive the factor weights. However, it has been noted that when OLS is used in an analysis involving a dichotomous or succeed/fail dependent variable several statistical difficulties are encountered. Moreover, past studies have always assumed a deterministic relationship between an individual's likelihood of success and descriptive attributes and have made no provision for the increased uncertainty associated with forecasting the behavior of a specific individual. Because of these and other difficulties a different statistical approach was sought.

Rationale for Using Maximum Likelihood Estimation

"Although Maximum Likelihood methods for the analysis of qualitative data have been discussed in literature for years, econometricians and other analysts of qualitative socio-economic data continue to use inappropriate and overly restrictive methods." ^{2/}

Application of OLS regression to problems involving dichotomous dependent variables can yield highly misleading results since the distributional characteristics of the error term are no longer in consonance with the classical assumption of normality.

The theoretical formulation of Classical Ordinary Least Squares (OLS) Regression requires that several assumptions be made with respect to the nature of the error term. These assumptions are stated concisely below:

$$(i) \quad E(\xi) = 0$$

$$(ii) \quad E(\xi\xi') = \sigma^2 I$$

where ξ is a $n \times 1$ vector of independent random variables and I is the Identity matrix.

In the case of a dichotomous regressand, defined to be 1 or 0, the error term must assume a value of either:

$$\begin{array}{ll} 1 - X'\beta & \text{(Y observed equals 1)} \\ \text{or} & \\ -X'\beta & \text{(Y observed equals 0)} \end{array}$$

^{2/} Noriwo, Marc and S. James Press, Univariate and Multivariate Log-Linear and Logistic Models, (Santa Monica California: Rand Corporation R-1306-MA/NIH, 1973), p. v.

Thus, in order for ξ to have an expectation of zero its distribution must be:

$$\begin{array}{rcl} \frac{\xi}{(1-X'\beta)} & \frac{f(\xi)}{X'\beta} & \text{(Y observed equals 1)} \\ -X'\beta & (1-X'\beta) & \text{(Y observed equals 0)} \end{array}$$

where $f(\xi)$ equals the normal p. d. f. evaluated at ξ which results in a variance of:

$$\begin{aligned} E(\xi\xi') &= -X'\beta^2(1-X'\beta) + (1-X'\beta)^2 X'\beta \\ &= X'\beta(1-X'\beta) \\ &= E(Y)(1-E(Y)) \end{aligned}$$

Because the variance is a function of the expected value of Y, this implies that the variance varies systematically with the explanatory variables, X. Hence the assumption of homoskedasticity is untenable.

The Generalized Least Squares (GLS) model overcomes this difficulty by normalizing the variance to a constant by weighting the estimated Y by:

$$\frac{1}{E(Y)(1-E(Y))}$$

Nevertheless, there still remains (1) the problem of the Bernoulli nature of the error term with respect to hypothesis testing, (2) the assumption that the expectation of the error term equals β and (3) the $E(Y)$ is unknown and has to be estimated. But the most serious deficiency springs from the misspecification of the functional form which does not prevent the estimates from varying outside of the unit interval and presumes a linear relationship between the explanatory variables and the true probability function. Moreover, Nerlove and Press illustrate that the slope of the estimated OLS regression line is sensitive to variations in the proportion of observed 1's and 0's.

Consequently, standard tests of significance, with respect to the estimated coefficients do not apply since the estimates are biased and inconsistent. Second, the traditional measure of performance, the multiple R^2 is no longer meaningful for comparison with non-linear

estimation methods since the errors are not commensurable.^{3/}

And third, the estimated probabilities can vary outside the unit interval which make interpretation difficult. Notably, Nerlove concluded that "...we can always improve on the least squares estimation (whether or not it is corrected for heteroskedasticity) since it is a linear estimator."

Maximum Likelihood Estimation (MLE) methods overcome the statistical problems encountered by OLS in analyzing relationships involving a dichotomous dependent variable. But, most MLE methods also assume a deterministic relationship when predicting attrition as a function of personal attributes and make no provision for the increased uncertainty in forecasting the behavior of a specific individual (i.e., point estimate). The following paragraphs describe a general MLE method which overcomes these deficiencies.

The Conceptual Model

Motivational attrition from service trainings programs and the service itself can be considered simply as a change in career goals on the part of the individuals involved. To the extent that many involuntary discharges may possess a significant motivational component and result from an overt act or demonstration of adverse behavior on the part of an individual who has no avenue to voluntarily leave, many involuntary separations may be of a voluntary nature. In such cases, changes in career goals can be viewed through the classical Marshallian framework--"The attractiveness of a trade depends not on its money earnings, but its net advantages."^{4/} Initially the individual surveys the alternatives available to him and weighs the advantages and disadvantages of each. In his assessment of the respective alternatives he considers not only monetary factors, but also nonmonetary factors such as job satisfaction, geographic preference and perhaps financial security. Naturally he selects the one with the highest net advantages.

^{3/} Nerlove, Marc and S. James Press. Univariate and Multivariate Log-Linear and Logistic Models. (Santa Monica, California: Rand Corporation, 1973), p. v.

^{4/} Marshall, Alfred, Principles of Economics, 8th ed., (London: MacMillan and Company, 1961), p. 357.

For purposes of illustration consider the recurring decision facing an active duty recruit. Assume he makes an implicit dollar valuation incorporating all of the advantages and disadvantages of his current career choice and a similar valuation for an alternative choice, given his knowledge of each. So long as his subjective dollar valuation of his current career choice (his Service utility) is greater than the subjective dollar valuation of the alternative career being considered (Alternative utility) he remains in the Service. The decision is made in terms of the relative difference between the two utilities. As long as the net difference is positive he will not attrite, if it is zero he is indifferent and if it is negative he will voluntarily leave the Service or perform in such a way that will achieve this end.

The Mathematical Model^{5/}

Let Y be a dichotomous random variable defined to be 1 if an event E occurs; and \emptyset otherwise. Let X be a $1 \times m$ vector of m explanatory variables of Y which may be dichotomous, polytomous, or continuous.^{6/} Let β be a $m \times 1$ vector of coefficients such that $X' \beta$ specifies a linear function of X . Finally, let ξ denote an $n \times 1$ vector of random disturbances distributed $N(\emptyset, 1)$. By hypothesis, Y is related to X' ($i=1, \dots, n$), such that:

Observed

$$Y_i = 1: \text{ when } X'_i \beta_i + \xi_i > U_i \quad (\text{event occurs})$$

$$Y_i = \emptyset: \text{ when } X'_i \beta_i + \xi_i \leq U_i \quad (\text{event does not occur})$$

where U_i represents a $n \times 1$ vector of utilities that the individuals receive from the event not occurring and is $\sim N(\emptyset, \sigma^2)$.

^{5/}

The estimation procedure described in this paper has been programmed in Fortran IV (ASCI) on a Burroughs 6700 computer.

^{6/}

To satisfy the assumption of normality, the value of the dependent variable should be able to assume ≥ 30 different values.

Conceptually, when an individual is faced with two alternative choices he will assign a utility to each. Since we assume that the individual will act rationally and seek to maximize his total utility, he will be expected to select the alternative to which he assigned the highest utility. Although, from the individual's point of view, the choice is purely deterministic, from the observer point of view, the choice has a systematic component, $X'\beta_i$, and a random component, $U_i - \xi_i$. If we attempt to apply utility maximization to the known component we will predict a fraction of the cases correctly.

Let P_i represent the probability to an event E occurring such that:

$P_i = \text{prob}(X'\beta_i + \xi_i > U_i) = \text{prob}(X'\beta_i > U_i - \xi_i)$
 which can be further expressed by (1.1).

$$(1.1) \quad P_i = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(\xi_i, U_i) d\xi_i dU_i$$

where $f(\xi_i, U_i)$ is the joint density function of ξ_i and U_i .

Since we have a systematic component, $X'\beta_i$, and a random component, $U_i - \xi_i$, we can reduce (1.1) to a more manageable level by making the substitution $\xi'_i = U_i - \xi_i$. The new random component, ξ'_i , is assumed to be distributed $N(\mu, \sigma'^2)$. ^{2/}

Thus equation (1.1) reduces to:

$$(1.2) \quad P_i = \int_{-\infty}^{X'\beta_i} f(\xi'_i) d\xi'_i$$

^{2/}

The mean of ξ'_i is denoted by μ' where:

$$\mu' = E(U) + E(\xi)$$

and the variance of ξ'_i is denoted by σ'^2 where:

$$\sigma'^2 = \text{var}(U) + \text{var}(\xi)$$

Since we have chosen the normal transformation because of its basis in nature, we then elect to normalize the integral in (1.2) by letting:

$$z = \frac{\xi' - \mu'}{\sigma'} = \frac{\xi' - \theta}{\sigma'}$$

$$dz = \frac{1}{\sigma'} d\xi'$$

Finally, if we equate the occurrence of event E to an individual's failure from a training program, P_i represents his probability of failure as a function of his unique set of personal characteristics weighted by a vector of coefficients, β . Thus:

$$(1.4) \quad P_i = F\left(\frac{X' \beta}{\sigma'}\right)$$

Before solving for the respective coefficients we make the following substitutions for notational convenience:

$$(1) \quad \text{Let } J_i = \frac{X' \beta}{\sigma'} \quad (i = 1, \dots, n)$$

$$(2) \quad \text{Let } \alpha_{m+1} = \frac{1}{\sigma'}$$

$$(3) \quad \text{Let } \alpha_k = \frac{\beta}{\sigma'} \quad (k = 0, \dots, m)$$

$$(4) \quad \text{Let } I_i = X' \beta + \xi_i$$

The Maximum Likelihood Solution

Let S represent an ordered sample of T observations, where the first r observations equal zero and the remaining T-r observations equal one. Without loss of generality, the likelihood of the sample is given by:

$$(1.5) \quad L = \prod_{i=1}^r [1 - F(J_i)] \times \prod_{i=r+1}^T F(J_i)$$

In order to maximize L in terms of α_k , the logarithmic likelihood must be derived and is given in (1.6):

$$(1.6) \quad \ln L = \sum_{i=1}^r [1 - F(J_i)] + \sum_{i=r+1}^T F(J_i)$$

$$(1.7) \quad \text{where: } F(u) = \int_{-\infty}^u \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{1}{2}\left(\frac{\mu}{\sigma}\right)^2} d\mu$$

and

$$(1.8) \quad f(u) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{1}{2}\left(\frac{\mu}{\sigma}\right)^2}$$

Let X_0 be exactly 1 for all i . Then setting the partial derivatives of $\ln L$ with respect to α_k equal to 0 yields the following system of $m+1$ equations:

$$(1.9) \quad \frac{\partial \ln L}{\partial \alpha_k} = \sum_{i=1}^r \frac{-f(J_i)}{1-F(J_i)} X_{ki} + \sum_{i=r+1}^T \frac{f(J_i)}{F(J_i)} X_{ki} = 0$$

$$\frac{\partial \ln L}{\partial \alpha_{m+1}} = \sum_{i=1}^r \frac{-f(J_i)}{1-F(J_i)} X'_i \beta_i + \sum_{i=r+1}^T \frac{f(J_i)}{F(J_i)} X'_i \beta_i = 0$$

These equations are, of course, non-linear but can be solved simultaneously by the Newton-Raphson method.

Tests of Hypothesis^{8/}

Tests of hypothesis regarding the significance of one or more of the predictor variables may be accomplished once the parameter variances and covariances are specified. The respective square roots of the diagonal elements of the negative inverse of the matrix of second derivatives evaluated at the point of maximum likelihood yields large sample estimates of the coefficient standard error. Once computed, standard tests of hypotheses for one or more of the predictor variables can be easily accomplished.

$$(1.10) \quad \frac{\partial^2 \ln L}{\partial \alpha_k \partial \alpha_t} = \sum_{i=1}^r -X_k X'_i \left[\frac{f(J_i)^2}{1-F(J_i)^2} - \frac{f(J_i)J_i}{1-F(J_i)} \right] + \dots$$

$$+ \sum_{i=r+1}^T X_k X'_i \left[\frac{f(J_i)J_i}{F(J_i)} + \frac{f(J_i)^2}{F(J_i)^2} \right] \quad (t, k=0, 1, \dots, m)$$

^{8/} Tests of hypotheses may also be accomplished for any set $(\alpha_1, \dots, \alpha_m)$ by the Likelihood Ratio Method.

Prediction

Since we are primarily interested in which alternative the i 'th individual will choose, rather than characteristic statistics of the group, we must develop a prediction mechanism whereby we may infer within some limit which alternative he will choose.

In estimating β we have assumed X to be fixed. We may relax this constraint as long as we can assume that X is uncorrelated with β , ξ , and U ; such that we consider the conditional probabilities of our estimators given X . For example: $E(b_1/X_1) = \beta_1$, where X_1 is an $n \times m$ vector of given X 's and σ_i (for $i = 1, \dots, m$) represents the standard deviation of the respective explanatory variables. Moreover, our estimators still possess the desired properties of efficiency and consistency.^{9/}

By relaxing the assumption that X is fixed and realizing that we, the observers, have no control over what value X assumes, we may say that the utilities among different individuals for the alternative choices are distributed as independent bivariate normal random variables, such that:

$$(1.11) \quad \text{prob}(I_i > U_i) = \int_{-\infty}^{\infty} \int_{-\infty}^{U_i} f(I_i, U_i) dI_i dU_i$$

Using the convolution formula and letting $w_i = I_i - U_i$ we find that the marginal density is given by:

$$(1.12) \quad f(w_i) = \int_{-\infty}^{\infty} f_1(w_i + U_i) \cdot f_2 U_i dU_i \text{ where } f_1 = f_2 = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{\mu}{\sigma}\right)^2}$$

^{9/} A simple proof is based on Chebyshev's inequality, which states that for any random variable Z with a finite mean ν and variance σ^2 , the probability of a deviation equal to K times the standard deviation or more is at most equal to $1/K^2$:

$$P \left\{ |Z - \nu| \geq K\sigma \right\} \leq 1/K^2 \text{ for any } K > 0$$

in the case of \hat{b} , and its mean, β the variance is σ^2/N so that the inequality in brackets becomes

we thus obtain:

$$P \left\{ |\hat{b} - \beta| \geq \epsilon \right\} \leq \frac{\sigma^2}{N\epsilon^2} \text{ for any } \epsilon > 0$$

Since $\sigma^2/N\epsilon^2$ goes to zero as N we may conclude \hat{b} is a consistent estimator of β .

Thus, the marginal density of $w_1 = L_1 - U_1$ is:

$$(1.13) \quad g(w_1) = \frac{1}{\sigma^* \sqrt{2\pi}} e^{-\frac{1}{2} \left(\frac{W_1 - \mu^*}{\sigma^*} \right)^2}$$

$$\text{where } E(\mu^*) = \int_{-\infty}^{\infty} L_i f(L_i) - \int_{-\infty}^{\infty} U_i f(U_i) = b_0 \quad \frac{7/}{}$$

$$\text{and } \sigma^* = \sigma' \sqrt{\sum_{i=1}^m \sigma_i^2} \quad \sigma' = \sqrt{\text{var}(U) + \text{var}(\xi)} \quad \frac{8/}{}$$

$\sigma_i = \text{std dev. of } X_i$

We now proceed to interpret the marginal density of w .

Considering that w represents the difference between the respective utilities, when the sum equals \emptyset the individual is said to be indifferent between the two alternative choices. Thus:

$$g(\emptyset)$$

is the mean point of indifference for all individuals and is estimated by $f(b_0)$, where $f(\cdot)$ is the $N(\emptyset, 1)$ probability density function (p. d. f.).

However, before we make our predictions we must take into account the uncertainty in (1) the mean point of indifference, (2) the estimators, and (3) the random disturbances.

First, we construct an upper confidence bound on b_0 such that:

$$(1.14) \quad \hat{b}_0^* = \hat{b}_0 + z_\alpha \sqrt{\text{var}(\hat{b}_0)}$$

Second, we construct a lower confidence bound on L_1 given X_1 such that:

$$(1.15) \quad \hat{L}_1^* = \hat{L}_1 - z_\alpha \sigma' \sqrt{\sum_{j=0}^m \text{var}(\hat{b}_j) X_j + 1}$$

10/ b_0 equals the intercept when X is in deviation form.

11/ for large samples only

Possessing all the components we now compare $F(I_1)$ to $F(b_0^*)$ and predict under the following regime:

If $F(I_1^*) > F(b_0^*)$ the event is predicted to occur, i. e. $Y = 1$

If $F(I_1^*) \leq F(b_0^*)$ the event is predicted not to occur, i. e. $Y = 0$

where $F(\cdot)$ is the $N(0,1)$ Cumulative Density Function (c. d. f.)

The results should be interpreted as follows: A candidate with a given set of personal attributes will be predicted to attrite if his estimated utility for his set of alternatives is greater than the estimated mean point of indifference. The confidence which can be placed in each prediction of attrition is an option which can be varied along with the percent of actual attritions identified and the percent false positive (i. e., those predicted attritions who actually succeed). These three parameters can be specified to yield the best result given a user's preferences.

Initial Validation at the United States Air Force Academy

The model was initially tested at the United States Air Force Academy because it had a high cost due to attrition, had been studied by others using classical statistical techniques (which provided a basis for comparison) and had readily available data which avoided an expensive data collection effort. The objective was to determine whether a more accurate selection standard could be developed using the MLE model to weight Academy selection criteria to predict motivational resignations. The selection standard was derived by estimating a utility function and indifference point for each member of the Class of 1976. The standard was cross validated by applying it to the Class of 1977. The results showed 59% of these cadets predicted to fail did fail within their first two years. To further evaluate the approach a second selection standard was estimated using the Class of 1977 and applied a priori to the incoming Class of 1979. Within six months, 49% of the predicted failures had voluntarily resigned.^{12/} Notably, no previous study using classical statistical techniques yielded comparable results.

^{12/} Dempsey, Jack R., and Jonathan C. Fast, Predicting Attrition: An Empirical Study at the United States Air Force Academy, (Randolph AFB, TX: Air Force Military Personnel Center, March 1976).

III. IMPACT OF ENLISTMENT STANDARDS ON RECRUITING AND ATTRITION

Background

Since the implementation of the AVF, the Services have experienced little difficulty in meeting their recruiting objectives. The favorable recruiting market which characterized the first few years of the AVF era provided ample numbers of qualified volunteers from which the services could draw to sustain manpower requirements. However, this excess supply of volunteers was bolstered by several factors which include: a series of manpower reductions, annual increases in the number of males reaching age eighteen (an aftershock of the "baby boom" following World War II), and a sluggish national economy accompanied by a high unemployment rate among the enlistment-eligible aged group. Currently, personnel planners are concerned about the apparent reversal in these factors which have, in the past, promoted a condition of excess supply. Because recruiting is becoming increasingly difficult and the possibility of recruiting shortfalls more probable, there is renewed interest in how enlistment standards impact the manpower market and recruit quality.

Each Service has defined a unique set of mental standards a potential enlistee must meet in order to be eligible for enlistment. The Air Force requires a prospective recruit to achieve the following prerequisites: a combined total score of 170 on the four Air Force aptitude test composites of the Armed Services Vocational Aptitude Battery (ASVAB); a minimum score of 45 on the General Aptitude Composite of the ASVAB; and completion of high school if classified as mental category III or IV by the Armed Forces Qualifying Test (AFQT). The other Services have similar requirements. Because errorless long range predictions of human behavior are not within the state-of-the-art, any screening process (or enlistment standard) will deny enlistment to some applicants who would succeed (false positive). Also, the enlistment standard will allow enlistment of some applicants who will later fail (false negative). These two errors are inextricably associated with the dual problems of attracting sufficient numbers of recruits and retaining individuals through the first term of enlistment. Using the Air Force enlistment standard for an example, only 38 out of every 100 applicants denied enlistment could be expected to fail. This means that 62 applicants would be permanently disqualified for enlistment who would have otherwise completed their first term of enlistment. ^{13/}

^{13/} The example is based upon an analysis in which 14,000 CY 72 accessions were rescreened using current Air Force mental standards. In the group that would not have been accepted under current Air Force mental standards, 62% completed their first term of enlistment.

Using the MAP Model to Derive a More Precise Enlistment Standard

The imprecision of current Service enlistment standards and the assuring results obtained at the United States Air Force Academy provided the impetus to investigate whether the MAP Model could be used to derive a more efficient enlistment standard for the Air Force.

The Sample

The sample population consisted of 14,923 Air Force accessions who entered the Service between June 1972 and August 1972.

Procedure

The data file, maintained by the Computational Sciences Division, Air Force Human Resources Laboratory, was matched with airman tape files, maintained by the Air Force Military Personnel Center, to obtain discharge data. A total of 607 cases in the original population did not match the official data files, which reduced the sample population to 14,316. The loss of these cases is not thought to materially bias the analysis presented.

Discharge status was determined by official loss code which identified all personnel who had been separated from the Service during the first term of enlistment. Loss codes indicating a voluntary/normal loss were grouped together as were loss codes indicating a discharge of an involuntary nature. Based on the specific loss code each individual was assigned to one of three mutually exclusive groups (Table 1).

TABLE 1

Group	Sample Size
I Active Duty	10,002
II Voluntary Loss	669
III Involuntary Loss	<u>3,645</u>
TOTAL	14,316

Since most voluntary/normal losses do not result from marginal performance or adverse behavior, voluntary/normal losses were removed from the sample in order to isolate the effect of enlistment criteria on involuntary losses exclusively. The removal of this group further reduced the sample population to 13,647.

Because the MAP Model algorithm restricts the number of observations to 3,000 or less, a computational sample of 2,642 was randomly selected from the sample population (Table 2).

TABLE 2

Group	Sample Size
I Active Duty	1,992
II Involuntary Loss	650
TOTAL	2,642

MAP Model Specification

After performing a series of preliminary analyses using the Automatic Interaction Detector (AID) to assist in the identification of principal first order relationships, the probability of success was hypothesized to be:^{14/}

$$P_i = \frac{1}{\sqrt{2\pi}} \int \frac{\sum_{i=1}^3 B_i X_i - \frac{1}{2} (\mu)^2}{e} d\mu$$

where:

X_1 = age at enlistment ≥ 19 < 19
 X_2 = education level ≥ 12 < 12
 X_3 = Administrative & Electrical Composite (ASVAB)^{15/} normalized score

^{14/}

Sonquist, J. A. and J. N. Morgan, The Detection of Interaction Effects. (Ann Arbor, Michigan: University of Michigan, Institute for Social Research, 1969).

^{15/}

Because of the high degree of collinearity that exists between the administrative and electrical composites of the ASVAB the scores were combined.

X_4 = Military Service Inventory (MSI) ^{16/} normalized score
 X_5 = # Dependents in Household ≤ 2
 X_6 = Armed Forces Qualifying Test (AFQT) normalized score

With the model specified, a utility function and indifference point were estimated for the computational sample using the MAP Model (Table 3)

TABLE 3
Estimated Coefficients and T - Value

	<u>Variable</u>	<u>Coefficient</u>	<u>T-Value</u>
b1	age	.125707	1.87
b2	education level	.355775	2.51
b3	Administrative & E1	-.037114	1.69
b4	MSI	.343853	2.43
b5	# Dependents	.283619	1.76
b6	AFQT	.034158	1.71

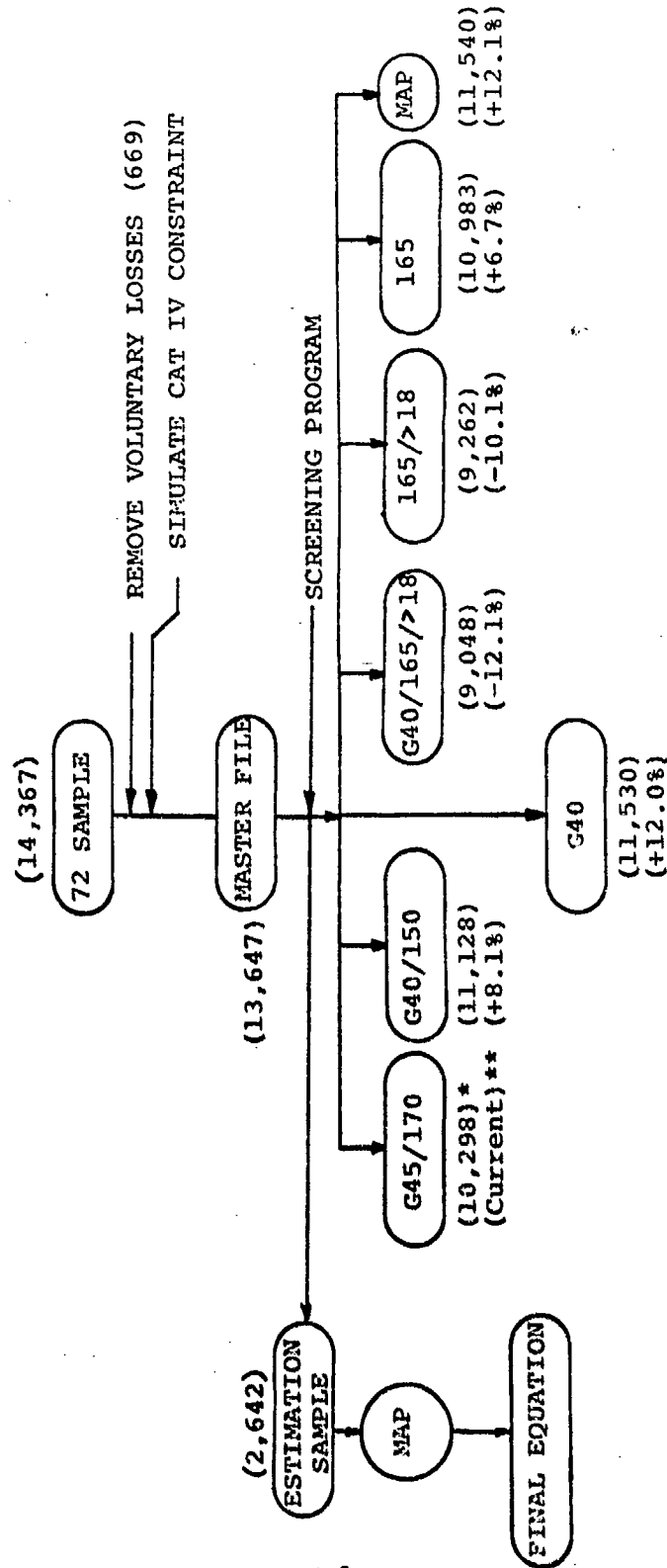
U _i (Indifference Point) = .52 α = -.650289			

Comparative Analysis

Once the utility function and indifference point were estimated using the MLE method presented earlier, the coefficients and indifference point were used to weight the appropriate selection data and establish a cutting score respectively. The original sample of 13,647 CY 72 accessions was then rescreened using this MAP standard. But to make the results more meaningful with respect to impacts on recruiting and attrition, the sample population was rescreened using the current Air Force enlistment standards and several other hypothetical, but traditionally oriented, enlistment standards (fig 1). The results are presented in Table 4 and address its impact of each standard on recruiting pass-rate), attrition (loss-rate), quality (% non-High School, average ASVAB score, and so on) and force characteristics.

^{16/} The Military Service Inventory (MSI) is a 50 question self-report inventory developed by the Testing and Evaluative Division, Air Force Military Personnel Center. The development of the MSI was spinoff of a previous study conducted by LaChar et al. in 1972. They attempted to develop a psychometric instrument called the History Opinion Inventory (HOI) for the purpose of identifying airmen who would be unable to adapt to a military environment. The 100 questions contained in the HOI were revalidated against a criterion of involuntary attrition and restructured into a 50 question format.

FIGURE 1
METHODOLOGY OF ANALYSIS



* (# PASS)
 ** (% MARKET INCREASE/DECREASE)

TABLE 4
COMPARISON CHART

STANDARD *	PASS RATE	LOSS RATE	<HS	QUALITY INDICATORS						FORCE CHARACTERISTICS				
				M	A	G	E	(Average) AFOT	I	II	III	IV	Minority	(Avg) AGE
1 G45/170	75%	23%	6%	64	63	68	68	66	6%	48%	45%	1%	9%	18.8
2 G40/165/>18	66	22	4	64	62	68	68	66	7	46	46	1	10	19.1
3 G40/150	82	24	6	64	61	66	67	65	6	46	47	1	11	18.8
4 165/>18	68	22	4	64	62	67	67	65	6	45	47	2	10	19.1
5 165	80	23	6	63	61	66	67	65	6	45	47	1	10	18.8
6 NAP	84(H)	21(L)	5	64	61	67	67	65	5	40	53	2	10	18.8
7 G40	84	24	6	62	60	64	63	64	6	44	48	2	12	18.8
8 72 OVERALL	100%	27%	14%	59	57	62	62	61	5%	38%	55%	3%	13%	18.8

(H) High
(L) Low

*See description in Table 5

TABLE 5

Enlistment Standards Description and Abbreviation

Standard Description	Abbreviation
1. Current Air Force Enlistment Standards require a minimum combined total of 170 on the four aptitude composites (Mechanical, Administrative, General, and Electrical) of the Armed Service Vocational Aptitude Battery (ASVAB)	G45/170
2. Minimum combined total of 165 on the four aptitude composites of the ASVAB; minimum score of 40 on the General Aptitude composite; minimum age of 18 years.	G40/165/ 18
3. Minimum combined total of 150 on the four aptitude composites of the ASVAB; minimum score 40 on the General Aptitude composite.	G40/150
4. Minimum combined total of 165 on the four aptitude composites of the ASVAB; minimum age of 18 years.	165/ 18
5. Minimum combined total of 165 on the four aptitude composites of the ASVAB.	165
6. Standard derived by weighting the factors described earlier in the paper by the appropriate coefficients and using a cut off score of .52.	MAP
7. Minimum score of 40 on the General Aptitude composite.	G40
8. Actual standard used for 1972 accession. Minimum score of 40 on at least two of the four aptitude composites of the ASVAB.	72 Overall

Note: All standards except MAP assume that if an applicant is classified as Mental Category III or IV on the Armed Forces Qualifying Test he/she must be a high school graduate.

All standards except 72 Overall simulate the current Category IV restriction of one per recruiting detachment per month (i.e. approximately 40 per month nationwide).

Discussion of Results

According to the analysis presented in Table 4, the MAP standard had the highest pass-rate, lowest loss-rate, and did not adversely affect quality. In fact, 57% of the individuals who would have been denied enlistment, if a MAP standard had been used in CY 72, were involuntarily separated prior to completion of their first term of enlistment. This means that out of every 100 individuals that would have been denied enlistment under the MAP standard in CY 72, only 43 would have succeeded. This compares to 62 potentially successful applicants turned away under current Air Force enlistment standards. The reduction in the number of potentially successful applicants erroneously denied enlistment (43 vs 63) means that the Air Force could have reduced the number of involuntary losses by 15% and simultaneously expanded the available manpower pool by 12.1% when the MAP standard is compared to current Air Force enlistment standards.

IV. CONCLUSIONS

The analysis presented in this paper illustrates that the Services can simultaneously increase the applicant pool and reduce the number of involuntary losses by appropriately weighting selection criteria in such a way that the weights reflect the marginal contribution of each criterion in determining an applicant's likelihood of successful completion of his first term of enlistment.

Notably, the research described in this paper has prompted a nationwide DOD-wide operational test of the MAP standard scheduled to begin February 1, 1977.

In a time of expanding employment opportunities within the private sector in which it is becoming increasingly difficult to attract sufficient number of recruits to sustain manpower requirements the services must not turn away large numbers of potentially successful applicants.

In a time of budgetary stringency in which involuntary attrition has drawn much scrutiny and represents an immense expense in terms of DOD manpower, resources and mission capability, the Services must make sure enlistment standards operate to allow enlistment to only those applicants most likely to succeed during their military tenure.

Sustaining quality and meeting recruiting goals are often competing objectives. The approach to enlistment standards presented in this paper is a step toward simultaneously achieving recruiting quality and quantity objectives.

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NAVY VOLUNTARY RELEASE PILOT PROGRAM

Robert V. Guthrie
Navy Personnel Research and Development Center

Abstract

The Voluntary Release Pilot Program calls for the implementation of volunteer release measures, on a controlled trial basis with the following objectives: (a) development of improved recruit screening methods; (b) expediting discharge of those personnel who are unsuited and/or unproductive for naval service; (c) reduction of unauthorized absences rates, non-judicial punishments, and associated costs; and (d) validating the volunteer release concept in terms of possible Navy-wide applications. The major hypotheses of this research effort are: (a) a virtual "walk-away provision" at any time after boot camp but before completing six months of active duty will separate those people who would eventually become problems, at a time when the Navy has a minimum investment in them; (b) the volunteer discharge provision will not produce more prior-EAOS discharges, rather, create earlier and more cost-effective discharges; and (c) personal and environmental variables associated with attrition and retention rates can be identified and analyzed for possible use in recruit screening devices. Two exploratory hypotheses are: (1) confinement and administrative burdens associated with unauthorized absences and non-judicial punishment rates will reduce in a voluntary release environment and (2) those individuals who do not exercise voluntary release options will be productive employees with favorable potential for serving out their enlistment contracts.

Volunteer Release Pilot Program

The Navy lost 43,972 men through "separation for cause" during FY 75. It was estimated that the great majority of those lost had been only marginally productive for a significant period of time prior to discharge, and had also been disciplinary/administrative burdens to their commands. The non-productive manpower costs associated with this problem was substantial. Experience in the Canadian Armed Forces indicated that, given the opportunity, the same marginal or unsatisfactory performers would identify themselves and voluntarily leave the service at an early point in their enlistment and prior to becoming an administrative and disciplinary burden.

In connection with these concerns, various Navy study groups identified the following subset of problems:

1. Current recruitment candidate screening devices did not specifically identify those who would not be capable of successfully adapting to and competing within the naval environment.
2. The use of confinement as a deterrent or corrective device for individuals convicted of repeated or long periods of unauthorized absences was ineffective and costly.
3. Current administrative discharge procedures did not always result in timely release of nonproductive individuals and contained no method by which an individual could obtain release from an enlistment contract, other than for reasons of hardship.

On 10 March 1975, a select CNO Task Group on Navy Corrections Systems noted these problems and made the following recommendations:

1. Assign top priority to personnel research devoted to improvement of pre-enlistment screening devices.
2. Analyze the most promising "on-the-shelf" screening devices for possible use in addition to present methods.
3. Establish policies and procedures for timely release of personnel recruited, by choice and/or performance, for naval service.

These three recommendations provided the framework and rationale for a volunteer release pilot program. Therefore, this research program is directed conceptualizing, tracking, and analyzing results of such discharge options and the development of a noncognitive screening device.

Purpose

Objectives

This research effort calls for the implementation of an integrated program of volunteer release measures, on a controlled, trial basis with the following objectives:

1. Identification of potential screening methods.
2. Expediting discharge of those personnel who are unsuited and/or unproductive for naval service.
3. Reduction of unauthorized absence rates, non-judicial punishments, and associated costs.
4. Validating the volunteer release concept in terms of possible Navy-wide applications.

Hypotheses

The major hypotheses of this research effort are:

1. A virtual "walk away provision" at any time after boot camp but before completing six months of active duty will separate those people who would eventually become problems, at a time when the Navy has a minimum investment in them.
2. The volunteer discharge provision will not produce more prior-EAOS discharges, rather, create earlier and more cost-effective discharges.
3. Personal and environmental variables associated with attrition and retention rates can be identified and analyzed for possible use in recruit screening devices.

Exploratory Hypotheses

1. Confinement and administrative burdens associated with unauthorized absences and nonjudicial punishments rates will reduce in a voluntary release environment.
2. Those individuals who do not exercise voluntary release options will tend to be productive employees with a favorable potential for serving out their enlistment contracts.

Method

Subjects

Individuals with Current Enlistment Dates (CEDs) of 1 January 1976 through 31 January 1976, 4-year, nonprior service, USN, males assigned to Apprenticeship Training were designated as the experimental group (N = 1,152). During the apprenticeship training period each member of the experimental group was informed of the program, his eligibility, general instructions with caveats.

Control group subjects, i.e., those without the option for release, possessed CEDs of 1 February 1976 through 28 February 1976 (N = 960). This group possessed the same general characteristics (nonprior service, males, USN, etc.) as the experimental group.

Procedures

The general procedure for this study utilized data obtained from a 350 character extract of the Master Enlisted Record of all subjects, a Recruit Background Questionnaire (RBQ), Exit Questionnaire for attritees, performance evaluations, and disciplinary records from individual commands. These data will be handled and updated over the entire four year term of this study through an interactive data-based management system, and analyzed within the context of the general multivariate model.

Data instrumentation. A Recruit Background Questionnaire (RBQ) was administered to both experimental and control group subjects during boot training at each Recruit Training Center. This instrument contained sections measuring general background characteristics; attitudes toward jobs, schools, and the Navy in general.

Exit Questionnaire (EQ). All attritees were given a special questionnaire which allowed them to rate their perceptions of Navy life and express their reasons for leaving.

Master Enlisted Record Extract (MER). Basic data on the characteristics and current status of subjects were obtained through a 50 field 350 character extract from the MER obtained from BUPERS on a monthly basis. Those fields contain subject and group identification data, school and marital status, sex, race, ethnic origin, home of record, pay grade, job classification, current activity and address, a record of both Navy assignment and school history, age, years of education, activity type, SCREEN code and score, AFQT score, and all 16 ASVAB scores. In addition, there are several fields which check on the accuracy of the data or indicate important changes in subject status on a continual monthly basis.

Activity Reports. Performance evaluations and records on individual disciplinary actions were obtained from each subject's current duty station.

Research Design and Analysis. Initial analyses examined the general entering characteristics of the experimental and control group cohorts within the framework of a 3x4x2x2x2 (RTC x Quality Index x Service School Status x Sex x Condition) incomplete block design. A multivariate analysis of variance procedure was carried out, employing specific a priori contrasts within main effects and all non-confounded interaction effects on age, years education, SCREEN scores, AFQT scores, ASVAB Scale Scores, and a series of factor scores obtained from initial analyses of RBQ responses. In addition, other independent variables including race, ethnic origin, marital status, and recruiting area were blocked with those initial independent variables of particular interest.

As a further means of describing the subject population, a series of two-way contingency tables were constructed among all independent variables of interest. Chi-Square tests of significance were carried out on corresponding frequency distributions. Statistically significant results will be presented in the form of descriptive histograms. All the above analyses will serve to identify any initial lack of equivalency between the experimental and control groups.

The primary analytic task, as data on attrition, performance, and disciplinary actions becomes available, will involve the construction of an analytic and conceptual model, within the framework of multiple discriminant function analysis to account for attrition as attributable to sets of both individual differences and situational variables. Special attention will be paid to possible differences in predicting attrition for men vs. women, and general detail vs. school drops vs. school graduates. In addition, the time of attrition will be carefully noted, and attempts will be made to account for differences between training center drops and fleet drops. As an appreciable number of subjects reach their first permanent duty assignment, MANOVA analyses will be carried out for type duty station vs. attrition vs. condition on scores from the fleet questionnaire, as well as the other dependent variables already described.

Results

The Voluntary Release Pilot Program is a longitudinal study which has recently completed its first year of operation. Findings to date include the following:

1. The experimental group has experienced a higher attrition rate than the control group.
2. The control group continues to have more disciplinary cases and poorer average performance ratings.
3. There is no indication of the experimental group's losses leveling out.
4. High "A and B" quality and GED accessions attrition rate indicates in-service (vice pre-service) impact of training decisions.

5. Ratings (SN/FN/AN) and place of recruit training show no difference in attrition losses.

These findings are based on first year statistics and in no way should be construed as final statement in themselves.

Personnel Effectiveness and Premature Attrition
in the All-Volunteer Navy¹

E. K. Eric Gunderson² and Anne Hoiberg³

Naval Health Research Center
San Diego, California 92152

With the establishment of the All-Volunteer Force (AVF) in 1973, military manpower planners faced the problem of recruiting sufficient numbers of qualified personnel to man Navy ships and support systems without the pressure of the draft. In 1974 Congress imposed the requirement that at least 55% of enlistees must be high school graduates and no more than 18% could be in Mental Group IV (General Classification Test scores below 42) which further restricted the pool of potential applicants. With better pay and unfavorable economic conditions outside the Navy, recruiting quotas have largely been met; however, the end of the effects of the World War II "baby boom" and improved economic conditions signal recruiting difficulties ahead.

Recently, concern has shifted to problems of personnel attrition. Attrition can serve the positive function of separating poor performers from service, but too much turnover wastes recruiting and training investments, impairs organizational effectiveness, and reduces the number of eligible career replacements.

In the Navy attrition rate is primarily a function of (1) personnel quality and (2) organizational conditions and practices. A great deal of research has been devoted to identifying individual characteristics that predict attrition but relatively little to organizational factors that affect attrition. Both of these components or aspects must be considered in efforts to control attrition.⁴

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²Head, Environmental and Social Medicine Division.

³Head, Health Care Systems Branch, Environmental and Social Medicine Division.

⁴Economic conditions outside the Navy also affect attrition/retention, but such influences are outside the control of the naval organization and will not be considered here.

Personnel quality and organizational conditions not only affect attrition but also relate to performance effectiveness. Performance ineffectiveness, for example, unauthorized absence, is often a precursor of premature attrition.

The purpose of this study is to examine selected indices of personnel effectiveness and premature attrition during the past decade and, particularly, to compare Navy enlistees on these indicators before and after establishment of the AVF. Rates of unauthorized absence, desertion, demotion, advancement, unfavorable discharge, medical discharge, and overall effectiveness will be considered for enlistees entering the Navy each year from 1966 through 1975. Major occupational groups will be examined separately.

The following specific questions will be addressed: Has there been any change in personnel effectiveness or attrition rate among first-term enlistees since AVF? If there has been a change, was the change Navy-wide or limited to specific occupational groups? Can observed changes in personnel effectiveness be explained by differences in personnel quality (General Classification Test scores)? Are changes in personnel effectiveness paralleled by change in disease and injury rates? What individual, environmental, and organizational factors importantly influence personnel effectiveness and premature attrition?

METHOD

Sample. The sample consisted of 525,121 male Caucasian enlistees who entered the Navy during calendar years 1966 through 1975. Most of these individuals were assigned to selected occupational specialties during their first enlistments, but a large number did not attain a designated specialty and remained Seamen, Firemen, or Airmen. The specific occupational categories and the numbers of personnel included are shown in Table 1.

Procedure. The service history data pertaining to occupational classification, personnel effectiveness, and attrition were obtained from Bureau of Naval Personnel computer files reflecting losses and gains from the Navy Enlisted Master Tape. Copies of these tapes were provided by the Naval Personnel Research and Development Center, San Diego. Over the 10-year period this information has been compiled into longitudinal service history records for all Navy enlisted personnel. This file is used in epidemiological research and in long-term follow-up of psychiatric and medical conditions. The service history data used in this study were for the first enlistment only.

Sailors in each occupational category were divided into three groups according to General Classification Test (GCT) scores. These verbal aptitude scores are used as the principal basis for assigning personnel to various Navy schools and occupations and serve here as a general indicator of personnel quality. The three GCT groups or levels were: 1 - 20 to 50; 2 - 51 to 57, and 3 - 58 to 80. These intervals divided the total sample roughly into thirds. After dividing each occupational category into the three GCT levels, percentages or rates were computed for the 30 resulting subgroups (10 occupational categories X 3 GCT levels) on each of the personnel effectiveness indices. These indices reflected the percentages of individuals in each group that met the specific criterion during the first enlistment. The criteria were: (1) having one or more unauthorized absences; (2) being declared a

Table 1
 Percentage Distributions by Occupation, GCT Level,
 and Year of Enlistment

Occupational Group (Specialty)	GCT Level ^a	Year of Enlistment									
		66	67	68	69	70	71	72	73	74	75
Deck (BM, QM, SM) N = 28,974	1	35	33	28	44	35	37	39	38	44	16
	2	29	29	33	30	34	30	28	29	27	36
	3	36	38	39	26	31	32	33	32	29	48
Ordnance (GM, GMT, GMG) N = 10,283	1	27	27	26	34	25	30	33	31	33	20
	2	29	28	31	30	30	33	29	27	34	36
	3	44	45	43	36	45	37	38	43	33	44
Electronics (ET, ETN, ETR) N = 26,196	1	2	2	2	2	2	1	1	2	3	2
	2	10	12	12	16	16	12	7	10	17	10
	3	88	86	86	82	82	87	92	88	80	87
Radio (RM) N = 25,612	1	8	7	9	13	14	16	13	19	30	33
	2	26	28	26	30	35	38	35	39	41	33
	3	66	65	65	57	51	46	52	42	28	34
Clerical (YN, PN, SK, DK) N = 34,993	1	18	17	11	22	17	17	18	19	25	19
	2	28	29	26	31	32	29	29	31	32	35
	3	54	54	63	46	51	54	53	50	42	46
Engine. & Hull (MM, EN, BT, BR) N = 71,972	1	27	30	26	29	18	18	22	28	34	21
	2	30	30	30	27	21	21	22	27	28	27
	3	42	40	45	45	61	62	56	45	38	52
Construction (CU, EA, CE, EQ, EO, CM, BU, SW, UT) N = 27,097	1	30	27	44	44	40	30	21	24	32	32
	2	30	32	25	24	32	34	31	35	36	37
	3	40	42	31	31	28	36	48	42	31	31
Aviation (AD, ADR, ADJ, AM, AMS, AMI, AME) N = 44,244	1	26	20	19	30	27	27	33	28	36	22
	2	34	36	38	39	40	35	33	36	37	40
	3	40	44	43	31	33	38	34	36	27	38
Medical (HM) N = 37,327	1	11	8	12	15	15	10	10	15	9	8
	2	26	25	29	32	33	28	28	33	32	30
	3	62	67	60	54	52	62	62	52	59	62
Nonrated (SN, FN, AN) N = 218,423	1	50	64	64	66	56	55	62	58	69	38
	2	24	19	19	19	23	24	22	24	19	29
	3	25	17	17	14	21	22	16	18	11	33

^aGCT intervals were as follows: 1 = 20 to 50; 2 = 51 to 57; and 3 = 58 to 80.
 AFQT scores were used instead of GCT scores in 1975.

deserter; (3) receiving one or more demotions; (4) attaining a pay grade of E-5 (Petty Officer Second Class), and (5) being classified as ineffective. Ineffectiveness was defined as (1) premature separation from service because of unsuitability, unfitness, misconduct, or court-martial, or (2) receiving a negative recommendation for reenlistment.

Service history data from Bureau of Naval Personnel loss-gain files were utilized for the period January 1966 through December 1976. Thus, the follow-up periods for men who enlisted in 1973 and 1974 were not complete and percentages of unauthorized absence, desertion, etc., for 1973 and 1974 accessions were underestimated.

RESULTS

Quality of Personnel. Percentage distributions by GCT level for each occupational category and each year of enlistment are shown in Table 1. For example, accessions for 1966 who were assigned to Deck occupational specialties were distributed as follows: 35% in Level 1 (low), 29% in Level 2 (middle), and 36% in Level 3 (high). The quality of enlistees, as measured by GCT scores, varied considerably among occupational groups but remained relatively stable over time for most specialties. During the 10 years, general decreases in quality were seen in 1969 and 1974.

When occupational categories were examined separately, only two striking or distinctive changes in the distributions of GCT scores were noted. During the decade the Radioman group shifted from one of the highest in quality to one of the lowest. As contrasted with most other groups, percentages in the high GCT level did not decrease in 1969 for the Engineering and Hull group. In fact, personnel quality was highest for this group during 1970 through 1972.

Percentages of Unauthorized Absences and Desertions. Beginning in 1969, percentages of unauthorized absence (UA), shown in Table 2, increased steadily for virtually all occupational categories. Prior to that year, values were mostly in the 2-4% range but by 1973 a high of 28% was reached in the Engineering and Hull group. Of the major occupational categories, excluding the Nonrated group, the highest UA rates occurred in 1973 and 1974 in the Engineering and Hull and Deck specialties. The Engineering and Hull group showed the largest increase in UA rate over the decade and the largest increase after AVF (1973 and 1974).

Percentages UA were considerably higher for the Nonrated group than for the designated occupational groups. The UA rate for Nonrated personnel increased from approximately 15% in 1966 to slightly more than 40% in 1973. The smallest increases in UA rate occurred in the Electronics and Hospital Corpsman specialties.

Percentages of men deserting during the first enlistment, shown in Table 3, paralleled the upward direction found for unauthorized absences, although the increases were substantially smaller in magnitude. Between 1966 and 1969, the desertion rate across designated occupational specialties remained relatively stable within a narrow range from 0-2%. The desertion rate for Non-

Table 2

Unauthorized Absence Rate by Occupation,
GCT Level, and Year of Enlistment

Occupational Group (Specialty)	GCT Level ^a	<u>Year of Enlistment</u>								
		66	67	68	69	70	71	72	73	74
Deck (BM, QM, SM)	1	8	7	7	10	13	10	12	20	15
	2	6	6	8	9	12	12	16	18	15
	3	4	5	6	7	9	10	12	19	13
Ordnance (GM, GMT, GMG)	1	5	5	5	6	8	13	7	11	7
	2	2	6	5	4	8	10	6	14	7
	3	2	2	4	5	5	7	12	12	11
Electronics (ET, ETN, ETR)	1	--	--	--	--	--	--	--	--	--
	2	0	0	1	2	2	5	5	5	4
	3	1	2	1	2	3	4	6	5	4
Radio (RM)	1	2	2	2	4	4	7	8	14	11
	2	1	3	2	4	6	9	9	14	8
	3	2	2	2	3	4	6	9	11	7
Clerical (YN, PN, SK, DK)	1	1	1	2	4	5	5	8	12	6
	2	1	2	2	4	4	5	6	12	8
	3	1	1	2	3	3	4	6	9	6
Engine. & Hull (MM, EN, BT, BR)	1	6	6	7	8	10	13	17	28	23
	2	6	6	6	8	10	13	19	26	22
	3	3	5	5	5	7	10	14	17	12
Construction (CU, EA, CE, EQ, EO, CM, BU, SW, UT)	1	2	2	2	2	5	6	8	9	5
	2	1	1	2	2	5	7	9	7	4
	3	1	2	1	1	4	4	8	8	4
Aviation (AD, ADR, ADJ, AM, AMS, AMH, AME)	1	2	2	2	4	5	6	8	14	11
	2	1	2	2	6	5	6	9	12	10
	3	1	2	2	4	5	7	8	13	8
Medical (HM)	1	1	2	4	5	4	5	8	8	5
	2	2	3	4	5	5	5	8	6	6
	3	2	2	3	4	4	4	5	6	4
Nonrated (SN, PN, AN)	1	15	12	10	14	19	22	35	41	29
	2	15	13	13	18	20	23	32	42	32
	3	11	12	13	15	17	18	26	37	30

^aGCT intervals were as follows: 1 = 20 to 50; 2 = 51 to 57; and 3 = 58 to 80.

rated sailors, on the other hand, was about 7% for the period 1966-1968, increased to 10% during 1969 and 1970, and increased again rather sharply to 21% during 1973.

From 1970 to 1972, only slight increases in desertions occurred in most specialties but in 1973 definite increases in almost all occupations are apparent. The largest increase occurred in the Engineering and Hull category, and it can be seen that this relatively high rate is sustained in 1974 and 1975, even though the periods of follow-up were shorter for those years. The smallest percentages were found in the Electronics and Hospital Corpsman specialties.

Demotion Rates. The percentages receiving demotions during the first enlistment were computed for all occupational groups, GCT levels, and years. The results generally paralleled those for UA and desertion (and are not shown here) with small increases in demotion rate shown for all occupational groups from 1966 to 1972 and 1973. The highest demotion rates in 1973 were in the Nonrated, Engineering and Hull, and Deck categories while the lowest rates were in the Electronics and Hospital Corpsman specialties.

Advancements. The percentage attaining E-5 during the first enlistment was not meaningfully related to other indicators of personnel effectiveness but was highly dependent upon GCT level. Within all occupational specialties, the largest percentages achieving Second Class Petty Officer status during the first enlistment were in the highest GCT levels.

Overall Ineffectiveness. The composite indicator of ineffectiveness, based upon an unfavorable discharge or a negative recommendation for reenlistment, showed large increases over the 8-year period. Those results are shown in Table 4. For almost all occupations, the highest rate of ineffectiveness occurred in 1973. The highest rate among designated occupations was in the Engineering and Hull group. The Nonrated group reached a high of 71% classified as ineffective in 1973.

Attrition Rates. Increases in premature attrition during recent years are shown in Table 5. These rates are based upon all enlisted Male Caucasians discharged during the years indicated. The rate of Unsuitable type discharges increased almost three-fold while the rate of Unfit, Undesirable, and Bad Conduct discharges doubled during the period shown, presumably reflecting higher rates of personnel ineffectiveness for men enlisting in the early 1970's. The rate of medical discharges remained stable with a high of 4.6% in 1974.

High Risk Occupations. It is apparent from the foregoing results that the Engineering and Hull and Deck occupational groups present relatively high risks with respect to UA and desertion. Recent studies of medical inpatient data have indicated that hospitalization rates also tend to be high for Engineering personnel, particularly Boiler Technicians. In order to pursue this relationship further, UA and desertion rates were examined separately for the Boiler Technicians included in this study and compared with rates for all other occupational groups combined. These results are shown in Figure 1. It can be seen that the UA and desertion rates for Boiler Technicians were much higher than the rates for other sailors, particularly in 1973 and 1974, after the advent of AVF. (Again, it is noted that the values for 1974 and

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Table 3

Desertion Rate by Occupation, GCT Level,
Year of Enlistment

Occupational Group (Specialty)	GCT Level ^a	Year of Enlistment									
		66	67	68	69	70	71	72	73	74	75
Deck (BM, QM, SM) N = 28,974	1	1	1	1	1	3	2	2	4	3	8
	2	0	1	2	1	2	2	3	8	7	10
	3	1	1	2	2	1	2	3	8	8	6
Ordnance (GM, GMT, GMG) N = 10,283	1	1	1	1	2	1	2	2	2	3	7
	2	0	1	1	1	1	3	2	2	6	4
	3	1	1	1	1	1	1	3	2	4	5
Electronics (ET, ETN, ETR) N = 26,196	1	--	--	--	--	--	--	--	--	--	--
	2	--	1	0	0	1	1	1	3	2	0
	3	0	1	1	1	1	1	3	2	2	1
Radio (RM) N = 25,612	1	--	--	--	1	2	2	4	6	4	2
	2	0	1	0	1	2	3	3	6	5	2
	3	0	0	0	1	1	2	3	3	5	2
Clerical (YN, PN, SK, DK) N = 34,993	1	0	0	0	1	2	1	1	6	3	2
	2	0	0	0	1	2	2	2	4	4	3
	3	0	0	0	1	1	2	2	5	5	2
Engine. & Hull (MM, LN, BT, BR) N = 71,972	1	1	0	1	1	2	3	5	12	14	15
	2	1	1	1	2	2	5	7	12	14	15
	3	1	2	2	2	3	4	6	8	9	8
Construction (CU, LA, CE, EQ, EO, CM, BU, SW, UT) N = 27,097	1	1	0	1	1	1	2	2	2	2	2
	2	0	0	1	1	2	1	2	3	4	2
	3	0	1	0	0	0	1	3	2	3	--
Aviation (AD, ADR, ADJ, AM, AMS, AMH, AME) N = 44,244	1	0	0	0	1	2	2	3	4	4	1
	2	0	0	0	2	2	2	3	5	4	2
	3	0	0	0	1	2	2	3	4	4	2
Medical (IM) N = 37,327	1	0	2	1	1	1	1	3	4	2	--
	2	0	1	1	1	2	1	3	2	2	0
	3	0	1	1	1	1	1	2	2	1	0
Nonrated (SN, FN, AN) N = 218,423	1	8	6	4	8	9	11	18	21	18	6
	2	7	8	7	11	11	13	16	21	18	5
	3	7	8	7	10	11	11	15	17	15	3

^aGCT intervals were as follows: 1 = 20 to 50; 2 = 51 to 57; and 3 = 58 to 80.
AFQT scores were used instead of GCT scores in 1975.

Table 4

Rate of Ineffectiveness by Occupation,
GCT Level, and Year of Enlistment

Occupational Group (Specialty)	GCT Level ^a	Year of Enlistment							
		66	67	68	69	70	71	72	73
Deck (BM, QM, SM)	1	4	7	8	9	9	7	7	8
	2	5	9	10	12	11	12	10	15
	3	4	10	13	14	15	13	13	18
Ordnance (GM, GMT, GMG)	1	4	8	7	7	9	5	6	5
	2	4	7	9	10	11	8	9	11
	3	4	8	10	9	10	10	12	13
Electronics (ET, ETN, ETR)	1	--	--	--	--	--	--	--	--
	2	3	7	8	12	10	9	7	10
	3	5	10	11	12	13	10	14	10
Radio (RM)	1	4	9	9	12	15	12	13	17
	2	5	8	10	14	17	15	16	17
	3	4	8	11	14	13	12	14	18
Clerical (YN, PN, SK, DK)	1	3	6	6	7	7	7	6	10
	2	3	6	7	10	10	9	11	14
	3	3	6	8	12	9	9	11	15
Engine. & Hull (MM, EN, BT, BR)	1	4	7	7	11	8	10	16	24
	2	5	9	9	14	13	15	21	27
	3	5	11	13	15	16	16	18	20
Construction (CY, EA, CE, EQ, EO, CM, BU, SW, UT)	1	2	9	14	17	20	15	18	16
	2	2	9	9	8	15	14	19	17
	3	2	6	8	8	13	12	15	15
Aviation (AD, ADR, ADJ, AM, AMS, AMH, AME)	1	5	9	10	14	11	10	14	15
	2	4	7	10	15	14	12	17	16
	3	4	9	10	15	12	12	17	15
Medical (HM)	1	10	18	19	19	17	15	19	22
	2	8	13	19	21	16	15	20	15
	3	8	13	16	19	14	14	14	13
Nonrated (SN, FN, AN)	1	57	52	59	68	62	49	58	71
	2	56	64	66	67	60	58	60	70
	3	56	70	69	67	62	60	62	67

^aGCT intervals were as follows: 1 = 20 to 50; 2 = 51 to 57; and 3 = 58 to 80.

Table 5

Rates (Percents) of Premature Attrition
for Navy Enlisted Personnel
by Type of Discharge and Year of Discharge

<u>Type of Discharge</u>	<u>Year of Discharge</u>					
	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Unsuitable	5.4	6.7	7.5	7.3	11.3	15.4
Unfit, Undesirable, Bad Conduct	4.0	6.6	8.6	5.0	7.3	8.1
Medical, Disability Retired	4.0	3.8	4.4	4.2	4.6	4.2

1975 are underestimates because of the shorter periods of follow-up for men enlisting in those years.)

DISCUSSION

The results have shown that personnel ineffectiveness, as measured by UA and desertion rates and other indicators, and premature attrition have increased sharply among Caucasian enlisted men during the past few years. This general decline in performance effectiveness began before, and continued after, AVF.

All occupations showed some decline in effectiveness, but much greater changes were evident in certain occupational groups than others, namely, Engineering and Hull and Deck. The greatest increment in UA and desertion rates for the Engineering and Hull group was during the first year of the AVF--1973. The Boiler Technician rating group particularly showed large increases in UA and desertion rates. In contrast, there was relatively little change in the Hospital Corpsman group, and this was the only occupational group that did not show increases in UA and desertions at the beginning of AVF.

The observed changes in personnel effectiveness cannot be explained by differences in personnel quality as measured by GCT scores. There was little, if any, relationship between GCT level and rates of UA and desertion. That is, within most occupational groups there was no consistent association between GCT level and UA or desertion rate. Only in the Nonrated and Engineering and Hull occupational groups for 1972 and 1973, respectively, was there clearly a difference between high and low GCT groups in UA rate. This result is perhaps sur-

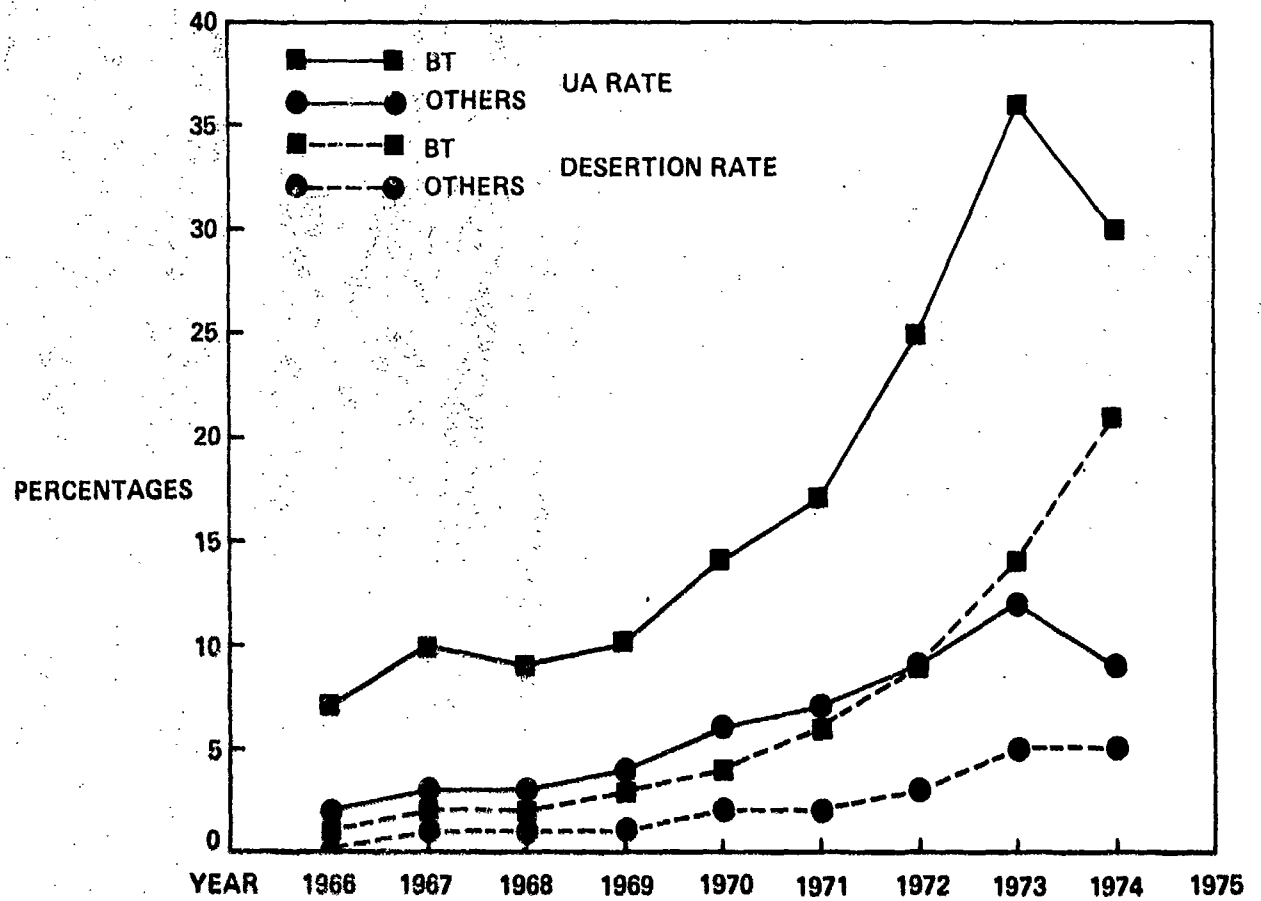


Figure 1. Comparison of UA and desertion rates for boiler technicians versus other occupational groups by year of enlistment.

prising in view of consistent findings over many years that GCT scores correlate with ineffective performance. In the present study, however, we are looking at the relationship within homogeneous occupational groups rather than across heterogeneous occupational groups. The only performance indicator consistently predicted by GCT level in this study was percent attaining E-5 or above. Thus, within occupational groups, GCT predicted superior performance during first enlistment but not ineffective performance (UA or desertion).

There is evidence from recent medical studies that the high rates of UA, desertion, and attrition for Boiler Technicians are paralleled by a high rate of hospital admissions and that the hospitalization rate for this group has increased since AVF. In 1970-1971 Boiler Technicians had a 20% higher hospital admission rate than other enlisted occupations; in 1974-1975 this differential had increased to 36%. These medical findings suggest that job stresses have increased for Boiler Technicians during recent years.

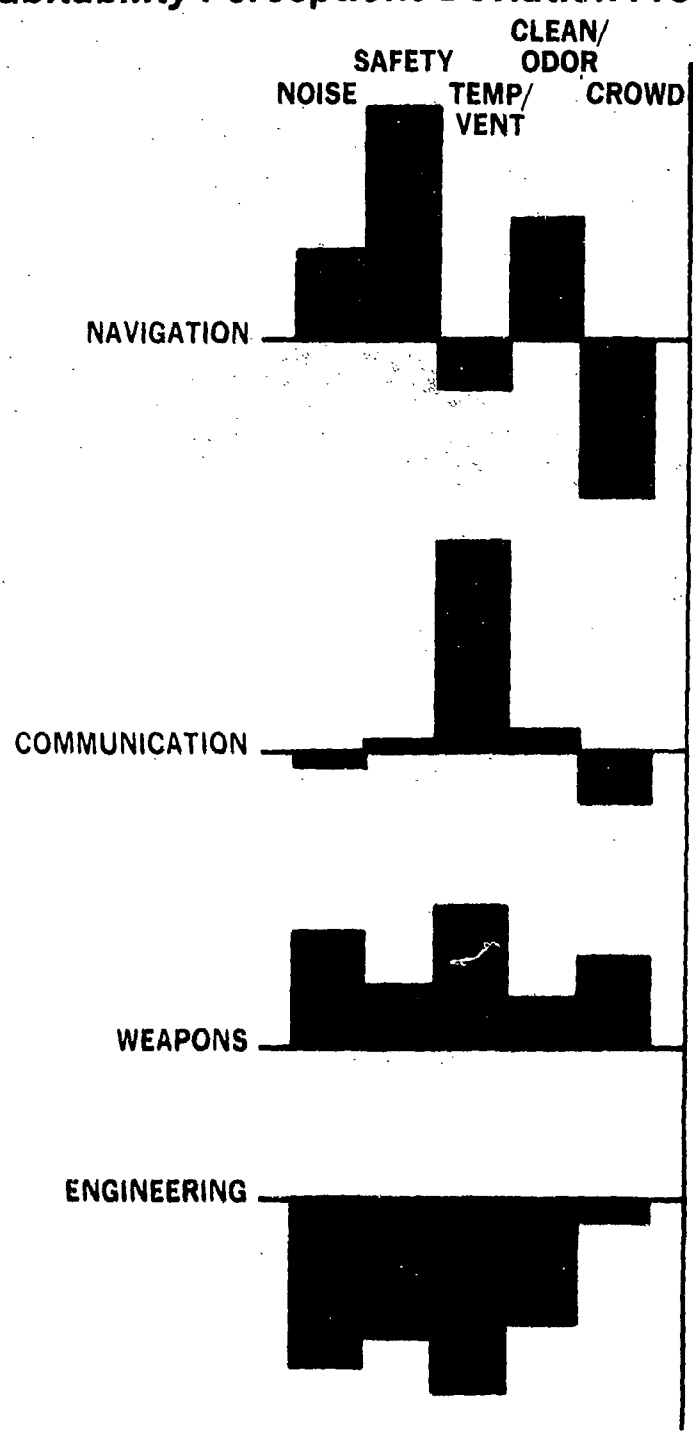
In current studies of environmental and organizational determinants of illness and injury rates aboard 18 destroyer-type ships, Boilers and Machinery (Engineering) and Deck division personnel have been found to have much higher morbidity rates than other groups. At the same time crew members' perceptions of their work environments and organizational climates in these divisions are quite different from perceptions in other divisions. For example, in Figure 2 it can be seen that Engineering personnel perceived their work environments as very unfavorable. Mean values for five environmental scales are compared for four types of departments or divisions--Navigation, Communications, Weapons, and Engineering. Values above the mid-line represent favorable environmental conditions while values below the mid-line represent unfavorable working conditions. Engineering personnel report their work areas to be noisy, unsafe, hot, and dirty but not crowded.

In Figure 3 working conditions are compared for divisions within two departments--Weapons and Engineering. Boiler (B) and Machinery (M) divisions within the Engineering Department reported extremely hot, dirty, noisy, and unsafe conditions compared with other divisions. Note that the Deck divisions within the Weapons Department reported relatively favorable environmental conditions on most scales.

In studies of organizational climate aboard ship it has been shown that Boilers and Machinery divisions and Deck divisions--particularly the latter--tend to have unfavorable division climates. In Figure 4 it can be seen that Boilers/Machinery and Deck personnel perceived more conflict and ambiguity than most other divisions; the Deck divisions perceived extremely low Job Challenge; Leader Support was perceived as low by Deck division personnel, and both types of divisions reported very low levels of Workgroup Cooperation, Friendliness, and Warmth. The latter climate dimensions, Leader Support and Workgroup Cooperation, have correlated importantly with measures of division performance effectiveness, illnesses and injuries, job satisfaction, and reenlistment decisions in our studies to date.

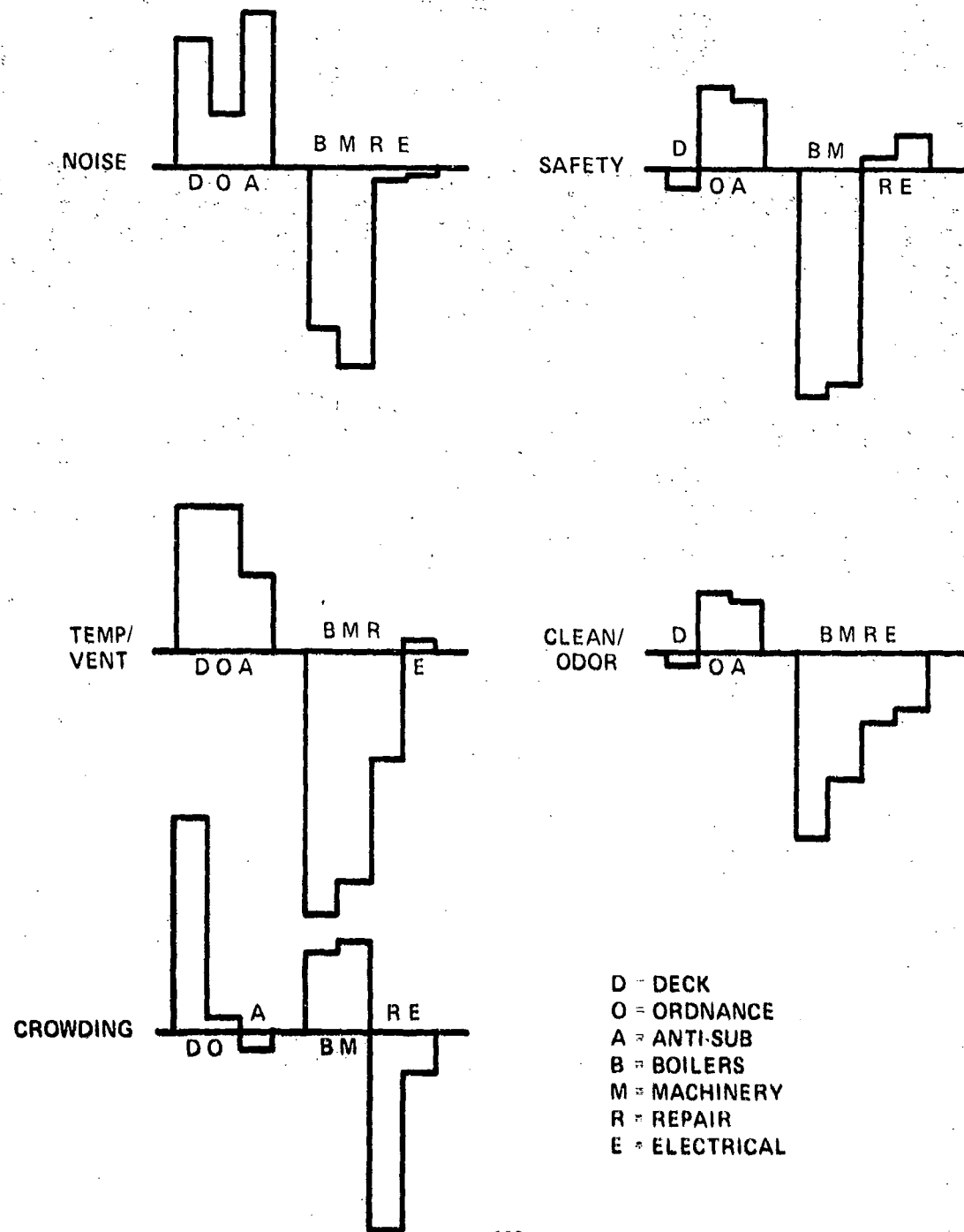
Finally, Figure 5 shows the relationship between perceived safety and actual injury rate for divisions aboard ship. Mean ratings of safety in work areas for various divisions are plotted on the abscissa and injury rates on

Fig. 2 **Habitability Perceptions Deviation From Ship Norms**



*HIGH SCORES REPRESENT FAVORABLE HABITABILITY

Fig. 8 VARIATION OF HABITABILITY PERCEPTIONS
FOR DIVISIONS WITHIN WEAPONS
DEPARTMENTS AND ENGINEERING

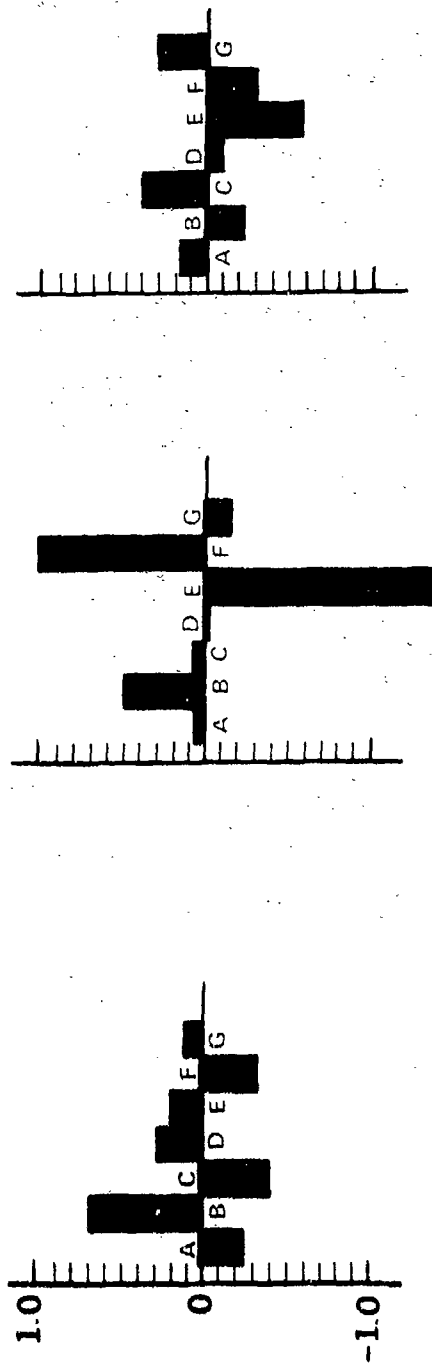


ORGANIZATIONAL CLIMATE PROFILES FOR DIVISION TYPES

CONFLICT AND AMBIGUITY

JOB CHALLENGE

LEADERSHIP SUPPORT



WORKGROUP COOPERATION PROFESSIONAL ESPRIT DE CORPS JOB STANDARDS

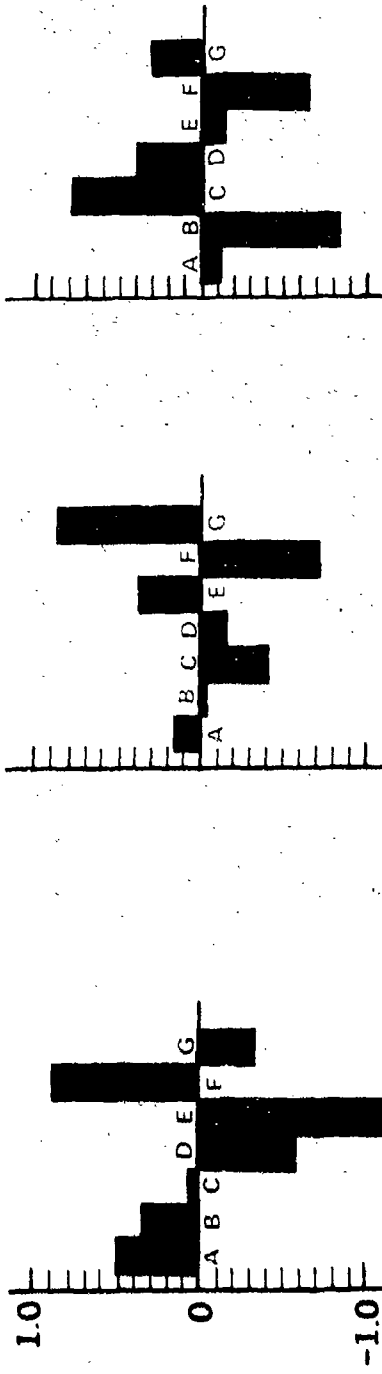
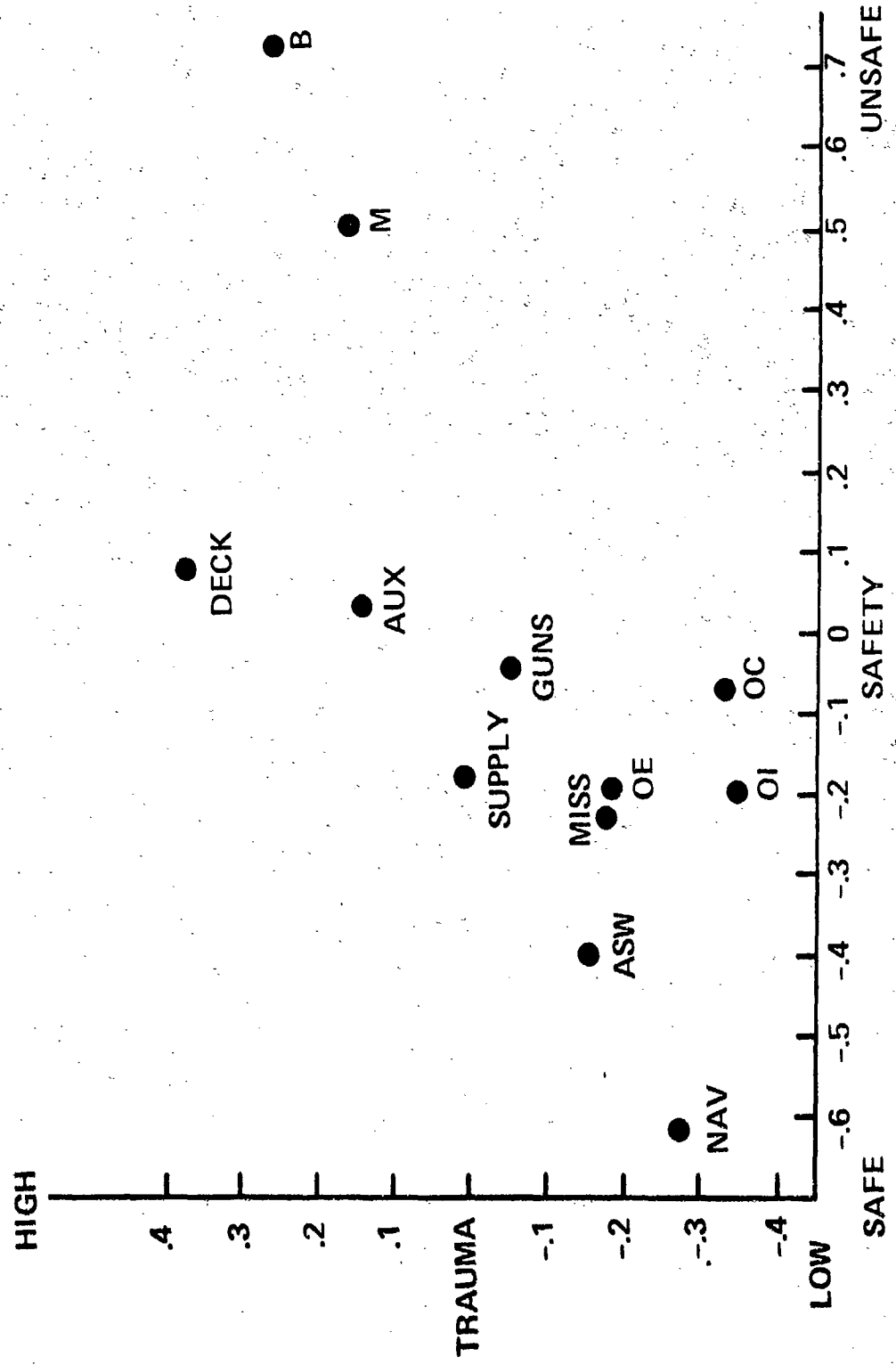


Fig. 4 A. NAVIGATION, ORDNANCE, ANTISUBMARINE WARFARE B. FIRE CONTROL, REPAIR, ELECTRICAL, AUXILIARY, MISSILES C. COMMUNICATIONS, INTELLIGENCE D. BOILERS, MACHINERY E. DECK F. ELECTRONICS G. SUPPLY

NOTE: ALL SCORES ARE STANDARDIZED DEVIATIONS FROM THE MEAN.

Fig. 5 Relationship of Perceived Safety to Accident Rate for Shipboard Divisions



the ordinate. Boilers (B) and Machinery (M) division personnel not only perceived their work areas as very unsafe but in fact during the next 7 months of an overseas deployment incurred relatively high injury rates. The Deck divisions did not perceive their work areas as unsafe but, nevertheless, experienced the highest injury rate of any division. Our interpretation of these and other results is that physical hazards are the most important determinants of injury rates in Engineering spaces but that unfavorable leadership and personnel utilization factors may be the most important contributors in Deck division.

On a subsample of seven ships for which disciplinary data were available, it was found that not only illness rates but disciplinary rates and job dissatisfaction were exceptionally high in Boilers, Machinery, and Deck divisions.

The hostile and hazardous nature of their work environment may help explain why many Boiler Technicians want to avoid their work situations, including going UA. Similarly, the monotonous nature of routine maintenance duties (cleaning, painting, and repair), coupled with leadership inexperience or indifference, could partly account for the high rate of behavioral problems among Deck personnel.

During the past three decades there has been a great deal of research on selection or screening techniques to reduce disciplinary and psychiatric problems and premature separation from the service. For example, 20 years ago the results of an ONR-supported study of 20,000 recruits who entered service in 1954 showed that age at enlistment, education, GCT, AFQT, and attitude inventory, called the Navy Delinquency Scale, predicted premature attrition (Gundersen and Ballard, 1956). A combination of age at enlistment, education, and Delinquency score provided probability tables that were moderately useful for identifying high risk recruits.

Plag and Goffman (1966) studied 10,000 Navy recruits who enlisted in 1960 and 1961 and developed probability tables, called Odds-for-Effectiveness, based upon four items: aptitude score, education, suspension or expulsion from school, and pre-service arrest record. These tables have been used in the past by recruiters to screen applicants. The tables recently were revised and updated by the Naval Personnel Research and Development Center in San Diego, and other studies have been done at NPRDC of biographical and attitudinal variables that predict delinquency and attrition.

Lockman (1976) recently reported a study of attrition during the first year of service and showed that education, aptitude score, age at enlistment, race, and primary dependents were valid predictors.

Many other similar studies have been conducted with highly consistent results. In this area the problem is not lack of knowledge but rather lack of utilization or application of this knowledge.

In the area of analysis of situational influences, such as physical environment and organizational structure and climate, on health, premature attrition, personnel effectiveness, and reenlistment, a substantial amount of work has been done during the last few years at the Naval Health Research Center with the help of an ONR-sponsored team from Texas Christian University and at the Naval Personnel Research and Development Center with the help of

a team from the University of Michigan. It is clear from our studies aboard deployed ships in the Atlantic and Pacific Fleets that organizational conditions have an important impact not only on illness and injury rates but on personnel effectiveness and retention. It has not been useful to use the data profile for the whole ship as the unit of analysis because of the great variability among different types of divisions within the ship. Deck divisions from different ships are more alike than Deck divisions and other divisions from the same ship. Thus, the division is the proper unit of analysis for most of our studies of environmental and organizational influences and is the proper level to take action with respect to personnel coordination and control problems and prevention of accidents, UA, and premature attrition.

SUMMARY

Several indices of personnel effectiveness, including unauthorized absence, desertion, demotion, advancement, and being classified as ineffective, and rates of premature attrition were examined for all Navy male Caucasian enlistees during the period 1966 through 1974. UA and desertion rates increased for most occupational specialties during 1970 through 1974 and increased sharply for Engineering and Hull personnel, particularly Boiler Technicians. Boiler Technicians also have shown increased hospitalization rates over the same period. Increases in personnel ineffectiveness and premature attrition could not be attributed to changes in personnel quality (aptitude scores). Studies of environmental and organizational conditions aboard operational combat ships have indicated very unfavorable crew members' perceptions of working conditions, including physical environment, leadership support, and personnel utilization and cooperation, for those occupational groups that have shown greatest increases in personnel ineffectiveness and premature attrition. More attention needs to be given to organizational conditions and practices as determinants of attrition.

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A MODEL TO ANALYZE THE COST IMPACT OF
FIRST-TERM ATTRITION IN THE NAVY AND MARINE CORPS

by

Daniel Huck
Kenneth Midlam

GENERAL RESEARCH CORPORATION

April 6, 1977

BACKGROUND

Under a study funded by the Office of Naval Research, GRC staff have been developing a computerized user-oriented system for evaluating the cost of first-term attrition in the Navy and Marine Corps. The methodology is, of course, extendable to the other Services provided a suitable data base is available. The data collection and modeling effort of this project are expected to be completed by next month, at which time a draft final report will be submitted detailing the specifications of the system and the results of test simulations.

In describing the attrition costing system, this briefing is divided into five parts. The first is a discussion of the methodology employed; the second describes the input data used and the output measures produced; the third section discusses GRC's perception of the value of the system for decision makers, which is followed by a sample problem using live data.

STUDY OBJECTIVE AND CONCEPTUAL APPROACH

The objective of this study is to develop a system which integrates cost, attrition and effectiveness data to enhance the analysis of manpower policy alternatives affecting first-term personnel. The approach

has been to use the concepts inherent in life-cycle costing typically applied to equipment acquisition decisions and adapt them for use as a human capital accounting tool in evaluating manpower policies. Since personnel decisions affecting first-termers entail both present and future obligations, analyses supporting these decisions should use a time horizon that encompasses all relevant present and future costs. The magnitude of these future costs is predicated not only on the wages and benefits DOD pays an individual, but also the replacement costs that will occur due to attrition. Finally, these costs should be evaluated in the context of the benefits that accrue to DOD from the services rendered by the first-termer.

Figure 1 shows schematically our conceptual approach to developing a comprehensive attrition costing system. As mentioned before, the inputs to the system are cost, utility and attrition data. The hackneyed phrase, "garbage in - garbage out," was very much on our minds when we began developing the system, and the majority of GRC's contract effort has been expended in acquiring data sufficiently detailed and accurate to ensure user confidence in the validity of the results when the system is turned over to the Services. Output from these data can be displayed in report form for information purposes or they can be manipulated in the system to produce various benefit cost measures and other indicators useful to management.

SYSTEM INPUT DATA COMPONENTS

Attrition Data

GRC, through the cooperation of the Navy, Marine Corps, and MARDAC, wrote a series of programs to produce attrition data that were suitable for the model's purpose. The Navy attrition data, as of this date, have been extracted from MARDAC personnel files disaggregated by the categories shown on Table 1. The Marine Corps data are currently in the process of being extracted. Consequently, the example that will be used in this presentation incorporates only Navy data, but our final report will cover both Services.

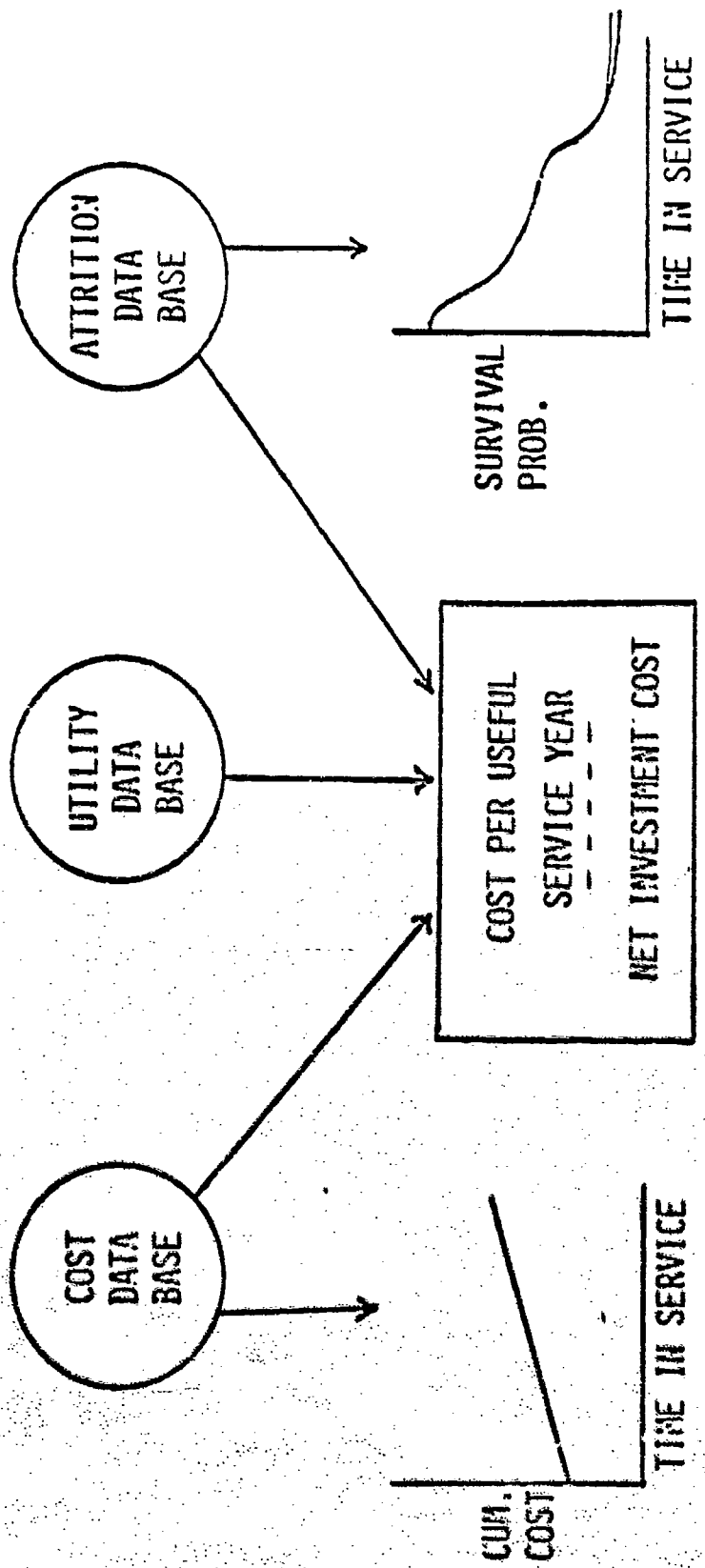


Figure 1
 FIRST-TERM ATTRITION COST ANALYSIS
 SYSTEM OUTPUTS

Table 1

ATTRITION DATA

● DATA NECESSARY TO GENERATE RETENTION BY MONTH OF SERVICE UP TO THE 50TH MONTH

● FIRST TERM MALE ENLISTEES CLASSIFIED BY:

- CIVILIAN EDUCATION
- RACE
- MENTAL GROUP
- AGE
- NUMBER OF DEPENDENTS
- ACCESSION COHORT (7/72 - 6/75, 7/75 - 9/76)
- TERM OF ENLISTMENT
- ENLISTMENT BONUS
- PROGRAM ENLISTED FOR
- LOSS TYPE

● FIRST TERM FEMALE ENLISTEES CLASSIFIED BY:

- CIVILIAN EDUCATION
- RACE
- ACCESSION COHORT
- AGE
- TERM OF ENLISTMENT
- LOSS TYPE

For use in the attrition costing system, these data are converted into survival rates for enlistees classified by any demographic combination displayed on the previous table. These survival rates are the probability in any given month of reaching and completing that month of service. Figure 2 shows Navy survival rates for 3-year non A-school enlistees and, as I'm sure most of you are aware, significant differences in retention patterns exist for various cohorts. I would like to stress, however, that it is unwise to set recruiting or assignment policies solely on the basis of the observed attrition without examining the cost and benefit implications of those decisions.

Utility Data

Utility or effectiveness data are another major input to the system. Use of utility data is optional; however, assumptions made concerning the relative worth of an individual to the Service can be a very important consideration in making decisions that affect recruitment, training and retention of personnel.

Three alternative utility assumptions are possible. The first is that utility is not explicitly considered in the system, which implies that the utility index has a value of 1.0 for all cohorts considered through all time periods. The second alternative utility assumption would be that utility is proportional to cost. This implies that acquisition and training are the only investments made and that an individual's value of output is equal to the cost incurred at each point in time throughout his first term. The third alternative utility assumption, which is the one used in the example that will be discussed later in this paper, is that utility is proportional to the degree of on-the-job proficiency attained as an enlistee progresses through his first term of service. A rough construction of this function for Navy can be made by combining results of studies by BK Dynamics, Decisions & Designs, CNA, and the RAND Corporation.

For our work, we assumed that for first-termers utility is measured by job-related competence and our reference point is a high-school

RETENTION OVER TIME OF SERVICE
HIGH SCHOOL DIPLOMA GRADUATES
3-YEAR ENLISTEES (NON A-SCHOOL)
BY AGE AT ENTRY, SEX, MENTAL GROUP

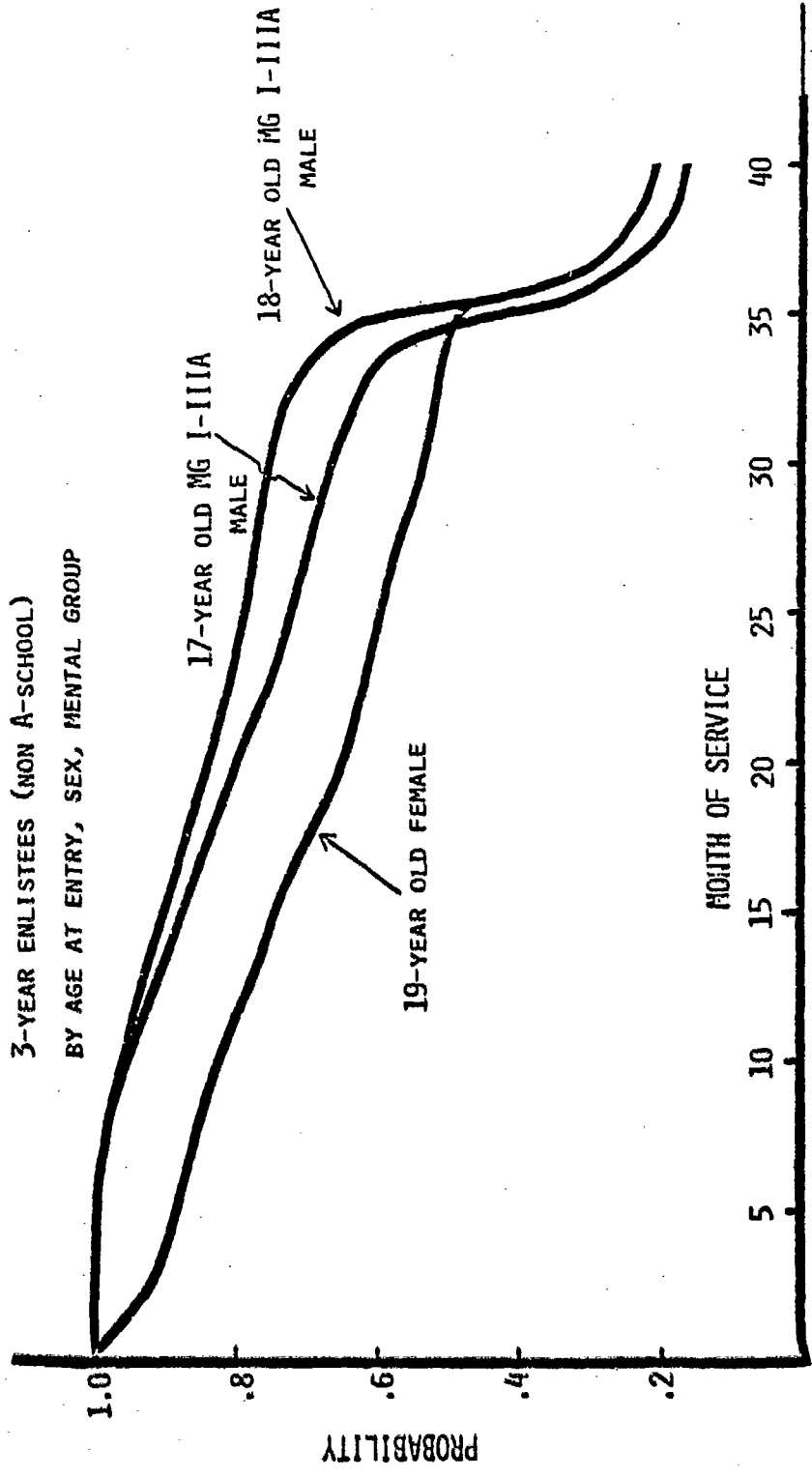


Figure 2

graduate mental group I-IIIA enlistee with 48 months of service. Assigning him or her a utility of 1.0, and scaling all others relative to that reference point, leads to curves like those shown on Figure 3. The curve at the upper left may be considered the reference curve and corresponds to the utility of a typical A-school graduate. The second curve shows progressively less improvement in utility over time and is intended to represent the learning experience of an A-school graduate in mental group IIIB. Note that each curve at its origin remains flat over the first 4 months of service, implying that zero utility is obtained from an individual while he or she is in training. While studies show that maximum technical competence is achieved by the 5th or 6th year of service, increases in overall utility beyond the 4th year accrue in the main by the exercise of managerial skills and supervisory responsibilities. Thus the first-term enlistee appreciates in worth to the Navy largely through his acquisition of a usable productive skill which he perfects within his first 48 months of service.

Cost Data

The cost component of the input data includes pay and allowance data shown here by grade, year of service, and personnel community. All Navy and Marine Corps skills have been grouped into what are called personnel communities. There are five personnel communities in the Navy, which are:

- Technical
- Engineering deck/hull
- Aviation
- Administrative supply
- Other

There are four Marine Corps communities—these are:

- Combat
- Combat support
- Ground support
- Aviation

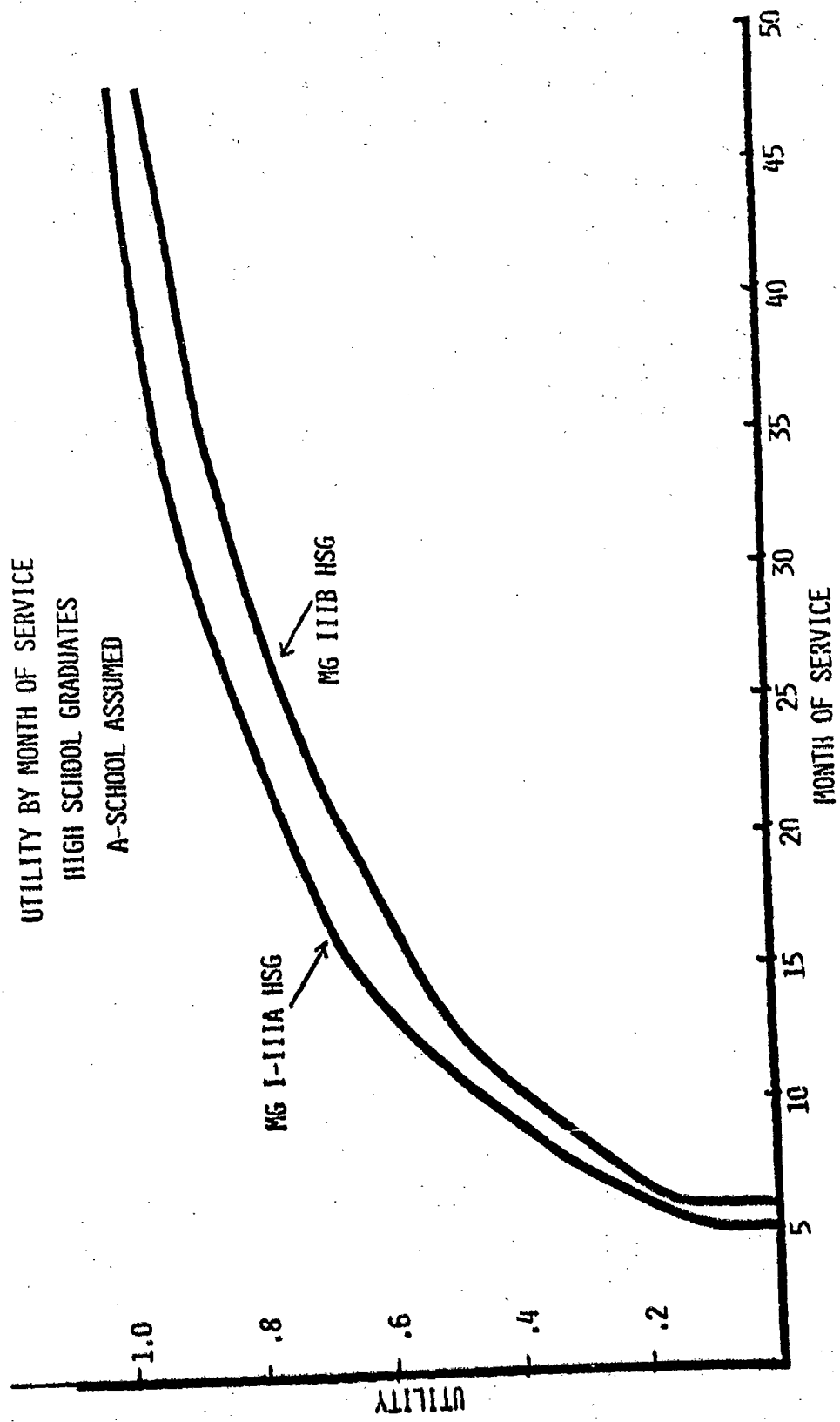


Figure 3

Navy pay data were obtained from the military pay stratified sample for the transition quarter, while the Marine Corps data were obtained from their MMS file for data from the months covering September, October, and November for 1976. Data elements include base pay, quarters, subsistence, and special pays.

Training cost data have also been collected, which for the Marine Corps include basic plus first school training for each entry level MOS and an average cost for each personnel community. Similar Navy training cost data were collected for basic plus apprentice or A-school for each rating and averaged for each personnel community. These data are expressed in the system in terms of cost per enlistee of various curriculum lengths.

Other cost data available in the system include medical system costs, travel costs, recruiting and initial processing costs, and corrections and judicial system costs.

POLICY ANALYSIS CAPABILITY OF THE MODEL

Before describing the actual outputs of the system, I am going to discuss some of the manpower policies and issues that are addressable by the system in the hope that these output measures and their use in an example, which employs actual data, will be more meaningful to you.

The argument has been put forth by defense officials that enlisting certain types of individuals will produce a savings in manpower costs, even though their initial recruiting costs may be quite high relative to other supplies of manpower that are more readily available. It has been on this basis that the recruitment of high school graduates becomes a cost-effective policy when attrition rates and replacement costs become part of the decision making process. The example that I will use later in the presentation will delve further into the subject of cost-effectiveness and compare various male and female high school graduate enlisted cohorts.

Policies that impact on the rate of attrition, as well as the time of its occurrence, have cost implications as well and can be readily evaluated

by the system. The cost-effectiveness of an early release or trainee discharge program can be evaluated using this system.

The effect of changes in the compensation system can be examined from a number of different perspectives. The use of the enlistment bonus is a case in point, where the cost of the incentive to increase the supply of enlistees with more favorable retention patterns can be compared to the savings and replacement costs avoided through lower turnover in the force.

Full scale simulations are also possible with the system to test out the sensitivity of variations in cost elements and overall cost-effectiveness results. Virtually any data element in the system can be modified by the user if he wishes to make his own assumptions about the components of the system, such as promotion rates, retention rates, salary levels, or utility indices. From a policy analysis standpoint, this is probably the most powerful aspect of the system since it permits the user to develop explicit cost estimates of policies that affect retention in the first-term force.

OUTPUT MEASURES AVAILABLE FROM THE MODEL

In addition to displaying the actual input data in report form, as I mentioned earlier, a number of key output measures are produced by the system.

Cumulative Cost

The first output measure that is available is cumulative cost. Table 2 shows the monthly cumulative expenditure of a specific cohort. While the data have been truncated for display purposes, this is actual cost data. The \$2,250 figure at month 0 is actually the marginal cost of recruiting an NPS male high school graduate in mental category I-IIIA for the Navy. This estimate was derived from a recent econometric analysis of the supply of volunteers under a study funded by the Office Assistant Secretary of Defense for Manpower. Since many of the decisions policy makers face are incremental in nature, it was decided that marginal costs, rather than average costs, would be used for recruiting for groups that are considered to be supply limited to the military.

Table 2

MODEL OUTPUTS

CUMULATIVE COST—THE TOTAL COST ACCUMULATED BY MONTH N
FOR AN INDIVIDUAL WHO SURVIVES TO MONTH N

NAVY NPS MALE, I-III A, HSG

<u>MONTH</u>	<u>MONTHLY COST</u>	<u>CUMULATIVE COST*</u>
0	\$ 2,250	\$ 2,250
.	.	.
.	.	.
3	1,063	5,327
.	.	.
.	.	.
6	525	7,513
.	.	.
.	.	.
12	537	11,227
.	.	.
.	.	.
24	562	17,897
.	.	.
.	.	.
48	680	32,373

Expected Service

The next output is expected service, and Table 3 shows the number of months or years that can be expected from a specific cohort recruited. Again, this is actual data and the cohort displayed on this table is expected to provide on average 40.1 months of service for a 4-year term of enlistment.

Expected Cost

Unlike cumulative costs, Table 4 shows those cumulative costs when adjusted for the likelihood of an individual surviving that month of service. The monthly cost is simply multiplied by the survival rate to yield the expected cost. Note that for this cohort the expected cost is slightly more than \$27,000 over a 4-year enlistment. The cumulative cost shown on Table 2 was approximately \$32,000 over the same time period and for the same cohort when attrition is not considered.

Expected Value and Expected Cost Per Utile

Table 5 shows the method for computing the expected value and expected cost per utile. A utile in our terminology is considered to be one fully productive person-year of service to the military. The basis for this utility index was described earlier and, when multiplied by the survival rate, the expected number of utiles can be computed. The expected cost per utile is shown at the bottom of the table and is simply the sum of the expected cost divided by the sum of the expected utiles. In this case, each year of fully productive service for the cohort being considered here costs approximately \$12,700.

Investment Cost

Table 6 shows investment cost and is defined as the expected cost minus expected value in dollar terms. Expected value is assigned a dollar value simply by multiplying that fraction of a month in service that is considered to be fully productive for the cohort and multiplied by the monthly cost of a fully qualified journeyman. Using this methodology,

Table 3

MODEL OUTPUTS

EXPECTED SERVICE—THE ACTUAL TIME IN SERVICE EXPECTED
FROM AN INDIVIDUAL OVER N MONTH TIME FRAME

NAVY NPS MALE, I-III A, HSG
(4-YEAR A-SCHOOL)

<u>MONTH</u>	<u>SURVIVAL RATE</u>
0	1.000
.	.
.	.
3	.980
.	.
.	.
6	.959
.	.
.	.
12	.909
.	.
.	.
24	.822
.	.
.	.
48	.673

40.1 MONTHS (3.34 YEARS)

Table 4

MODEL OUTPUTS

EXPECTED COST—THE COST INCURRED IN THE NTH MONTH IN SERVICE X
THE PROBABILITY OF SURVIVAL THROUGH THE NTH MONTH

NAVY NPS MALE, I-111A, HSG

<u>MONTH</u>	<u>MONTHLY COST</u>	<u>X</u>	<u>SURVIVAL RATE</u>	<u>=</u>	<u>EXPECTED COST</u>
0	2,250		1.000		2,250
.	.		.		.
.	.		.		.
3	1,063		.980		1,042
.	.		.		.
.	.		.		.
6	525		.959		503
.	.		.		.
.	.		.		.
12	537		.909		488
.	.		.		.
.	.		.		.
24	562		.822		462
.	.		.		.
.	.		.		.
48	680		.673		458
					<u>27,400</u>

Table 5

MODEL OUTPUTS

EXPECTED VALUE ("UTILITIES")—THE VALUE IN THE NTH MONTH OF SERVICE
 (RELATIVE TO A FULLY QUALIFIED JOURNEYMAN) X THE PROBABILITY
 OF SURVIVAL THROUGH THE NTH MONTH

MONTH	UTILITY INDEX	X	SURVIVAL RATE	=	EXPECTED VALUE
0	0		1.000		0
.	.		.		.
.	.		.		.
3	0		.980		0
.	.		.		.
.	.		.		.
6	.19		.959		.18
.	.		.		.
.	.		.		.
12	.55		.909		.50
.	.		.		.
.	.		.		.
24	.81		.822		.67
.	.		.		.
.	.		.		.
48	1.00		.673		.67

2.16 "UTILITIES"
 (YEARS)

EXPECTED COST PER "UTILE"—EXPECTED COST ÷ EXPECTED UTILITIES
 \$27,400 ÷ 2.16 = \$12,690

Table 6

INVESTMENT COST - EXPECTED COST (EC) MINUS EXPECTED VALUE (EV)
 X COST OF A FULLY QUALIFIED JOURNEYMAN (C*)
 EC - (EV·C*)

MONTH	EXPECTED COST	EXPECTED VALUE	X C*	=	INVESTMENT COST
0	\$2250	.0	680		\$2250
.
3	1042	.0	680		2042
.
6	503	.18	680		381
.
12	488	.50	680		148
.
24	462	.67	680		6
.
48	458	.67	680		0

NET INVESTMENT COST \$9,775

it is assumed that a fully qualified journeyman produces a dollar value of service that precisely equals the cost of service he has provided. The net investment cost shown at the bottom of the table is the amount of money expended on an individual in this cohort for which we have not yet received a return in service. The meaning of the concepts of cumulative and expected costs, expected value, and net investment cost may become clearer from the following figure.

Figure 3 shows graphically the four cost and value output measures that I just described to you. The upper line is the cumulative cost for an individual in this cohort when attrition is not considered. The line below that is the expected cost, and is simply monthly total costs adjusted for the likelihood of the individual being in service during that month to incur those costs. The next line down is investment cost. It, again, is the amount of money expended for which benefits have not yet been received to DOD. The lightly shaded area is expected value and, as is evident from the graph, is the difference between the expected cost and the investment cost or, explicitly, it is the amount of money expended which an equivalent dollar value of return in services rendered can be anticipated by DOD. The darker shaded area is the net investment cost and, again, is total expected cost minus the dollar value of productive services provided. Note that in the first few months of service, major costs incurred are investment costs for which no immediate return in services rendered accrues to DOD. As we move further out on the month of service line, value of services rendered begins to expand, due primarily to the increase in utility associated with a more experienced individual and the "break-even point" is reached at the 32d month of service. It is at this month that cumulative expected value of service provided exceeds the cumulative expected investment cost. A "break-even point" that is closer to the origin of the graph (i.e., 0 months of service) is more desirable since it implies that, for the cohort analyzed, costs have been recouped sooner by services rendered.

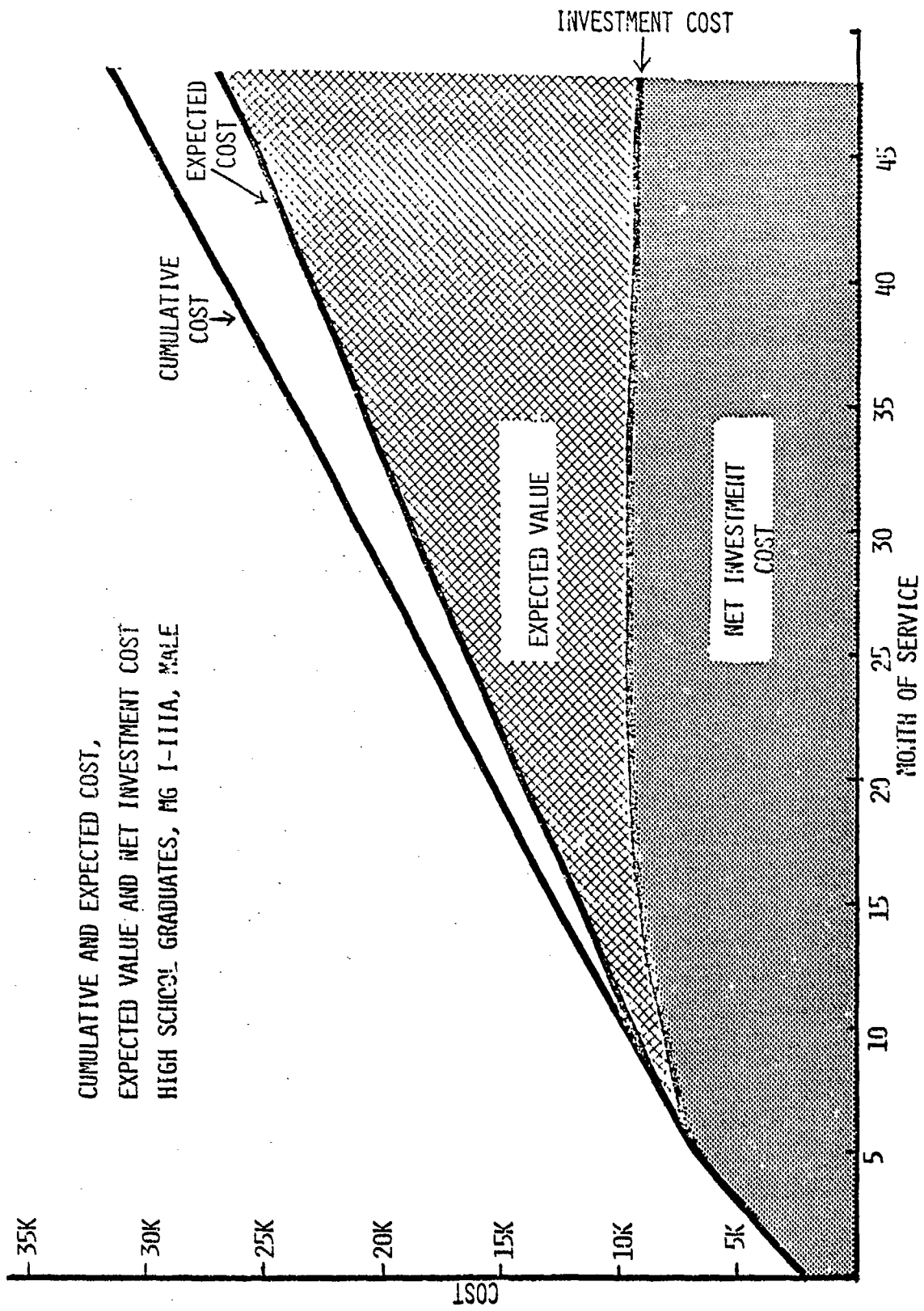


Figure 3

Expected Cost to Produce One Person with 48 Months of Service.

The last model output discussed here is the expected cost to produce one person with 48 months of service. As we are all aware, unless an individual has a 0 probability of attriting during his first 48 months of service, we will have to recruit and train more than one individual to ensure that at least one is available for reenlistment at the end of his or her first term. Table 7 essentially shows the cost likely to occur if one individual in this cohort is to be available for reenlistment. On average, we must recruit and train 1.5 individuals who are male diploma high school graduates in mental groups I-III A to ensure that one is available for reenlistment at the end of his term of service. The cost of this is approximately \$41,100. This cost, however, does not ensure that the individual will reenlist and if the chances of the individual reenlisting are one in three, then our expenditures to produce one reenlistment exceed \$120,000, or approximately three times the cost figures shown on this table.

SAMPLE PROBLEM

Figure 4 shows the survival rates for three types of cohorts. Recruiting of the male high school graduate in mental groups I-III A has been preferred, in part because of the lower attrition expected from these individuals. While females are being actively recruited by the Navy, they do experience higher attrition. One issue that could be addressed by this system is, that given the higher attrition associated with females, is it more cost-effective to recruit, train and retain them when compared to their male high school graduate counterparts?

Results on Table 8 show that while females will on average produce less expected service and expected utiles as we have defined them, important cost measures associated with this cohort are lower for females than for their male counterparts. The one exception to this is the expected cost to produce one person with 48 months of service, where it appears that a male IIIB high school graduate is equivalent in cost to the female graduate. On the surface, the data suggest that it is more cost effective to recruit and train females than males. There

Table 7

MODEL OUTPUTS

EXPECTED COST TO PRODUCE ONE PERSON WITH 48 MONTHS SERVICE

$$\frac{1}{P_{48}}$$

X EXPECTED COST

$$\frac{1}{.67}$$

$$X \$ 27,400 = \$ 41,100$$

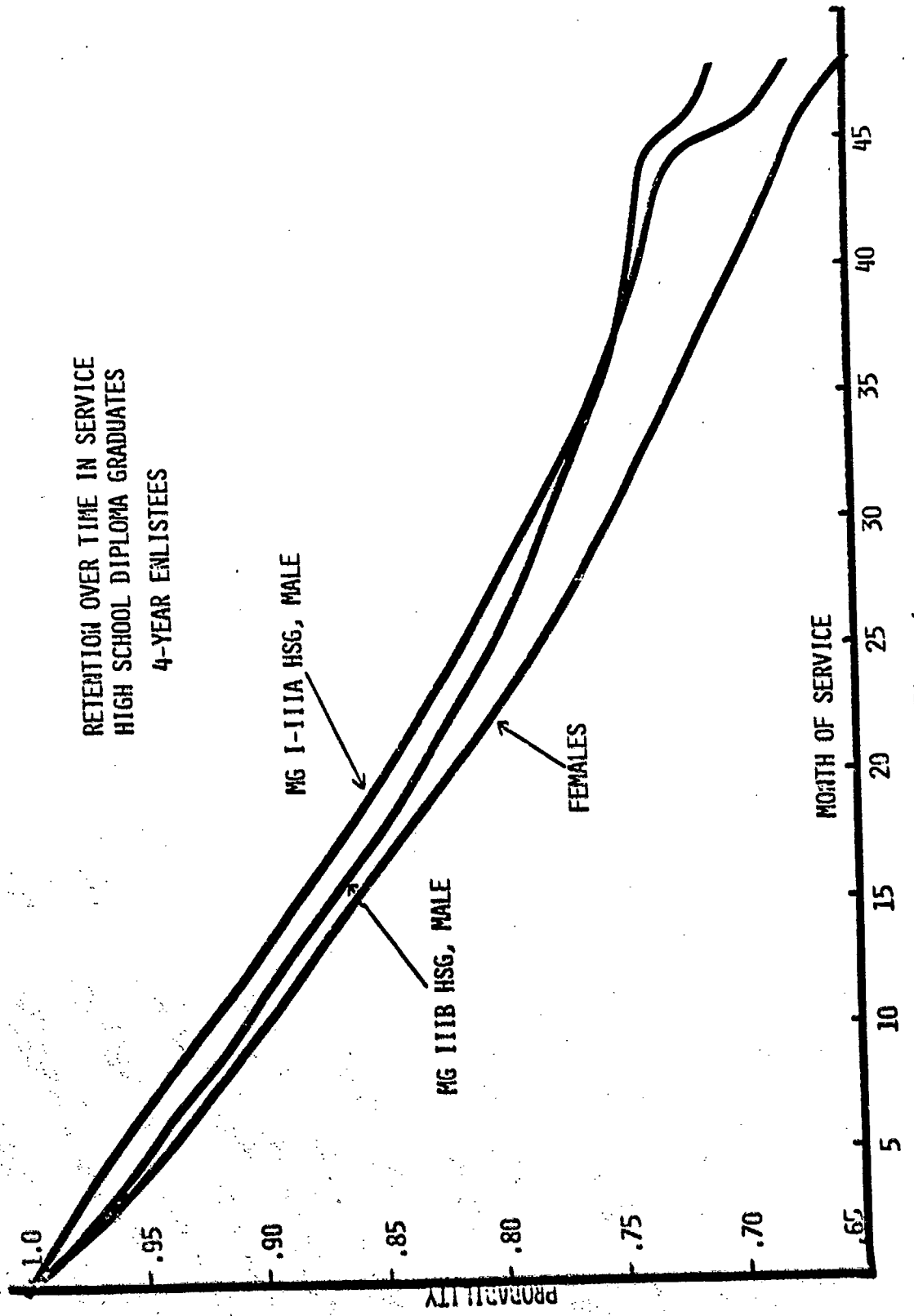


Figure 4

Table 8

COMPARISON OF OUTPUT MEASURES
HIGH SCHOOL DIPLOMA GRADUATES
(4 YEAR FIRST TERM)

	MALES		FEMALES
	M.G. I-III A	IIIB	
CUMULATIVE COST	\$32,373	\$31,192	\$30,243
EXPECTED COST	\$27,400	\$26,125	\$24,400
EXPECTED SERVICE	40.1 MO	39.5 MO	39.4 MO
EXPECTED VALUE ("UTILS")	2.16 YRS	1.99 YRS	2.07 YRS
COST PER UTILE	\$12,690	\$13,130	\$11,790
NET INVESTMENT COST	\$ 9,775	\$ 9,885	\$ 7,510
EXPECTED COST TO PRODUCE ONE PERSON WITH 48 M.O.S.	\$41,100	\$36,800	\$36,970

are, however, a number of assumptions that were made in deriving these output measures that could be modified by the user to change the overall results. The first deals with the cost of recruiting these individuals. It was assumed, for example, that the cost of recruiting a male high school graduate is the marginal cost of \$2,250, as described earlier. For females, the marginal cost is assumed to be zero since they are considered to be an excess supply and no additions to the recruiting force need be made to recruit more females. This is probably the single most significant cost factor that favors the recruitment and retention of females over males. The other major assumption is that females have the same utility profile as male high school graduates, mental categories I-III A. Should females achieve proficiency at a slower rate than their male counterparts, the scale may tip in favor of males as the more cost-effective cohort to recruit.

SELECTIVE OVERVIEW OF NPRDC ENLISTED ATTRITION R&D

Martin F. Wiskoff
Navy Personnel Research and Development Center

The following overview is termed "selective;" that is, a select number of studies directly related to enlisted attrition will be addressed. The focus is on recently completed, ongoing and soon to be started work in three areas of attrition R&D: (1) descriptive--categorizing or cataloging knowledge of attrition related phenomena; (2) predictive--seeking to establish quantitative relationships between demographic and conditions of service variables and attrition; and, (3) field studies--introduction of some intervention strategy into the "normal" operational sequence to assess impact upon attrition. My purpose is to provide a feel for the types of R&D being conducted by NPRDC, rather than attempting to be all inclusive in coverage.

I. DESCRIPTIVE ATTRITION R&D

A. Career Expectations

I recently completed a review of Armed Services studies of career expectations from four nations, Australia, Canada, the United Kingdom, and United States (Wiskoff, 1977). The purpose was to assess career expectations as they related to assimilation into military service.

In the review, career expectations were related to three stages of the assimilation process:

- Anticipatory assimilation--recruitment/procurement.
- Adjustment-accommodation--expectations related to military service training, work and conditions.
- Identification--military career decision.

Following are some representative findings, and possible management actions.

1. Expectations Related to Recruitment--Procurement (Anticipatory Assimilation)

a. Youth in member nations hold similar expectations of military attractions and benefits, focusing on those associated with technical training, security, and pay. Tempering this general statement is the finding that there are expectation differences relating to the unique aspects of the military services, (e.g., travel for the Navy) and to the specific demographic characteristics and environmental background of respondents (age, education, geographic location, skill marketability).

b. The anticipatory expectations of pre-service youth tend to be somewhat unrealistic concerning pay, future education, and life goals, with a distinct tendency toward overestimation of their future achievement and underestimation of pay within the military.

The opinions or assertions contained herein are those of the writer and are not to be construed as official or reflecting the views of the Navy Department.

c. A great amount of idealism appears in youth expectations concerning service life, and leadership.

2. Expectations related to Military Service Training, Work and Conditions

a. Expectations has served often as one of the number of variables used to explain work motivation, job performance, and military adjustment. For example, a Canadian study found that men generally expect suitable work and are displeased when expectations are not met.

b. Expectations change--mostly in the downward direction--as individuals progress through the adjustment-accommodation phase (as influenced by service conditions) after recruit training.

3. Expectations and the Military Career Decision (Identification)

Porter and Steers (1973) in their extensive review of employee turnover and absenteeism, comment. "The major turnover findings of this review . . . point to the centrality of the concept of met (or unmet) expectations in the withdraw decision", (page 170).

A consistent finding among the studies is the key role that expectations play in formulating the career decision, whether or not these expectations are embedded in reality. Furthermore, expectations about the future exert more influence as a determiner of career intent than present conditions. Some specific findings were:

a. Expectations of noneconomic benefits (i.e., such intrinsic factors as satisfaction with job and service life) have the greatest influence on the positive career decision. Determinants of leaving the military revolve around pay, assignments, and family separation.

b. There are distinct subgroup differences in relating expectations to careers, particularly in regard to demographics, environment prior to entry, and conditions of service experienced.

c. The pattern of decreasing career intent during the first service tour is seen as coexistent with changing expectations and the notion of expectancy disconfirmation.

On the practical side, there are several actions amenable for consideration by military planners and practitioners. The major operational implications are:

1. Recruiting appeals must be more flexible and more relective of applicant needs and expectations, and incentive programs must be tailored to specific population subgroups.

2. Greater emphasis should be placed on enhancing the accuracy of communication between applicants and recruiters. Suggestions in this regard include establishment of career information systems to increase the amount and fidelity of information available to prospective recruits and development of counseling programs to enable better matching of available options with expectations/needs of applicants.

3. Innovative ways of enhancing the assimilation process should be considered. Thought should be given to such notions as heightening group cohesiveness, providing reality-oriented training, and introducing more accurate leadership expectations.

4. In addition, to becoming more aware of the influence that expectations exercise on careers, the military should examine its own expectations concerning personnel and their families and the manner in which military service creates and influences expectations.

II. PREDICTIVE ATTRITION R&D

A. Prediction of Enlisted Tenure-Two Years (POET-2)

The original Odds for Effectiveness (OFE-1) table was developed using data collected on a sample of nonprior service male enlistees entering the Navy in 1960-61. This table was designed to estimate the probability that a man would render effective naval service as a function of: (1) aptitude test score, (2) number of years of school completed, (3) number of expulsions/suspensions from school, and (4) number of arrests (Plag and Goffman, 1966).

The OFE-1 table was officially implemented in the beginning of CY 1973. Navy recruiters, instructed to compute an OFE-1 score for each male nonprior service applicant for enlistment, experienced increasing difficulty in obtaining arrest information. As a result, the Navy Personnel Research and Development Center was requested to revise the OFE-1 table and remove the arrest variable. The resultant OFE-2 table became operational for screening all male nonprior service applicants as of October 1975 (Sands, 1976).

The OFE-2 table was viewed as an interim solution to a pressing operational problem. The data used for constructing the table are more than fifteen years old. In addition, the data were collected during a time when enlistment in the Navy was influenced to some extent by the pressure of the draft.

The age of these data provided a spur to the development of an updated system entitled POET-2 (Prediction of Enlisted Tenure). With a similar rationale to Dr. Lockman's work on SCREEN (Lockman, 1976) the purpose of POET-2 was to develop effective tools to aid in screening applicants for enlistment. These tools can serve to reduce the often substantial social, financial and personal costs of erroneous acceptances. Specifically, we attempted to develop a procedure which could provide the recruiter with an estimate of an applicant's probability of surviving two years. Those applicants with a low probability could be screened out, thereby producing a net decrease in premature attrition. The POET model we have produced is designed to provide these estimates as a function of: (1) aptitude test score, (2) number of years of school completed, (3) age, and (4) number of primary dependents (Sands, 1977).

The sample used in developing the model was all nonprior service enlisted males with an active duty base date in CY 1973; the first cohort to enter the Navy under All Volunteer Force Policy. Over 68,000 males are included in the study.

With this model we were able to produce a total of eighty unique combinations of predictors. For convenience, the eighty probability estimates have been organized into a single easy to use table. In addition, management-oriented information was prepared to illustrate the various consequences of employing alternative cutting scores in selecting applicants. This permits examination of the tradeoffs involved in setting standards in light of current supply and demand for nonprior service enlisted males.

The statistical evidence indicates that the POET-2 model is capable of producing reasonably accurate predictions. With the analyses presented as an expectancy tradeoff table, showing the consequences of using alternative cutting scores; the personnel manager is provided with a degree of flexibility he has seldom had in the past.

B. Recruit Background Questionnaire

Biographical data have long been found to be predictive of tenure in industrial work situations (Schuh, 1967). For the Navy, we have already discussed the development of entry screening tools such as OFE, with correlations in the range of .30 for predicting premature attrition. On the basis of a number of studies performed at our Center, we felt it would be productive to develop a background questionnaire to serve as an adjunct to presently used techniques for screening naval applicants.

In 1974, a number of likely sources were reviewed, and 370 items were isolated, which were then divided into seven experimental questionnaires. Each of the questionnaires was administered to recruit training populations and item analyses were performed against a recruit training attrition criterion. The eighty-two most promising items were selected for the final form of the Recruit Background Questionnaire (RBQ). Of those, over 50% were classified into four categories; school performance, attitudes and expectations, demographic data, and employment history. Although clearly related to attrition during recruit training, the operational effectiveness against criteria of long-term attrition has not as yet been established (Atwater, Skrobiszewski and Alf, 1976).

Because of the perceived potential of the RBQ, the instrument was incorporated into the Voluntary Separation Pilot Program. The program itself is described more fully by Dr. Guthrie in another section of this report. I will discuss the RBQ as it is currently constructed for the program.

The RBQ has been revised especially to meet the information needs of the Pilot Program. From the original eighty-two items of the 1974 study, a core of forty-four were used to produce a new RBQ of 120 items. This revision is designed to more adequately measure constructs related to enlisted turnover. The instrument now contains the following six constructs:

1. Biographical-Attitudinal Items

Items refer to demographic background characteristics, attitudes toward jobs, school, the Navy in general, career plans, and reasons for enlisting.

2. Expectations Regarding the First Job Assignment

Items cover expectations of supervision, working conditions, recognition for good work, and the work itself.

3. Perceptions of the Organizational Climate of the Recruit Training Center

The focus of these items is on policies, practices, morale, and fairness at the RTC. The Company Commander is the focus of items dealing with attitudes

toward supervision, while the company itself is addressed by items dealing with operational efficiency, co-worker cooperation, and morale.

4. Measures of Achievement Needs

Specific achievement dimensions refer to aspiration level, achievement behavior, and persistence in high school.

5. A Measure of What Is Often Called the Internal-External Basis of Control

The term "internal" is used to describe an individual who believes he has some control over his destiny and who perceives contingencies between actions and outcomes; the term "external" refers to individuals who believe their destiny is controlled by outside factors.

6. Perceptions of General Living Conditions experienced at the RTC

These require the individual to describe general living conditions in boot camp on a series of semantic differential items; for example, ventilation, lighting, privacy, etc.

With the exception of climate and perceptions of general living conditions, the RBQ constructs consist of individual characteristics hypothesized to be related to attrition decisions. The climate and living condition items are felt to involve environmental determinants of attrition.

The instrument was administered in November 1976 at all Recruit Training Centers, to over 6,000 people.

At this point, the primary analysis phase for the RBQ is being conducted against an early Fleet and A-School attrition criterion. We will determine not only the predictive power of this new expanded instrument, but also expect to have solid information on the differential validities of the six major constructs. Later we will obtain job performance and disciplinary records, and administer a specially designed exit questionnaire.

C. Reading Tests

The topics of reading and literacy have been looked at many times by the Navy research community. The most recent revival of interest has been in connection with the volunteer force concept and includes studies of literacy training, the readability and comprehensibility of written materials in the Navy, and possible reading screening measures (Fletcher, Duffy and Curran, 1977). It is the latter that I wish to discuss, particularly the relationship of reading level to attrition.

Data collected at NPRDC indicate that reading deficits in the Navy affect significant numbers of personnel. For example, if a 5.5 Reading Grade Level (RGL), the current reading level deemed necessary in the Navy, were required for admission into the service, 9%, or 7,800 of the FY 1974 recruit population would have been rejected.

A study of over 20,000 men entering Recruit Training Center, San Diego between 1 June 1974 and 1 February 1975 reported a clear and systematic relationship between reading ability (as measured by the Gates-MacGinitie reading test)

and boot camp attrition (Fletcher, et al, 1977). It was found that the less than 4th grade readers have a .36 probability of making it through boot camp, while the probability is .96 that the above 10th graders will make it. These analyses indicate that the attrition rate systematically decreases as reading test performance increases, and this is true across the entire range of reading levels. When considered in combination with other predictor variables such as odds for effectiveness, mental level and years of education, reading level contributes independently to the prediction of attrition.

Interest in the reading level/attrition relationship generated a study to investigate the feasibility of developing a short reading test for pre-enlistment screening use, which would focus on the lower levels of reading skill. Using the Gates-MacGinitie, we produced two forms of a short reading test, each one consisting of twenty-five vocabulary items, and fifteen reading comprehension items and requiring only one-third the administration time of the long form. It was found that the short tests evidence adequate reliability, exhibited reasonable statistical relationships with the longer test and could most appropriately be used to screen out individuals with reading levels below 4th grade (Cory, 1976).

Subsequent analyses indicated that the Gates-MacGinitie (long-form) was predictive of recruit training attrition for three racial groups, whites, blacks and Filipinos; the relationship being much greater for whites than for the other two groups. This finding was more pronounced for the short reading test, i.e., although there is a positive relationship for all three racial groups between low reading test scores and attriting from recruit training, for blacks and Filipinos considerably more of the people who would be screened out would be nonattritees than would be attritees.

To further complicate the picture, more recent longitudinal analyses on a part of the 1974-1975 data base to investigate the natura of the relationship between reading level and attrition have found differential effects depending upon the sample breakout and the point in service career attrition is measured (Sachar and Duffy, 1977).

Overall, the data indicate that lower level readers are more apt to be discharged from the Navy, and that this relationship is greater during recruit training than from recruit training to one year of service.

Reading grade level seems more related to discharge during the four week academic phase of recruit training than during the four week phase devoted more to physical conditioning and training of military skills. When the sample is split out into designated personnel (those who receive specialized training and then work in a speciality area) versus nondesignated personnel, the data indicated little relationship between reading level and discharge for designated personnel. For nondesignated personnel, the relationship is such that both high and low reading skills are related to high discharge rates. One possible explanation is that the reading test is serving as a general test of ability, i.e., low readers have difficulty in performing the job while high readers may be overqualified.

It is obvious that we must learn more about relationships of reading grade level with attrition and other behavioral phenomena. A trial administration of the short reading test has been incorporated into the voluntary separation program and hopefully analysis of this data will provide some answers. We do

believe that we should continue to work toward developing an appropriate measure of reading for future use as a supplement to existing screening measures. The potential dollar savings could be very large.

III. FIELD STUDIES

A. Experimental Procedures for the Classification of Naval Personnel

Historically, the Navy classification system has been based upon paper-and-pencil tests designed to assess the probability that individuals will perform successfully in formal school training. Studies have shown that this system functions quite well for the 60 to 70% of the entering enlisted personnel who go directly into formal school training after completion of recruit training. For the remaining 30 to 40% of the entering population, however, these classification procedures are grossly inadequate and provide little information as to how individuals may best be utilized when they enter the Fleet. And it is just this group of individuals, the "General Detail" population who consistently exhibit the highest attrition rates, as well as disproportionately high desertion rates, AWOL, sick bay calls and overall behavioral problems. Other studies have pointed out that a large measure of dissatisfaction is engendered when individuals have nothing meaningful to do in the job setting.

A pilot study, recently completed, had as its goal the development of a method for classifying General Detail personnel through the use of a technical classification assessment center approach (Siegel and Wiesen, 1977). The method emphasizes exercises which allow the individual to learn and perform tasks that simulate likely on-the-job learning and performance. Job analysis were first performed to establish the requirements of various Navy ratings along the learning, psychophysical/motor and social/motivational dimensions. Target Navy ratings were chosen to reflect a wide range of requisite abilities and duties. A set of exercises were then developed based on the job analyses and Guilford's structure-of-Intellect Model, to measure capabilities in these three dimensions.

The exercises were administered in the Fall of 1975 to approximately 140 men, following completion of recruit training, at the Naval Training Center, San Diego. Total testing time required of each individual being assessed, including semistructured interview and debriefing feedback by participants was less than six hours. Testing team members were two Navy Chief Petty Officers and two psychologists.

Recognizing that this study represented a pilot program, results were quite encouraging. The tests themselves evidenced adequate statistical reliability, reasonable independence, were practical to implement, and were employed in a consistent fashion by the various staff members from whom the classification recommendations evolved. Of the 140 men involved, 76 were "classifiable" into one of eight specialties: Postal Clerk, Storekeeper, Yeoman, Signaler, Machinist's Mate, Hospital Corpsman, Engineman, and Electrician's Mate.

Of equal importance, individuals assessed considered the multiple assessment methods employed to be fairer than and preferable to the usual paper-and-pencil evaluative techniques. At the present time, follow-up studies of these individuals are being conducted to obtain measures of on-job performance, behavioral indices and attrition information.

A follow-on to this successful pilot demonstration is currently being planned. As envisioned, it will involve a considerably larger number of individuals, a broad range of rating groups, and greater control over Fleet utilization of personnel who are classified by these procedures. This method offers exciting possibilities for effecting better utilization of personnel capabilities as well as reduction of behavioral problems experienced in on-job Fleet settings.

IV. FINAL REMARKS

This conference has surfaced a considerable body of information, generated by R&D, about the attrition from service phenomenon. It is my feeling that we researchers and managers have devoted more energy to collecting and then neglecting data than to truly attempting to utilize the potential of existing information. There is so to speak a lack of an institutional memory. It is certainly far more glamorous to create and accumulate than to rehash and integrate, although it is through the latter that I see the greater immediate potential for management gain.

One area that immediately comes to mind is that we do not appropriately accumulate information on people as a basis for making decisions about their service fate--i.e., we calculate probability estimates for screening people prior to service, but do not update the probabilities with service obtained variables.

It is essential that we extend the information gathering process on the individual and assess capabilities after entry using other than the paper-and-pencil type tests employed prior to entry.

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USAF ATTRITION TRENDS AND IDENTIFICATION OF HIGH-RISK PERSONNEL

Nancy Guinn
Personnel Research Division
Air Force Human Resources Laboratory

Every organization within the military experiences turnover in varying degrees of intensity. Today with increasing budgetary constraints imposed on military spending, excessive turnover becomes a critical issue, and the costs associated with recruiting and training large numbers of personnel to fill the vacancies of those who elect to leave the service becomes an important matter of concern. In addition to overall replacement costs, such losses make it difficult to build a career force with the desired experience and proficiency levels required to maintain organizational effectiveness.

Many basic airmen meet established enlistment standards but are subsequently discharged for unsuitability or classified as ineligible to reenlist upon expiration of their first term of service. A major objective of the selection and classification program is to develop more precise procedures or methods which will identify those young men and women not likely to succeed in their military career. Although discharge for unsuitability may occur at any time in service, the prediction of unsuitable performance during the initial tour of enlistment is usually of paramount concern.

Figure 1 represents the major areas of personnel research being accomplished by the Air Force Human Resources Laboratory. The areas outlined in red focus on those points in the military life cycle where attrition from the United States Air Force is most likely to occur.

The problem of excessive attrition troubles all the services. During the past 15 years, various attempts have been made to develop a screening

technique which could be used to reduce the number of individuals entering service who would be eliminated for unsuitability at a later date (Flyer, 1959; Plag & Goffman, 1966). Although some variability exists among the services in the importance of individual pre-enlistment characteristics, there is a general consensus that level of education, age, and general intelligence level are highly predictive of military adjustment (Flyer, 1959; Fisher, Ward, Lawrence and Holdrege, 1960; Gordon and Bottenberg, 1962; Arthur, 1971; Carpenter and Christal, 1973). A graphic representation of the relationship between selected factors and first-term losses is shown in Figures 2-5.

Figure 2 indicates the relationship between mental category and losses-all types. The sudden upsurge toward the end of the first term as shown in Figure 2 reflects the early-out policy available to enlisted personnel. Figure 3 delineates the relationship only for losses-undesirable. Regardless of type of loss, attrition is seen to be directly related to mental category.

Figures 4 and 5 further subdivide the mental category groups into high school graduates and non-graduates. The losses associated with the high school non-graduate population are dramatically shown in these figures. Across all mental categories, high school non-graduates show much greater loss rates than their high school counterparts. During this period, even the Category IV high school graduates show better retention potential than the Category I non-graduate. Similar loss curves were found when age was used in combination with mental category. The younger airmen (17 years old) reflected higher attrition rates.

Based on the consistent relationships found between variables such as age, level of education, and general intellectual functioning with overall

military effectiveness, Air Force medical personnel in 1972 developed an inventory to be used as a screening technique to identify recruits who are considered high-risk for problems in adaptation to the military environment. This instrument, an 100-item self-report history opinion inventory (HOI), was designed to tap dimensions of school adjustment, family stability, social orientation, emotional stability, bodily complaints, motivation and expectations for achievement, and response toward authority. The initial study identified 12 percent of the 15,000 recruit population as high risk for military adaptation (LaChar, Sparks, and Larsen, 1974). Half of this group labeled high-risk did, in fact, experience problems in adjustment during basic training, although their problems did not necessarily result in discharge from service. Based on these results, further research was accomplished by the Air Force Human Resources Laboratory on the same population to determine the accuracy of the HOI in predicting the criterion of in/out of service during the first two years of enlistment (Guinn, Johnson, and Kantor, 1975). The results of this follow-up study indicated that the self-report data contained in the HOI has some practical usefulness as a rough, preliminary screening device. Follow-on research is now in progress to develop separate HOI scales for males and females as well as a unisex scale, and evaluate the potential usefulness of these scales in identifying high-risk personnel. In April 1977, it is tentatively planned that a full-scale field study of the HOI will be implemented at the Armed Forces Examining Stations. Results of this effort should further delineate the usefulness of this instrument in identifying high-risk personnel from all branches of the armed services. Possible implementation of this test measure at the initial entrance point would be even more cost-effective than

identifying high-risk personnel during their basic military training program.

Attrition from a training program also represents a costly expenditure which might be saved. Each year the Air Force invests millions of dollars in training to improve the skills of those individuals who enlist in the Air Force. Air Force planners have always been concerned over training attrition costs and constantly seek ways to reduce the overall costs by enlisting those with the highest probability of success in a military career. One method of control over possible attrition from training is the use of stringent qualifications for initial enlistment. The main components of Air Force enlistment have centered on aptitude, graduation from high school, and age - the same components found to be related to attrition in previous research studies.

While aptitude levels required for enlistment have remained relatively constant, educational requirements have varied considerably. Today enlistment standards require that each accession qualify on three criteria: (1) the total score on the four combined aptitude indexes of the Armed Services Vocational Aptitude Battery (ASVAB) must be equal to or exceed 170; (2) the General Aptitude Index score must be 45 or higher; (3) if an enlistee is classified as Category III or IV on the Armed Forces Qualification Test (AFQT), that enlistee must be a high school graduate.

An AFHRL study of the impact of enlistment standards on the procurement-training system highlights the cost avoidance which might be realized by changing enlistment standards (Vitola, Guinn, and Wilbourn, in press). The first phase of the study compared a number of proposed standards with the actual standard used during 1974 as well as the current 1975 standard being

used today to show the value of these standards using several criteria of evaluation. The components for the proposed enlistment standards included various levels of aptitude, educational level, and age (Table 1).

Table 2 presents interesting data on the relationship between age and attrition from training. It appears that the younger 17 year olds represent a high-risk group for possible elimination. In general, 17 year olds demonstrate lower overall aptitude and represent a majority of the high school non-graduates. From these data, it appears that a standard including some type of age requirement would be quite cost-effective. Table 3 presents comparative data on the actual and 1975 standards along with the proposed standards. Both cost-avoidance figures and the impact on the recruiting market associated with each standard are presented. Based on these results, several of the proposed standards appeared to merit further consideration. Table 4 presents a comparison of several composite standards. While those standards which include high school graduation as a component indicate large savings, they reject a large segment of the manpower pool. Only if the selection ratio were quite favorable would such a stringent requirement be considered feasible.

Before a final decision was made on the value of one composite standard compared to another, an evaluation was made which included some indication of the impact of the proposed standards on the quality of Air Force accessions. Both the AFQT and ASVAB were used as indicators of quality. Inspection of Table 5 reveals little difference in the overall means or the percentages in each mental category among these proposed standards. Similar trends are found when the mean ASVAB performance is compared among standards (Table 6).

Little, if any, differences in quality would result from using any of the proposed standards, while each of the proposed standards provides benefits not afforded by the stringent 1975 standard.

Based on the data of this study, it was empirically demonstrated that judicious use of an enlistment requirements index in the selection process could result in appreciable savings in basic military and technical training costs. Further, the value of an enlistment standard must be estimated using multiple criteria rather than a single criterion of cost alone.

From this investigation, it appears that the MAGE 165/AGE₁/HSC or MAGE 165/HSC standards would be feasible for operational use. When compared to the 1975 standard currently in use, both the proposed standards offer the following advantages:

- a. Greater cost avoidance
- b. An expanded recruiting market
- c. More effective screening of potential BMT eliminees
- d. No practical decrement in accession quality
- e. Equal opportunity for Black enlistment

Flexibility of enlistment requirements is essential to maintain viable force levels, minimize eliminee costs, and maintain accession quality; it is believed that the enlistment standards methodology developed in this study provides that flexibility.

Our research efforts in the attrition area also include an investigation of problems in the security/law enforcement career field. In 1974, the Security Police Directorate indicated that attrition in that career specialty had become an acute problem which required immediate attention. An unacceptable number of first-term personnel were being identified as non-effective which necessitated their retraining or separation from service. In response

to the request for research assistance, the Air Force Human Resources Laboratory initiated a project to develop a screening procedure for entry into the security police career field. The primary objective of the study was to develop an effective screening procedure which would reduce costs associated with retraining and/or separation of personnel who cannot adapt or cannot effectively perform security police duties; a concomitant goal of pre-screening security police applicants would also provide the additional potential of greatly improving the quality of security and law enforcement services for Air Force installations and resources. A sample of 4,501 basic airmen assigned to the security police AFSCs were administered an experimental battery consisting of three measures: (1) History Opinion Inventory; (2) Airman Assessment Inventory; and (3) Vocational Interest Career Examination.

Preliminary regression analyses were accomplished using the intermediate in/out criterion after completion of technical training. Final analyses using the in/out criterion after 9-12 months on the job are now in progress. Results of the preliminary study indicate that all three experimental test measures along with aptitudinal data should be considered in developing an effective screening procedure for security screening procedure for security police personnel. A minimum composite of items developed from the three tests and aptitude scores resulted in a multiple correlation of .46.

Using the prediction equation for this model, 94 percent of those individuals were correctly identified as to their actual in/out status after technical training (Table 7). Only one percent of those individuals who successfully completed training were identified as potential failures while 22 percent of the failures would have been identified as high-risk.

The possible monetary savings to be accrued from implementation of the experimental Security Police Selection Composite can be demonstrated by using the sample population as an example. Using the proposed prediction equation, the total number of security police personnel who were identified as potential graduates was 4387; 4131 or 94 percent were actually successful in completing their training program. Assuming that 4164 (the actual number in the sample population who did graduate) were required to meet operational commitments, a total input of 4430 would have been required instead of 4501. Instead of the original number of 337 eliminees, only 266 would not have completed the training program. The original number of eliminees (337) represents an approximate loss of \$967,190.¹ The lower number of eliminees which would result from using the prediction composite represents a cost of \$763,420 or a savings of \$203,770 over the original number of eliminees. While the cost avoidance associated with the sample population is somewhat small, savings associated with the total input into this career field (e.g., 1975 input was 9,268) would make consideration of such a screening procedure worthwhile.

The final topic of research focuses on the development of a selection methodology to identify individuals who might be career prospects. If it were possible to predict an airman's reenlistment potential, such an index could be used to assign enlisted personnel to the more critical specialty areas and/or to the more costly training programs to maximize the Air Force's return on training investment.

¹ Cost data furnished by Hq. ATC Comptroller

Research designed to describe and identify careerists has been attempted in the past by every branch of the armed services. Results of previous studies done in the Air Force indicate that the relationships of certain aptitude, attitude, and biographical data to reenlistment decisions were low but generally significant (Fitzpatrick and Cullen, 1957).

Although researchers have been moderately successful in developing a measure of reenlistment potential, there is general agreement that the task of predicting the criterion of reenlistment is quite complex. It is recognized that many factors influence a man's decision to remain in service after completion of his initial tour (Malone, 1967). Personal characteristics such as age, aptitude, number of years of education completed, and socio-economic level may have some effect on career decision. Other factors external to the individual and unpredictable at enlistment may influence his final decision such as supply and demand in the civilian job market or unemployment rates at the time of separation. In-service variables related to job satisfaction, training, and experience as a function of his military service also have their impact. Marital status and number of dependents may play some part in a reenlistment decision which cannot be predicted early in an airman's initial tour. Finally, not to be ignored are the more subtle influences such as the attitudes of family and dependents toward the Air Force and an Air Force career.

Survey response data from 3,062 first-term enlistees who had completed 2½ to 3½ years of service were used to develop the proposed Reenlistment Potential Index. The data base also included aptitudinal scores and final disposition at completion of initial tour.

The multiple correlation of the regression equation containing the biographical, aptitudinal, and attitudinal data listed in Table 8 was .55. Upon cross-application of the regression weights to another sample, the multiple correlation decreased to .51. Both correlations were significant at or beyond the .01 level.

To illustrate the practical utility of the Reenlistment Potential Index, predicted reenlistment scores were generated from the regression model. Using the computer-determined cutoff score, 81 percent of the sample population at time of entry could have been correctly identified as to their ultimate reenlistment status (Table 9). While 56 percent of the career personnel (reenlistees) would have been incorrectly identified, only six percent of the group who actually elected to leave service would have been incorrectly identified as possible career personnel. These figures would tend to indicate that considerable savings could be realized if personnel with high retention potential could be assigned to high cost training programs or to those critical AFSCs which typically experience reenlistment shortfalls.

This effort represents only our initial investigation in this area. While our preliminary results appear encouraging, it is realized that response data obtained after 2½ to 3½ years of service may have been affected by the time interval between survey and actual career decision. Additional areas need to be explored prior to consideration of using such an index in actual classification and assignment. The reliability and validity of the prediction system need to be assessed on a volunteer population. The applicability of the predictor equation for both males and females needs

to be confirmed. In addition, an effort should be made to study the different validities and functional relationships between the predictor composite and first-term career decisions when specific AFSCs are taken into account.

Should the career-field-specific equations be found to be useful, an exploratory effort will attempt to combine these data with estimated training costs for the various training programs to provide another component for use in the person-job match algorithm. By the interaction value of retention probability and estimated training cost for any specific AFSC, assignments could then take into account a factor to minimize the costs associated with potential elimination from that particular specialty area.

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TABLE 1. ENLISTMENT STANDARDS, DESCRIPTIONS, AND ABBREVIATIONS

Standard Description	Abbreviation
1. Actual Standard Used for Yearly Input	(Actual)
2. 1975 Enlistment Standards (MAGE 170 or higher; GAI=45 or higher; if Category III or IV on AFQT, High School Graduate)	(1975)
3. Composite Standard-High (MAGE=175 or higher; GAI=45 or higher; if Category III or IV on AFQT, High School Graduate)	(Comp-Hi)
4. Composite Standard-Low (MAGE=165 or higher; GAI=45 or higher; if Category III or IV on AFQT, High School Graduate)	(Comp-Lo)
5. Composite of Aptitude Indexes (MAGE=175 or higher)	(MAGE=175)
6. Composite of Aptitude Indexes (MAGE=165 or higher)	(MAGE=170)
7. Composite of Aptitude Indexes (MAGE=165 or higher)	(MAGE=165)
8. General Aptitude Index (G=55 or higher)	(GAI=55)
9. General Aptitude Index (G=50 or higher)	(GAI=50)
10. General Aptitude Index (G=45 or higher) High School Graduates plus AFQT Cat I and II	(GAI=45)
11. High School Non-Graduates	(HSC)
12. High School Graduate	(HSG)
13. Minimum Age, 18 years	(AGE)
14. Minimum Age, 17 years, 6 months and above	(AGE ₁)
15. Composite of Aptitude Indexes (MAGE=165 or higher) plus minimum age	(165/AGE ₁)
16. Composite of Aptitude Indexes (MAGE=165 or higher), High School Graduate; plus AFQT Cat I and II High School Non-Graduates	(165/HSC)
17. Composite of Aptitude Indexes (MAGE=165 or higher) plus High School Graduation	(165/HSG)
18. Composite Aptitude Indexes (MAGE=165 or higher), Minimum Age plus AFQT Cat I and II High School	(165/AGE ₁ /HSC)

Standard Description	Abbreviation
19. Aptitude Composite (MAGE=165 or higher), Minimum Age plus High School Graduation	(165/AGE ₁ /HSG)
20. General Aptitude Index (G=45 or higher) and Minimum Age	(GAI 45/AGE ₁)
21. General Aptitude Index (G=45 or higher) and High School Graduate and AFQT Cat I and II High School Non-Graduates	(GAI 45/HSC)
22. General Aptitude Index (G=45 or higher) and High School Graduation	(GAI 45/HSG)
23. General Aptitude Index (G=45 or higher), Minimum Age High School Graduates, and AFQT Cat I and II High School Non-Graduates	(GAI 45/AGE ₁ /HSC)
24. General Aptitude Index (G=45 or higher), Minimum Age plus High School Graduates	(GAI 45/AGE ₁ /HSG)

TABLE 2 . PERCENTAGE OF ELIMINEES BY AGE GROUP - CY 1974

AGE GROUP	PERCENTAGE OF ELIMINEES	
	BMT	TT
17	11	11
17 (17/0-5)	15	14
17 (17/6-11)	9	10
18	8	8
19	9	10
20	8	10
21	9	9
22	11	11
23	11	10
24+	13	12

TABLE 3. COMPARISON OF ENLISTMENT STANDARDS - CY 1974

Standard	BMT & TT Cost	Cost Avoidance	Rejection		
			M(%)	F(%)	T(%)
Actual	\$21,678,400				
1975	20,943,800	\$ 734,600	17	17	17
Comp-HI	20,814,100	864,300	18	19	18
Comp-Lo	20,903,500	774,900	16	15	16
MAGE 175	20,872,500	805,900	12	17	13
MAGE 170	20,965,800	712,600	10	14	10
MAGE 165	20,483,500	1,194,900	8	12	8
CAI 55	21,265,600	412,800	25	17	25
CAI 50	21,151,300	527,100	16	10	16
CAI 45	20,338,500	1,339,900	10	4	10
HSC	20,008,000	1,670,400	0*	0*	0*
HSC	20,243,500	1,434,900	6	2	6
Age**	20,808,500	1,869,900	4	0*	4

* Less than one percent

** Eliminates 17 year olds, 0-5 months

TABLE 4. COMPARISON OF COMPOSITE STANDARDS

Standard	Cost Avoidance	Rejected		
		M(%)	F(%)	T(%)
1975	\$ 734,600	17	17	17
165/AGE ₁	1,445,600	12	12	12
165/HSC	1,178,200	9	12	9
165/HSG	2,555,900	15	14	15
165/AGE ₁ /HSC	1,863,200	12	12	12
165/AGE ₁ /HSG	2,849,100	17	14	17
GAI 45/AGE ₁	1,220,000	13	5	12
GAI 45/HSC	951,100	10	4	9
GAI 45/HSG	2,324,600	16	6	15
GAI 45/AGE ₁ /HSC	1,780,600	13	4	12
GAI 45/AGE ₁ /HSG	1,854,800	18	6	16

1 - Eliminates 17 (0-5 mos) year olds

TABLE 5. ENLISTMENT STANDARDS VERSUS AFQT PERFORMANCE

CY 1974 POPULATION

<u>Enlistment Standard</u>	<u>AFQT Mean</u>	<u>CAT I %</u>	<u>CAT II %</u>	<u>CAT III %</u>	<u>CAT IV %</u>
1975	63.9	4.1	44.2	51.4	.3
165/AGE ₁	62.7	4.1	42.7	53.0	.2
165/HSC	62.8	4.0	42.6	53.1	.3
165/HSG	62.8	4.0	39.9	55.7	.4
165/AGE ₁ /HSC	62.9	4.1	43.9	51.8	.2
165/AGE ₁ /HSG	62.9	4.1	43.7	51.9	.3
GAI 45/AGE ₁	62.5	4.1	42.1	53.4	.4
GAI 45/HSC	62.6	4.0	42.4	53.4	.2
GAI 45/HSG	62.5	4.0	40.0	55.8	.2
GAI 45/AGE ₁ /HSC	62.7	4.1	42.9	52.8	.2
GAI 45/AGE ₁ /HSG	62.6	4.1	44.0	51.7	.2

AGE₁ - Eliminates 17 year olds (0-5 months)

TABLE 6. ENLISTMENT STANDARDS VERSUS ASVAB PERFORMANCE

CY 1974 POPULATION

Enlistment Standard	A S V A B		M E A N S	
	MECH	ADMIN	GEN	ELEC
1975	59.3	57.9	70.0	67.5
165/AGE ₁	59.0	57.0	68.1	66.6
165/HSC	58.9	57.4	68.4	66.0
165/HSG	58.6	57.2	67.9	66.7
165/AGE ₁ /HSC	59.9	57.6	69.0	66.9
165/AGE ₁ /HSG	58.8	57.4	68.3	66.4
GAI 45/AGE ₁	58.2	56.9	69.0	65.8
GAI 45/HSC	58.4	57.1	69.2	65.9
GAI 45/HSG	58.0	57.2	68.9	65.3
GAI 45/AGE ₁ /HSC	58.5	57.4	69.2	66.0
GAI 45/AGE ₁ /HSG	58.7	57.1	69.0	65.8

AGE₁ - Eliminates 17 year olds (0-5 months)

Table 7. Hit/miss table

Predicted status	Actual status				Total
	In		Out		
In	4131 94% (hits)	99%	256 6% (false positives)	78%	4387 100%
Out	33 29% (misses)	1%	81 71% (hits)	22%	114 100%
Total	4164	100%	337	100%	4501

Table 8. Variables used in regression analysis to develop reenlistment potential index

PREDICTOR VARIABLES

1. Airman Qualifying Examination mechanical aptitude score
2. Airman Qualifying Examination general aptitude score
3. Airman Qualifying Examination electronics aptitude score
4. Airman Qualifying Examination administrative aptitude score
5. Armed Forces Qualification Test score
6. Biographical composite score
7. Importance/Possibility experimental scores
 - Importance motivators
 - Importance dissatisfiers
 - Possibility dissatisfiers
 - Possibility motivators
 - Total importance
 - Total possibility
 - Total motivators
 - Total dissatisfiers
 - Difference IPM
 - Difference IPD
 - Positive score
 - Total score
 - Importance/possibility score

CRITERION VARIABLE

1. In/out of service

Table 9. Hit/miss table

Predicted status	Actual career status		Total
	Reenlisted	Did not reenlist/separated	
Reenlisted	358 (hits) 44%	133 (false positives) 6%	491
Did not reenlist/ separated	455 (misses) 56%	2116 (hits) 94%	2571
Total	813 100%	2249 100%	3062

PREDICTING ATTRITION:
A TEST OF ALTERNATIVE APPROACHES

Robert F. Lockman and John T. Warner

Center for Naval Analyses

SLIDE 1

We are going to describe (1) the background of predicting premature enlisted attrition in the military service, (2) four competing approaches to predicting this attrition, (3) a test of these approaches, and (4) the implications of the results for recruiting policy.

BACKGROUND

The history of predicting premature attrition, that is, losses before the completion of the first-term of military service, dates back at least to the early 1960s. At that time, researchers in the Navy, Army, and Air Force found that the best pre-service predictors of premature attrition were, in order, level of education, mental ability, and age (references 1, 2, and 3). The multiple correlation of these three predictors with various measures of attrition was about .35 for all three services.

In-service measures of performance and ratings of behavior increased the predictability of attrition, but they could not be used for screening out potential recruits who were high loss risks. Personality tests have also been related to premature

PREDICTING ATTRITION: ALTERNATIVE APPROACHES

- BACKGROUND OF PREDICTING ATTRITION
- ALTERNATIVE APPROACHES
- TESTING THE APPROACHES
- IMPLICATIONS FOR RECRUITING POLICY

attrition with varying degrees of success, but they must be specially administered to applicants if they are to be used for screening purposes.

Criticisms have been made of these past studies and current ones that employ personal characteristics and entry test scores to predict premature attrition (reference 4). The low value of the correlation of the predictors with the stay/attrite criterion has been cited, e.g., the R of .35 mentioned earlier. However this magnitude of correlation compares favorably with the validity coefficients of measures used to predict occupational performance in the civilian and military worlds (reference 5). It has been said that the low level of predictability is due to a decreasing diversity of the AVF manpower pool which limits the degree of correlation that can be achieved. But if this were true, the correlation could be corrected for such restriction without too much effort. The use of "static" personal characteristics and entry test scores has also been criticized because important "dynamic" situational or organizational variables are ignored. The desirability of investigating such measures for in-service classification and assignment purposes is evident (we ourselves are currently doing this for the Navy), but their reliability and validity for predicting attrition in conjunction with the "static" measures still must be demonstrated. Finally, it has also been said that the use of personal characteristics and entry test scores results in self-fulfilling prophecies of attrition - if men are thought to be dumb

and uneducated, they will be expected to fail and, therefore, will fail. There are compelling reasons for not labeling men with educational levels and mental groups, but at the same time our society places different values on these characteristics, and it is gratuitous to expect the services to do otherwise.

In any event, attrition, like death and taxes, is always with us, and today it is with us more than it was during the draft era. The three to four years premature loss rates in the 1960s ran from about 25 to 30 percent. Today, the comparable rates are 30 to 40 percent (references 1, 2, 3, and 6).

SLIDE 2

Costs of premature attrition are up, not only absolutely but relatively with the higher pay for today's volunteers and increased recruiting and training costs. The Navy estimates that it costs \$1,500 just to "access and dress" a non-prior-service recruit; another \$1,500 to get him (or her) through 8 weeks of recruit training; another \$400 for two weeks of apprentice training for those who do not go to Class A (technical training) schools; and about \$1,800 for technical training that averages 6 weeks (references 7 and 8).

These stages occur before a man is assigned to the fleet and becomes a productive member of the Navy. And as men are lost anywhere along the line, the toll mounts up. The costs of administrative and disciplinary discharges, unauthorized absences, desertion,

AVERAGE COSTS

ACCESS AND DRESS	\$1,500
8 WEEKS RECRUIT TRAINING	1,500
2 WEEKS APPRENTICE TRAINING	400
6 WEEKS TECHNICAL TRAINING	1,800

disciplinary measures, medical procedures, and the burden of dealing with unproductive losses-to-be also must be added to the bill.

In sum, then, premature losses, even of the voluntary type now undergoing experimental review in the Navy, are significant and expensive. Since personal characteristics and test scores are useful for screening out loss-prone applicants, the question is, what is the best approach for doing so?

ALTERNATIVE APPROACHES

When we talk about the "best" approach for screening out loss-prone applicants, we mean the most valid and least expensive, subject to the available supply of manpower. If the pool or potential recruits is so small that virtually all applicants have to be taken to meet manpower requirements, then screening is useful only for putting a "watch out" tag on a man whose chances of completing an initial tour are dim. If there is flexibility in whom we can take, screening becomes more useful in denying entry to the poorer risks.

There are two bases for screening. The first one is actuarial. With a sufficiently large recruit cohort, actual loss rates could be calculated for men with different patterns of characteristics. The trouble here, even when data is available on hundreds of thousands of men, is that we cannot be sure which are the most important characteristics, and combinations thereof, that relate to losses.

Statistical approaches to predicting attrition overcome the drawbacks of the actuarial approach. They let us know what the significant combinations of characteristics are that relate to losses and smooth out the projected rates.

SLIDE 3

There are two main but different statistical approaches that can be taken, with two variants of each. The main approaches are linear and non-linear in form, with the variants being the use of either individual or grouped observations.¹

The linear approach with individual observations is the most common. It was used in the early work of Plag, Caylor, and Flyer for the Navy, Army, and Air Force, respectively. Recently, it has been applied by the Navy Personnel R&D Center. The grouped linear and non-linear approaches are ones that I used recently for the Navy. The individual non-linear approach has been proposed by Dempsey and Fast to the Air Force.

Let us briefly look at the main features of these approaches and compare their pros and cons.

The linear approach with individual observations is the most familiar one. Numerous computer programs for regression analysis using this approach are available. These programs can easily handle

¹See the appendix for a technical discussion of these approaches.

COMPARISON OF APPROACHES

<u>Approach</u>	<u>Sample size</u>	<u>No. of variables</u>	<u>Computation</u>	<u>Data fit</u>
Linear - individual	Any	Many	1 stage	Poor
- grouped	Large	Fewer	2 stage	Fair
Non-linear - grouped	Large	Fewer	2 stage	Good
- individual	Large	Fewer	Iterative	Best

very large samples of men and many predictor variables in a one-stage analysis. The major disadvantage of the individual linear approach is that it may not be efficient, especially when the relationship of the predictors to the chances of attriting is not linear.

Whereas the individual linear approach uses a binary dependent variable, stay-attrite, the grouped approaches use loss rates (linear) or the log of the odds of loss rates (non-linear) for groups of men defined by all possible combinations of the predictors. An example of a group is recruits with 12 years of education, MG II, age 17, Caucasian, and no dependents. The groups are weighted to take account of their varying size in a regression analysis that is similar to the one performed with the individual linear approach.

Both grouped approaches require redefinition or pooling of groups and an additional regression when a predictor variable is found not to be significantly related to the dependent variable. Both also require very large samples with even small numbers of predictors. Because of the large number of possible combinations of the predictors, enough men must be found in the groups to produce reliable loss rates.¹

The grouped linear approach has the same major disadvantage as its individual counterpart when the relationships of predictors and loss rates is not linear. The grouped non-linear avoids this problem.

¹In our case, we have 3 levels of education, 5 of mental group, 3 of age, and 2 each of race and dependents. The product of these is 180, the number of possible groups.

All of the approaches so far rely on ordinary least squares regressions to solve their attrition equations, even the grouped non-linear approach. The non-linear individual approach is estimated by a different method, maximum likelihood. It can handle equations where the dependent variable is not a simple linear combination of the predictors (as can the grouped non-linear). However, in some cases, it may be the most time-consuming approach computationally. This is especially true when large numbers of variables and large samples are used, because of the iterative searching for the best fit to the data.

In this age of computers and ability to process massive amounts of data, the major question about the four approaches just described is, does it make any difference which one is used with the same data base?

We sought to answer this question by using the same set of predictors for 67,000 non-prior service males who joined the regular Navy in calendar 1973. The object was to predict the attrition experience for these recruits after each one had had the opportunity to be in the Navy for one year.

SLIDE 4

PREDICTORS

LT12ED	-	less than high school graduation
*12ED	-	high school graduation
GT12ED	-	more than high school graduation
MGI	-	mental group AFQT percentiles 93 and above
MGII	-	mental group AFQT percentiles 65 to 92
*MGIIIU	-	mental group AFQT percentiles 49 to 64
MGIIIL	-	mental group AFQT percentiles 31 to 48
MGIV	-	mental group AFQT percentiles 30 and below
AGE17	-	17 years old
*AGE18-19	-	ages 18 and 19
AGE20+	-	age 20 or older
*CAUC	-	Caucasians
NON-CAUC	-	Non-Caucasians
PDEPS	-	primary dependents (wife, children)
*NDEPS	-	no primary dependents

The predictors were all dichotomous or binary variables used to maintain consistency with current Navy selection procedures. They are shown on the slide.

RESULTS

We separated the CY 1973 Navy enlisted cohort into two samples by alternately assigning the individuals in the data file to validation and cross-validation samples, respectively. The 2 samples were virtually identical in terms of their characteristics and average first-year attrition rate, which was about 17.5 percent. Then, each of the four approaches or models was estimated with the validation sample, producing four fitted equations.¹ Each of these equations contained the same independent variables or predictors previously mentioned.

We then determined how well each equation predicted the attrition in the cross-validation sample. Our procedure for judging the "goodness of fit" was as follows. First, we used each fitted equation to predict the probability that each individual in the cross-validation sample would be a "stayer" rather than an "attriter" (which is one minus the individual's predicted attrition probability.) The Navy calls the probability of staying the individual's SCREEN score. SCREEN stands for Success Chances

¹The parameter estimates for the different models are shown in appendix B.

for REcruits Entering the Navy. Then we picked a critical SCREEN cut score, the score that separates people who will be accepted from those who will be rejected, and looked at the pattern of results.

SLIDE 5

We looked at:

- (1) How many of the predicted stayers actually stayed,
- (2) How many of the predicted attriters actually attrited,
- (3) How many of the predicted stayers actually attrited, and, finally,
- (4) How many of the predicted attriters actually stayed.

The sum of (1) and (2) is the number of correct predictions, or "hits." Those who were predicted to stay but who attrite are called "false positives," and those who were predicted to attrite but actually stay are called "false negatives." Note that the percentage of false positives is the attrition rate the services would experience if they only took applicants with a SCREEN score above the cut score.

The success of each approach is judged by the percentages of hits, false positive and false negative predictions. As we will see, there is a tradeoff in identifying false positives and false negatives; you can reduce the percentage of false negative predictions only by increasing the percentage of false positive predictions. The "goodness" of a particular approach should be judged according to which percentage you are attempting to minimize, as well as by the percentage of hits.

PATTERNS OF RESULTS

<u>Predicted</u>	<u>Actual</u>	<u>Result</u>
Stay	Stay	Hits
Attrite	Attrite	Hits
Stay	Attrite	False +
Attrite	Stay	False -

We looked at three different cut scores in comparing the alternative approaches. We will also see that the performance of the different approaches is crucially dependent upon the cut score chosen. The first cut score is 80, which was the mid-point between the average screen score of the actual stayers and the average score of the actual attriters. This score was chosen because this mid-point is conventionally used for classification purposes. The second cut score is 71, which was chosen because it is the Navy's current cut score. The third cut score is 76, which was selected because the Navy is considering raising the score to 76. In our comparisons, individuals with cut scores of 80 and below, 76 and below, or 71 and below, respectively, will be labeled attriters, and those with higher scores will be labeled stayers.

SLIDE 6

Now let us look at specific results. Here are the percentages of the sample that would be labeled attriters and therefore rejected under the alternative approaches and cut scores. As you can see, if the cut score is 71, about the same percentage of the cohort would be labeled attriters and therefore rejected under all four approaches. However, when the cut score is raised to 76 or 80, some differences between approaches emerge. If cut scores are based on either of the two linear models, a higher percentage of individuals would be rejected than when they are based on either of the two non-linear models.¹

¹See figure B-1 in appendix B.

PERCENT OF COHORT REJECTED AT VARIOUS CUT SCORES
 UNDER DIFFERENT APPROACHES

	<u>71</u>	<u>76</u>	<u>80</u>
<u>Prediction</u>			
Individual linear	14	25	39
Grouped linear	15	24	37
Grouped non-linear	15	23	35
Individual non-linear	14	23	34

SLIDE 7

Let us now examine the percentage of hits, false positives, and false negatives obtained with each approach. Look first at the results for a cut score of 71. For this cut score the percentage of hits, false positives, and false negatives are about the same for all four approaches. For the higher cut scores, however, the non-linear models outperform the linear ones in terms of hits and false negatives. The percentage of hits is higher for the non-linear approaches. The difference in hits between the linear and non-linear approach is most pronounced when the cut score is 80. The percentage of false negatives is slightly lower at a cut score of 76, but considerably at a score of 80. Remember that false negatives are those individuals predicted to attrite who actually stay.

Let's now look at the false positives. The percentage of false positives is the attrition rate that would actually be experienced. It is clear that higher cut scores lead to lower attrition rates. Now, it does appear that, at given cut scores, there would be more attrition when a screen table based on the non-linear approaches is used. There is a reason for the higher attrition under the non-linear approaches: they admit more people than the linear approaches, as we saw a few moments ago. The additional recruits admitted have somewhat higher attrition chances than the group already taken, and this raises the attrition rate of the selected cohort. However, this increase in attrition rates is small relative to the increased percentage of applicants.

PERCENTAGE OF CORRECT, FALSE NEGATIVE, AND FALSE POSITIVE PREDICTIONS

<u>Prediction</u>	<u>Hits</u>		<u>False negatives</u>		<u>False positives</u>	
	<u>71</u>	<u>76</u>	<u>71</u>	<u>76</u>	<u>71</u>	<u>76</u>
Individual linear	78	73	13	10	9	17
Grouped linear	78	73	13	10	9	17
Grouped non-linear	77	74	13	11	10	16
Individual non-linear	78	74	13	11	9	16

accepted and the decreased percentage of false negative predictions using the non-linear approaches.

SLIDE 8

Our conclusions are shown on the next slide. If the cut score is 71, the score currently used by the Navy for general recruiting purposes, all four approaches will admit about the same number of recruits from any given cohort. Further, all four approaches produce about the same percentages of correct predictions ("hits"), false positives (predicted stays who attrite), and false negatives (predicted attrites who stay). At higher cut scores, the non-linear approaches are slightly better than the linear ones in that they admit more people from any given cohort, while yielding at least as high a percentage of correct predictions ("hits") and a lower percentage of false negatives (predicted attrites who stay). The non-linear approaches do, however, imply slightly higher actual attrition, since more people would be taken in using SCREEN tables based on these approaches.

The services are now under pressure from OSD and Congress to reduce first-term attrition, and one way to do this is to raise the cut score. As I mentioned earlier, the Navy is considering raising its cut score from 71 to 76. While the results with the alternative approaches at a cut score of 71 were not very different, they are at a cut score of 76. Of a cohort of 100,000 applicants, about 2,000 more would be screened out using one of the linear approaches rather than one of the non-linear

CONCLUSIONS

If cut score is 71:

- o All approaches admit about same number of recruits
- o All approaches have about same percentages of correct, false positive, and false negative predictions

With higher cut scores;

- o Non-linear approaches admit more people and consequently entail a higher attrition rate
- o Non-linear approaches yield a lower percentage of false negatives

approaches. Since the supply of manpower is limited and growing more so all the time, the services do not want to reject more applicants than is absolutely necessary to achieve some desired attrition rate. The more stringent the cut score, the better the non-linear approaches, since they do not unnecessarily screen out applicants and since they produce more hits, and fewer false negatives.

Let me close by noting one thing that remains to be done. This is to identify the optimal cut score. Raising the cut score is a way of reducing first-term attrition, but such a policy entails the cost of a reduced supply of acceptable manpower. This way of reducing attrition should be pursued only if the marginal costs of attrition exceed the costs imposed because end-strength goals are not met. Our future work will try to get at these costs and determine the optimal cut score.

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APPENDIX A
ALTERNATIVE MODELS FOR ESTIMATING
ATTRITION PROBABILITIES

Given the variables thought to influence attrition, the goal is to estimate the probability that an individual will attrite. Let $\underline{X} = (X_1, \dots, X_K)$ be the vector of variables (the characteristics of the individual, such as mental ability and educational level) thought to affect attrition. Then, with n observations on individuals who have been in military service, of which n_1 individuals were attriters and $n_2 = n - n_1$ individuals were non-attriters, we want to estimate an equation for the probability that an individual with a given set of characteristics (\underline{X} vector) will attrite. The estimated equation may then be used for prediction purposes. In this case, the dependent variable is binary and assumes a value of 1 if the individual attrites and 0 if he does not. Models that incorporate such dependent variables are called limited dependent variable models.

There are two classes of limited dependent variable models. One posits a linear cumulative distribution function; the other posits an S-shaped or sigmoid cumulative distribution. For the sake of exposition, we will refer to them as linear and non-linear models, respectively.

LINEAR MODELS

Linear models are estimated by ordinary least squares (OLS). The method is simply to estimate the following regression equation:

$$(1) \quad Y_i = \beta_0 + \beta_1 X_{1,i} + \dots + \beta_K X_{K,i} + \epsilon_i$$

The dependent variable in this regression, Y_i , depends upon whether the data is grouped or ungrouped.

Individual Linear Probability Model

If the linear model is based on the individual observations, the dependent variable is assigned the value 1 if the individual attrites and the value 0 if he does not. We call this the individual linear model. This model was used by Plag to estimate attrition probabilities from the Navy (reference 1).

The individual linear model is closely related to the linear discriminant function (LDF), first proposed by Fisher (reference 4) in 1936 as a means for identifying binary group membership on the basis of a linear combination ($\lambda_1 X_1 + \lambda_2 X_2 + \dots + \lambda_K X_K$) of known characteristics. It can be shown that the LDF "best" weights to place on the characteristics (the λ 's) are directly proportional to individual linear regression coefficients.¹ In our case, therefore, the discriminant function solution to separating applicants who belong to the population called attriters from the applicants who belong to the population called non-attriters would be based on a linear regression on a binary dependent variable.

¹See Maddala (reference 11). The factor of proportionality between discriminant function weights and OLS regression coefficients is the residual sum of squares from the OLS regression divided by $n-2$.

The individual linear model is appealing because of the computational ease of OLS and because OLS is capable of handling very large sample sizes. On the other hand, it has some shortcomings. The most frequently cited difficulties are that (1) the error term (ϵ_i in (1) above) is not normally distributed, (2) the error term does not have a constant variance, and (3) there is no restriction to predicting a probability between 0 and 1, although a prediction outside of this range is inadmissible. The first and third criticisms are not so serious,¹ but the second criticism implies that even within the class of linear models, the individual linear approach is not a fully efficient estimation procedure.²

¹The first difficulty implies that t tests for significance of regression coefficients are not exact tests. Maddala (reference 11) shows that, despite the binary form of the dependent variable in the linear probability model, the t tests for the regression coefficients are exact tests. The third cited difficulty is not really a problem either. The services would always take individuals with predicted attrition probabilities less than zero and screen out individuals with predicted probabilities exceeding unity. With large samples, predictions outside the limits of 0 and 1 will occur infrequently anyway.

²The error variance may be shown to be

$$\sum_i \beta_1 X_i (1 - \beta_1 X_i)$$

and is a function of the values of X. Since the error term is not constant, the OLS estimates of the β 's are not the most efficient, i.e., minimum variance, linear estimates.

Grouped Linear Probability Model

An alternative to the linear probability model based on the individual observations is the grouped linear probability model. In this model, the individual observations are grouped into cells on the basis of combinations of the X's, and the dependent variable is the proportion $\hat{P}_i = \frac{a_i}{n_i}$ of the n_i individuals in the i th cell who were attriters. \hat{P}_i is an estimate of the true probability P that individuals with a given set of characteristics will attrite. The total number of cells is the product, over the number of variables, of the number of intervals for each variable. Thus, if there are 3 education categories (e.g., <12 years, 12 years, >12 years), 5 mental categories (I, II, IIIU, IIII, IV and V), 3 age categories (<18, 18-19, >19), and 2 race groups (Caucasians and non-Caucasians), there would be 90 cells. To estimate the β 's, \hat{P}_i is regressed on categorical, or binary, variables representing the different levels of each independent variable.

In cells which contain small numbers of observations, \hat{P}_i may not be a good estimator of the true probability P_i . The variance of \hat{P}_i is $P_i(1-P_i)/n_i$ and is inversely related to n_i , the number of observations in the cell. Since \hat{P}_i does not have constant variance, neither does the error term in the regression, and the regression estimates of the β 's are not minimum variance estimates. This problem is handled by multiplying each \hat{P}_i by $\frac{1}{\sqrt{\frac{P_i(1-P_i)}{n_i}}} = \frac{\sqrt{\frac{n_i}{P_i(1-P_i)}}}{\hat{P}_i}$.

In cells which contain more observations, \hat{P} is a lower variance estimate of the true attrition probability; hence, in the regression more weight is given to those cells which contain the largest numbers of observations.

Even if individual linear and grouped linear approaches were fully efficient linear estimation procedures, they have a potential shortcoming. A plot of $P_i = \sum_{j=1}^k \hat{\beta}_j X_{ij}$, where the $\hat{\beta}_j$'s are the estimated coefficients, yields a straight line, because the linear probability models have linear cumulative distribution functions. However, studies have found that the plot of the actual P's (the cell proportions in the grouped linear model) against $\sum_{j=1}^k \hat{\beta}_j X_{ij}$ frequently takes the form of an S-shaped curve, or sigmoid (reference 12). If the cumulative distribution is S-shaped rather than linear, the linear probability models may provide poor fits to the data. Models which imply S-shaped cumulative distributions, in which the probability of attriting is not a simple linear function of its predictors, may provide more accurate fits to the data.

NON-LINEAR MODELS

Probability distributions which have S-shaped cumulative distributions can be employed to estimate the β 's. The two most common ones are the logistic and normal distributions. In each of these distributions, the random variable Z is assumed to be a linear function of $X_1 \dots X_k$, that is, $Z = \sum_{j=0}^k \beta_j X_j$ (where $X_0 = 1$).

Individual Logistic Distribution

Since the logistic distribution has the form $P = \frac{e^{-z}}{1+e^{-z}}$, the function to be estimated is given in (2).

$$(2) \quad P = \frac{\exp\{-(\beta_0 + \beta_1 X_1 + \dots + \beta_K X_K)\}}{1 + \exp\{-(\beta_0 + \beta_1 X_1 + \dots + \beta_K X_K)\}} = \frac{1}{1 + \exp\{\beta_0 + \beta_1 X_1 + \dots + \beta_K X_K\}}$$

Equation (2) is a non-linear equation which may be estimated by the method of maximum likelihood (ML). To estimate (2), the likelihood function L is formed, and that set of β 's which maximizes the value of L is found. Since individual observations are used, this model is called the individual logistic model. The likelihood function is:

$$(3) \quad L = \prod_{Y_i=1} \frac{1}{1 + \exp\{\sum \beta_i X_i\}} \prod_{Y_i=0} \frac{\exp\{\sum \beta_i X_i\}}{1 + \exp\{\sum \beta_i X_i\}}$$

Since (3) is not a simple linear expression, the β 's have to be estimated using non-linear techniques.

The other most frequently assumed probability distribution in maximum likelihood is a normal distribution with unit variance. In this case, the attrition probability is given in (4):

$$(4) \quad P = \int_{-\infty}^{\frac{-\sum \beta_i X_i}{\sigma}} \frac{\exp\{-\frac{1}{2}t^2\}}{\sqrt{2\pi}} dt$$

The likelihood function for the normal distribution is the following:

$$(5) \quad L = \prod_{Y_i=1} \left\{ P\left(-\frac{\sum \beta_i X_i}{\sigma}\right) \right\} \prod_{Y_i=0} \left\{ 1 - P\left(-\frac{\sum \beta_i X_i}{\sigma}\right) \right\}$$

Again, we find the β 's that maximize L, and this has to be done using iterative methods. This model is called the probit model.

Since the probit model is based on a normal distribution with unit variance, the parameters $\beta_1 \dots \beta_K$ are all scaled by a factor $1/\sigma$, where σ is the unknown standard deviation. σ is not separately estimable, and it is arbitrarily assumed to be unity. The probit model was used by Dempsey and Fast (reference 3) to estimate attrition probabilities from the Air Force Academy.

While the logit and probit models look different, their cumulative distributions are very similar. Suppose that Z_1 is a random variable distributed normally with unit variance and Z_2 is a random variable distributed logistically. It may be shown that Z_2 has variance $\frac{\pi^2}{3}$. Further, it may be shown that Z_2 divided by its standard deviation, $\frac{\pi}{\sqrt{3}}$, is distributed approximately normally with unit variance. Therefore, $Z_2 = \sum \beta_j X_j$ need only be multiplied by $\sqrt{3/\pi}$ to be comparable to $Z_1 = \sum \beta_j X_j$ obtained from the probit model. The estimates differ only by the scale factor $\frac{\sqrt{3}}{\pi}$. Therefore, ML logit is virtually identical to ML probit (and vice versa).

Grouped Logistic Model

With large amounts of data, the β 's in (2) can be estimated using linear regression. The probability function in (2) can be transformed into the following log-linear equation, which may be estimated with OLS:

$$(6) \quad \ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 \dots + \beta_K X_K$$

The dependent variable here is the logarithm of the odds of being an attriter, estimated by grouping the data into cells, just as in the grouped linear, and then using $\ln(\hat{P}_i/1-\hat{P}_i)$ rather than \hat{P}_i as the dependent variable in the regression. The grouped linear regression procedure was utilized by Lockman (reference 2) to estimate attrition probabilities from the Navy.

The error term in the grouped logit regression is non-constant and has the variance $\frac{1}{n_i \hat{P}_i (1-\hat{P}_i)}$. Therefore, weighting by the inverse of its estimated standard deviation, $\sqrt{n_i \hat{P}_i (1-\hat{P}_i)}$, yields a model with a constant variance error term. Again, this procedure places the largest weights on those cells containing the largest number of observations.

APPENDIX B

THE EMPIRICAL EQUATIONS OBTAINED WITH ALTERNATIVE APPROACHES

Table B-1 contains the parameter estimates obtained by applying the alternative statistical procedures to the data. The parameter estimates in the first column labeled individual logit were obtained by the method of maximum likelihood. The parameter estimates in the other three columns were obtained by the method of ordinary least squares. The numbers in the first two columns are estimates of the β 's in the logit probability function $P = \frac{1}{1 + e^{-\sum \beta_j X_j}}$. The numbers in the last two columns may be interpreted as estimates of the β 's in the linear probability function $P = \sum \beta_j X_j$. The "t" values for the different variables are in parentheses. (The "t" values for the individual logit parameter estimates are asymptotic "t" values - see Zedlewski (reference 12)). A "t" value of 1.96 or greater indicates that the coefficient is significantly different from zero at the .05 level; a "t" value of 2.58 or greater indicates significance at the .01 level.

TABLE D-1

ESTIMATES OF PARAMETER VALUES

Variable	Individual logit	Grouped logit	Grouped linear	Individual linear
Ed < 12	-.6715 (21.23) ^a	-.6557 (14.42)	.1093 (14.14)	.1072 (19.05)
Ed > 12	.3493 (4.51)	.2835 (2.87)	-.0318 (3.79)	-.0341 (3.82)
Mental Group I	1.1789 (9.32)	1.0398 (6.00)	-.0839 (9.65)	-.0842 (7.33)
Mental Group II	.2012 (4.50)	.2017 (3.60)	-.0200 (3.09)	-.0210 (3.61)
Mental Group III	-.3446 (7.71)	-.3415 (6.00)	.0523 (6.20)	.0534 (8.01)
Mental Group IV	-.5805 (12.98)	-.5712 (9.75)	.0972 (10.04)	.0988 (13.69)
Dependents	-.3489 (5.52)	-.4027 (5.21)	.0391 (3.61)	.0509 (5.57)
Age < 18	-.1450 (3.24)	-.1664 (3.14)	.0242 (2.56)	.0231 (3.38)
Age > 19	-.1848 (4.13)	-.1689 (3.24)	.0221 (3.51)	.0237 (4.16)
Race (Non-Caucasian)	.1359 (3.04)	.0805 (1.28)	-.0369 (4.15)	-.0246 (3.27)
Constant	1.9594 (61.96)	1.9503 (40.87)	.1179 (20.79)	.1192 (23.71)
N	30,000	137	137	30,000

^at values are in parentheses.

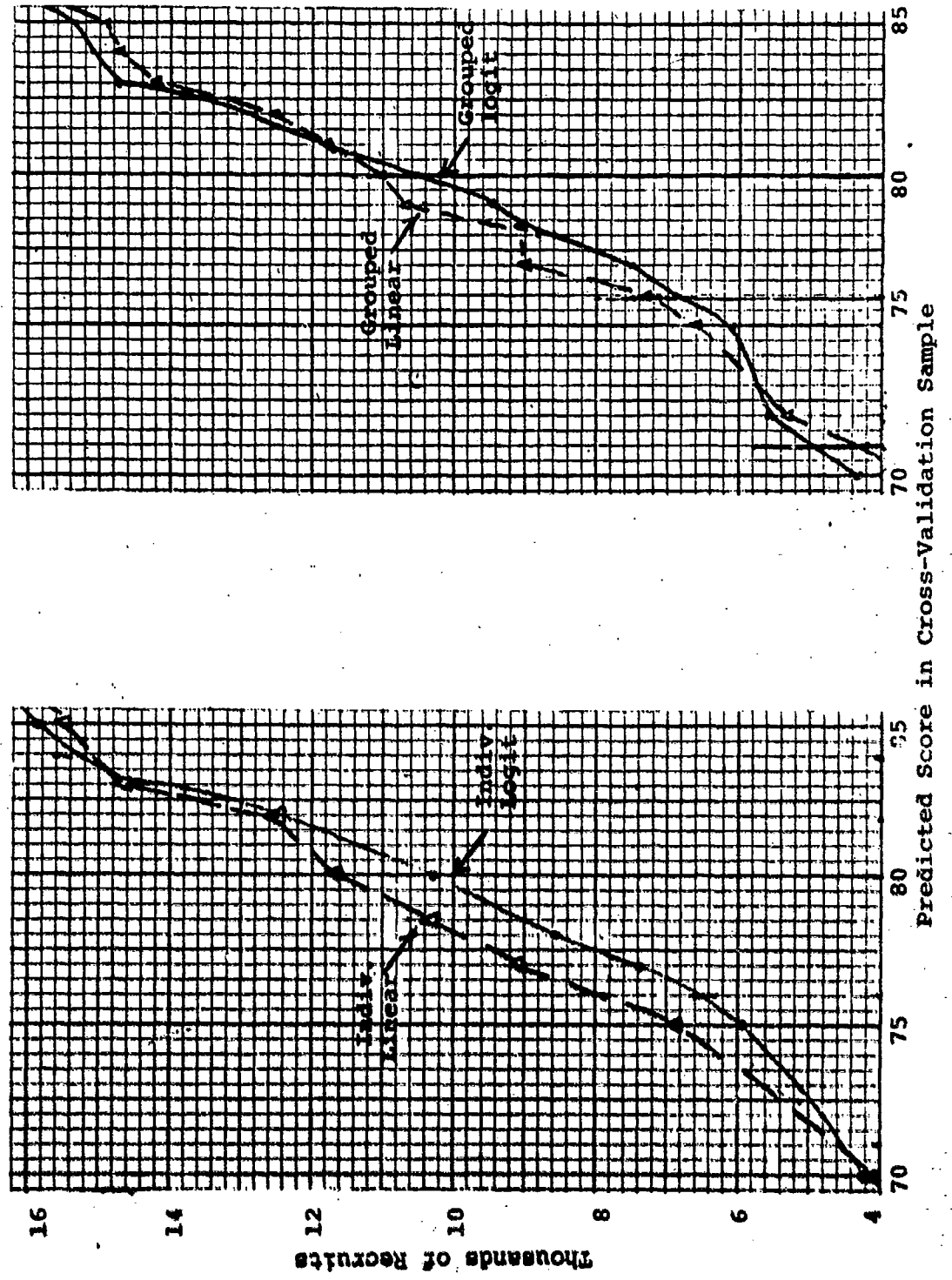


Figure B-1: Cumulative Predicted Score Distributions for the Four Approaches

Research Accomplishments
on a
New Dimension of Army Attrition

M. A. FISCHL

U. S. Army Research Institute
for the
Behavioral and Social Sciences

The basic thrust of this paper is that first term enlisted attrition is not a unitary factor. Attrition during the training phase of the enlistment--which is all the paper is really concentrating on--falls into two different families of reasons, one the services have considerable experience dealing with and one which seems to be brand new to the services and a concomitant of the need to field the largest peacetime, volunteer, force in history.

The accession testing programs of the services have been built to a high level of sophistication over more than 50 years of continued improvement and refinement. These tests have had as their objective avoiding attrition for reasons of insufficient ability to learn and do the literal/technical contents of jobs: tearing down a carburetor, field stripping an M-16 rifle, typing 50 words per minute, etc. They are dealing with prediction of success in the knowledge and skill aspects of jobs and job training. In the Army, job training is provided in AIT. In 1972 it estimated that introduction of its then new Army Classification Battery reduced AIT attrition by about 20 percent over the predecessor battery and resulted in savings of almost \$1,000 per soldier over not using aptitude tests.

So much for the aptitude testing program, geared to minimize AIT attrition, which is about half the early attrition the Army is experiencing. The technology exists to manage that half of the trainee attrition, and its current rate is probably a reasonable trade-off against not filling up the classrooms.

But the new dimension of attrition, the one for which mitigating technology is very immature, is attrition for reasons of not adjusting to the military environment, to military discipline--which the Army calls "motivational" reasons. I'll share with you steps the Army Research Institute has taken in beginning to build a parallel technology, to address attrition for reasons associated with failure to adjust to the military environment.

The original Military Aptitude Predictor (MAP) was assembled in fiscal year 1974. Its logic was drawn from ARI research in military delinquency dating back to the Korean War. The first MAP assigned weights to certain items of biographic information and combined these with aptitude test results to yield a "whole person" score, between zero and ten, the higher

the score the better the predicted chances for adjustment and completing the Basic Initial Entry Training phase. The biographic information for that MAP was age, education, and record of prior civil court convictions. The first thing that was learned from administering it was that the qualifying cut-off scores that would most successfully screen out potential attritions would also screen out unduly large numbers of successful soldiers.

At this point a personal history questionnaire was added to the MAP. Called the Early Experience Questionnaire (EEQ), this form inquired about prior civilian activities such as community and extra-curricular school activities, participation in sports, reasons for dropping out of school if applicable, personal activities and civilian job experience. When the EEQ alone was administered to 1235 enlistees results encouraged continued development but decidedly pointed against any immediate operational use. Specifically, although percentage comparisons were favorable--a fourth to a third of Basic Training attritions and poor soldiers were correctly identified at a cost of hypothetically keeping out only 14%-15% of satisfactory performers--in terms of numbers of soldiers, many more good ones would have been lost than poor.¹ The obvious reason for this is that there were (and are) so very many more good soldiers than failures: the ratio for Basic Training completions to attritions was well over 10:1.

At this point two more developmental steps were taken. First, the best test to come out of a performance test research program was added to the MAP procedures. This test was a calisthenic, "leg-ups", which indicated physical condition, willingness to push one's self physically, and was reasonably correlated with success in Basic Training.

The second developmental step was recognition of the need to "fence off" low risk individuals and not expose them to the chance of being screened out by the MAP. In the Spring of 1975 the full MAP, i.e., scoring procedure, "leg-ups", and questionnaire, was administered to 151 Basic Trainees who had been high school dropouts. Forty-nine of these were being separated from the service, 102 finishing training satisfactorily. The MAP flagged 22% of these attritions, at a cost of only 2% of the successes. When the high school diploma graduates in these training companies were added to the sample, the results were as shown in Table 1. Specifically, 13% of the attritions would have been screened out, while 99% of the successes would have allowed to enlist.²

¹A third of the failures in this sample was 34 soldiers; 15% of the satisfactory soldiers was more than 1,00.

²In fairness, the ratio of successes to attritions in that conveniently available sample was only a little larger than 2:1. More typically, Army input would have ratios closer to 10:1; which would necessitate careful weighing of favorable percentage differences against the sheer number of applicants rejected. Thirteen per cent of a hundred is pretty much of a standoff against one per cent of a thousand.

Later in 1975 a brief operational tryout was made at selected Recruiting Stations, which was informative and useful.

At about the same time a major assault was mounted into improvement of the questionnaire. New versions of the questionnaire are longer and much more probing. The best one inquired about high school experiences, perceptions, participation and achievements; self image; social interactions; work history; history of disciplinary problems; home life and parents' attitudes about military service. Analyses of that questionnaire as an indicator of early attrition in groups of several thousand successes and attritions in ratios of about 5:1, yielded cross-validated correlation coefficients approaching 0.50. This compares very favorably with prediction levels attained in the other technology, and suggests that a cost beneficial AFES procedure to screen for military adjustment potential, complementary to job trainability, may not be very far away.

Current Status and Future Portents

Right now that personal history questionnaire I just told you about is getting what may be a last pre-operational shakedown. Simulating actual operations, it has been administered to four thousand new accessions in two widely separated parts of the country just before these accessions began Basic Training. We are tracking these enlistees; their training phase will end in mid-summer at which time we'll know who was an attrition and who completed, for comparison back to their pretraining questionnaire scores.

Meanwhile, additional questionnaire forms are in tryout, scoring procedures are being experimented with which build the original MAP factors (age, education, civil convictions) directly into the questionnaire rather than treating them as separates, the cost-benefit usefulness of the performance task ("leg-ups" or some alternates which have been developed) is to be examined, as is a determination of whether to integrate the adjustment predictors with the job training predictors or to treat them as separate hurdles.

Alternates to the high school diploma are being explored for "fencing off" low risk applicants.

Two efforts of an interdisciplinary nature are in exploratory research and showing promise. It is too soon to speak any more definitively than to say that if either is successful it could impact on a number of aspects of AFES screening.

Finally, what might any of these procedures do for first term enlisted attrition? We estimate that the average cost to the Army for AFES processing, salary, and training of each early attrition is about \$3,500, and that the Army is taking that loss about 20,000 times a year for roughly \$70 million. Our target is a 20 per cent reduction in the early attrition

rate, which would save the human cost (to both the service and the individuals concerned) of roughly 4,000 enlistees, and save the fiscal cost of about \$14 million. To do this without deleteriously affecting opposite pressures to meet recruiting goals, is the challenge to all of us.

Table 1

Effect of a Procedure of Qualifying
All Diploma Graduates and
Using MAP Only to Sort the Dropouts

<u>Action</u>	<u>Consequences</u>			
	<u>Attritions</u>		<u>Successes</u>	
ENLIST	<u>83</u> 72	<u>100%</u> 87%	<u>195</u> 193	<u>100%</u> 99%
Diploma Grads	(34	41%)	(93	48%)
Dropouts Passing MAP	(38	46%)	(100	51%)
SCREEN OUT	11	13%	2	1%

QUALITY OF MARINES:
TEST SCORES, PERSONAL DATA, AND PERFORMANCE

Warren T. Matthews
Center for Naval Analyses

SUMMARY

This analysis examines the mathematical relations between the performance of first term Marines and their test scores and selected personal characteristics. The objective is to predict performance when only certain test scores and personal characteristics are known (i.e., at time of application for enlistment). A step-wise linear multiple regression process is used to identify the variables which best predict performance. Measures of performance include early attrition, desertion, early promotion, and rank achieved. The predictor variables thus identified differ from and are superior to the variables currently used for enlistment screening, as measured by the portion of variance (in the performance measure) explained by the sets of variables. A procedure for expressing the results in terms of the (new) ASVAB enlistment tests is provided, and a concept for application of these results to Marine Corps enlistment screening is presented.

This paper represents the best opinion of the author at the time of issue. It does not necessarily represent the opinion of the Department of the Navy.

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BACKGROUND

Prior to 1973 the military draft provided many recruits for the Army each year. Although a few draftees were assigned to the Marine Corps during the Viet Nam War, the primary effect of the draft on the Marine Corps was to generate draft-motivated volunteers. Draft calls ended in December 1972, and the statutory authority for them expired on 1 July 1973.

Marine Corps recruiting shortfalls began when the draft ended. In fiscal year 1974, the Marine Corps enlisted 48,764 regular male recruits. The quota had been 57,800, and the shortfall of 9,036 amounted to almost 16 percent of the goal (reference 1). During fiscal years 1975 and 1976, Marine Corps recruiting goals were achieved. However, during the transition quarter and thus far into fiscal year 1977, shortfalls have occurred. The authorized strength of the Marine Corps has been reduced from 196,000 to 192,000, and the actual strength is now about 189,000. Although scheduled and unscheduled discharges are currently below the levels which the Marine Corps anticipated this year, the continuing shortfall in recruiting is a problem affecting manpower planning and the future grade structure and promotion rates.

While recruiting quantity is below the current goal, required quality is increasing. Technological advances in weaponry, communications, data processing, and other fields have brought more complex equipment into the inventory. Many of the newer items require

operators, technicians, and repairmen who are more highly trained and more capable than the men they will replace. This trend will no doubt continue to require relatively more men with higher mental aptitudes.

Other current trends also will have an impact on future quality and quantity of Marine Corps enlistments. For instance, as a result of fluctuations in the U.S. birthrate in the 1950's and 1960's, the population of 17-21 year old candidates for the military service will begin to decline after 1978. The population of young men in age group 17-21 will decline from 10.7 million in 1978 to 9 million in 1990. Several current surveys show the Marine Corps to be the least popular of the services among young men who are considering military service. As relatively more young men attend college or trade school, the number actually available to the Marine Corps may decline even more. If Marine Corps manpower requirements remain fixed at current levels and if the percentage of the population entering the Marine Corps remains constant, the declining population will magnify the Marine Corps manpower shortfall in the years ahead.

These trends may lead the Marine Corps to more serious manpower shortfalls of both quantity and quality. The Marine Corps has responded by conducting research to develop attractive enlistment guarantees, to improve recruiting efficiency, to factor manpower requirements into the hardware design process, and to improve retention.

While each of these efforts is required to help the Marine Corps adapt to the all-volunteer environment, success depends in part on the screening of applicants for enlistment and reenlistment. It is essential to have the ability to predict which candidates are likely to succeed and to orient the recruiting and training establishment to those candidates. This paper will describe a method of satisfying that requirement.

OBJECTIVE

The objective of this analysis is to develop a method of converting the information available about an applicant for enlistment into an estimate of the quality of service that man will provide if enlisted. Manpower quality will be measured by desertion, attrition and promotion during the first two years of service. Attrition or desertion identify those whose problems were so severe that they could not or would not fit into the scheme of things in the Marine Corps. These measures are appealing because they provide an acid test of individual quality tempered by the needs of the service and the judgment of unit commanders.

In order to identify the factors related to quality of service, many test scores, personal characteristics, and other data will be examined. The correlation of these variables will show which data can be used to predict quality of service as well as the relative importance of different variables. The application of this analysis is to show how the limited information available

about applicants for enlistment can best be used by the recruiter in deciding to accept or reject the individual applicant.

DATA

The data used in this analysis include most information available about applicants prior to enlistment. (No attempt is made to consider the desirability of collecting new data for the recruiter's use; such considerations, while possibly useful, are beyond the scope of this analysis). The variables are listed at table 1, and the mean and standard deviation of each variable is shown at appendix A.

The data used in this analysis were collected from the Marine Corps Manpower Management System (MMS) and the Recruit Accession Management System (RAMS). Included in the data are 49,540 regular, male, nonprior service enlistees who reported for recruit training during fiscal year 1974. Each man was tracked for twenty-four months, and his performance in terms of early attrition and desertion was recorded. Incomplete records numbered 3,592 or 7 percent, leaving 45,948 records upon which this analysis is based.

Each fiscal year 1974 enlistee was required to attain an AFQT mental group percentile score of twenty-one or more. This restriction of range in mental group can affect the analysis results by introducing bias into the coefficients. Thus, these data have been corrected for range restriction so they approximate the mobilization population. The procedure is described at appendix B.

TABLE 1
LIST OF VARIABLES

<u>Variable</u>	<u>Values</u>
Desertion or early attrition	0 if neither 1 if either or both
Early attrition	0 if no 1 if yes
Desertion	0 if no 1 if yes
Recruit training attrition	0 if no 1 if yes
Rank achieved	1 if E-1 2 if E-2 3 if E-3 4 if E-4 5 if E-5
Promoted	0 if not promoted during recruit training 1 if promoted
Enlistment guarantee	0 if no enlistment guarantee 1 if cash guarantee 2 if non cash guarantee
Age	0 if age 17-20 upon reporting for active duty 1 if age 21 or more
Marital status	0 if not married upon reporting for active duty 1 if married
Recruit training depot	6 if recruit training at Parris Island 7 if recruit training at San Diego
Remedial training at depot	0 if never assigned to remedial training at depot 1 if assigned to remedial training

TABLE 1 (CONT'D)

<u>Variable</u>	<u>Values</u>
High school	0 if not a diploma graduate (including GED) 1 if a diploma graduate
Correctional custody at depot	0 if never assigned to custody at depot 1 if assigned once or more
Motivation platoon at depot	0 if never assigned to motivation platoon 1 if assigned
Race	1 if white 2 if non-white
Number of dependents	0 if no dependents 1 if one or more dependents
ACB-61 test scores (standard score):	Range: 40-160
Verbal (VE)	
Arithmetic (AR)	
Pattern analysis (PA)	
Classification inventory (CI)	
Mechanical aptitude (MA)	
Army coding speed (ARS)	
Army radio code (ARC)	
General information (GIT)	
Shop information (SM)	
Automotive information (AI)	
Electronics information (ELI)	
General classification test (GCT) = (VE+AR+PA)/3	
General technical = (VE+AR)/2	
Armed Forces Qualification Test (percentile score)	
Mental group score (AFQT)	Range: 0-100

This sample was selected for two reasons. All of these men enlisted in an all volunteer environment and are therefore thought to be more representative of future enlistees than were earlier cohorts. However, they have been in the Marine Corps long enough to be evaluated on the basis of their performance in Fleet Marine Force jobs. Actual job performance should be the fundamental and final criterion of manpower quality.

Measures of Effective Service

Both positive and negative measures of manpower quality are used in this analysis. Subjective measures such as fitness ratings, technical proficiency or conduct marks, course grades or peer ratings were not available for this analysis. While subjective measures can often provide insight into manpower quality questions, the objective measures of quality to be described below are thought to be appropriate for this analysis.

The positive measures of quality used are rank achieved and superior recruit training performance. The negative measures include desertion and early attrition from the Marine Corps during the first twenty-four months of service.

Explanatory Variables

The available explanatory data consist of personal characteristics and aptitude test scores. Personal characteristics included are education, race, age, and marital status. The test scores available are from the Armed Forces Qualitification Test (AFQT) and the Army Classification Battery (ACB-61). The 45,948 Marines in

this sample, who began their active duty during fiscal year 1974, took the AFQT mental group test as a condition of enlistment. Upon arrival at a recruit training depot, they took the ACB-61, which includes eleven subtests (see table 1). The quality of service of the Marines in the sample (measures of effective service) will be analyzed in terms of these explanatory variables.

Some of the personal characteristics available in the data must be grouped for analysis while others have only two natural values. For instance, marital status is clearly a yes or no value. The age of men in the sample ranged from 17 years to more than 22 years. The educational levels ranged from less than eight years through the college graduate level. In order to decide how to group these two variables for the remainder of the analysis, the two year early attrition rates for twenty-four subgroups of men were computed. Table 2 shows the results. In terms of age upon reporting for initial recruit training, those 21 years old or older have a 38 percent loss rate (within two years). While the 17-year old group has almost as high a failure rate, it is largely due to the educational (and mental group) distribution of men in that age group. Since 17 year old men will soon be 18, the feasibility of treating them differently is low. Therefore, the age variable has been grouped about the twenty-first birthday.

Education is originally available as many values. Table 2 shows that the high school graduates, trade school graduates and college-trained Marines have similar and below average loss rates.

TABLE 2

TWO YEAR EARLY ATTRITION RATES BY
AGE AND EDUCATIONAL LEVEL

<u>Educational level</u>	<u>Age at enlistment</u>				<u>Total all ages</u>
	<u>17</u>	<u>18-19</u>	<u>20</u>	<u>21 or more</u>	
1-10 years	41%	43%	51%	61%	43%
11 years	32	33	40	47	34
General Equivalency Diploma (GED)	32	33	41	37	38
High school graduate	17	17	24	28	19
Trade school graduate	a	9	16	29	20
Some college training	43	21	23	26	25
Total, all educational levels	34	26	31	38	30

^aToo few for statistical comparison.

These men were grouped together for the analysis. The men with GED perform very much like other non-high school graduates. Men with GED were classified with non-graduates for the analysis.

The aptitude tests used for Marine Corps enlistment screening and classification have been revised and changed periodically. The test used prior to enlistment during fiscal year 1974, when the Marines in this sample were enlisted, was the AFQT. In July 1974 the ASVAB, form 3 was adopted and used until December 1974. At that time, forms 6 and 7 of ASVAB were adopted for enlistment screening. ASVAB 6/7 now provides the only test scores available for use in enlistment screening.

For purposes of occupational classification, the Marine Corps administers an aptitude test battery to recruits soon after their arrival at recruit training. Prior to September 1976, the test battery used for recruit classification was the Army Classification Battery-61 (ACB-61). In September 1976 the ASVAB 6/7 was adopted for this purpose. Each recruit is administered the ASVAB form 6 or 7 which he did not take prior to enlistment. The ACB-61 scores of the men in this sample are included in this analysis.

The objective of this analysis is to produce results which can be used for enlistment screening. Therefore, these results must be stated in terms of the test scores and other data currently available about applicants for enlistment. Those test scores which are currently available prior to enlistment are the ASVAB 6/7 scores. Of course, the men in this sample took not the ASVAB 6/7

but the AFQT and ACB-61. A procedure to scale the results from ACB-61 to ASVAB 6/7 has been developed. The results of this analysis will be presented first in terms of ACB-61 scores and then scaled to the currently available ASVAB 6/7 scores. The scaling procedure is described in appendix C.

METHODOLOGY

The method of analysis is multiple linear regression of the explanatory variables described above on several measures of manpower quality. A step-wise regression procedure will be used to identify the order of explanatory power of the variables and to determine which linear combination of variables best predicts quality. The coefficients of correlation between each pair of variables, corrected for range restriction, are shown in appendix D. The linear function of the explanatory variables which best predicts quality of service will be determined. This function will be used to compute quality ratio tables which show the probability of effective service for men with every combination of the test scores and other significant attributes. These probabilities can be used by the Marine Corps to screen applicants for enlistment. They can be easily adjusted by the Marine Corps as manpower policy, demand, or supply change and as the basic data are updated.

The linear regression model was validated by estimating the coefficients with a random half of the sample and using the resulting coefficients to estimate the success of men in the other half of the sample. Four critical values of the screening criteria were used. The procedure and results are discussed in appendix E.

REGRESSION RESULTS

This analysis is designed to identify the mathematical relations between test scores and personal characteristics and each of several measures of manpower quality. Once known, these relations can be used to predict the various quality measures in terms of the available test scores and personal characteristics. A typical application of this knowledge would be to predict the effect on the desertion rate of a 10 percent increase in the proportion of high school graduates among all enlistees.

The result of a regression computation is the regression or prediction equation the equation expresses the predicted value of the dependent variable (such as probability of attrition) as a linear combination of several independent variable (such as education and test scores). The coefficients of the independent variables establish the relative importance or weight each variable in predicting the dependent variable. The sign of the coefficient shows the direction of the effect. That is, a negative coefficient shows that higher (lower) values of the independent variable are associated with lower (higher) values of the dependent variable.

There are several statistics which indicate the quality of the regression equation. The partial F statistic associated with each independent variable is a measure of the significance of that variable in predicting the dependent variable. All of the variables reported in this analysis have high enough partial F ratios

that we can be 99 percent sure that they appear in the regression equation due to statistical association with the dependent variable and not due to chance. The R^2 statistic is a measure of the portion of all variation in the dependent variable explained by the variables in the regression equation. The value of R^2 ranges from 0 to 1. For instance, a regression of base pay on pay grade and length of service would yield an R^2 value of 1.0 since all of the variation in base pay is due to grade and length of service. In predicting attrition and promotion, lower R^2 values are achieved indicating that less of the variation in these quality measures can be explained by the data available in a linear model. Non-linear models have been shown to increase the fit of the model to similar Navy attrition data only slightly (see reference 4). The fit of the linear model can be improved by grouping of the data. This method then predicts the percentage attrition of a large number of men with similar characteristics. The operational usefulness of this apparently better fitting model is not different from the individual model used in this analysis (see reference 4).

The regressions used here are based on a step-wise procedure. This procedure considers all variables and selects variables into the regression equation in the order of their joint value in predicting the dependent variable. The first variable selected is the single best predictor of the dependent variable. The second variable selected is the single variable which adds the most predictive

power to the regression equation after the first variable is considered. This procedure continues in steps as long as added variables are statistically significant. The cumulative R^2 values shown in this analysis increase at a decreasing rate as more variables are added to the equation. The decision of where to cut off a regression equation is based on the significance of the variables, the increase in cumulative R^2 provided by each additional variable, and the operational usefulness of the variables. The standard error of the estimates will be provided with the regression results.

Desertion

Desertion is an indication of manpower quality which is widely accepted and used for inter-unit and inter-service comparisons. Of the 45,948 men in our sample with complete records, 11.3 percent deserted, although many were returned to duty. Table 3 shows the regression results on desertion of the available measured variables. High school education, listed first, is the single variable which best predicts desertion. The negative coefficient indicates that non-high school graduates including those with a general equivalency diploma (high school value = 0) are more likely to desert (value = 1). The coefficient value of $-.1139$ indicates that when all other variables (test scores, race, etc.) are held constant, the probability that a high school graduate will desert is .11 less than the probability that a non-graduate will desert. (The F value shows that high school is in fact a statistically significant variable in predicting desertion. This sample is large enough that we can be 95 percent confident that any variable with

TABLE 3
REGRESSION RESULTS: DESERTION

<u>Explanatory variable</u>	<u>Coefficient</u>	<u>Cumulative R²</u>	<u>Partial F</u>
High school	-.1144	.042	1,374
GCT	-.0012	.047	204
Marital status	+.2012	.047	15
Race	-.0116	.047	9
(Constant)	+.2806		

Variables excluded:

AFQT
CI
Age

an F value of at least 3.84 is statistically significant). Once education is known, the arithmetic reasoning test score (AR) is the next best predictor of desertion. The negative sign of the coefficient indicates that men with higher AR scores are slightly less likely to desert. The remaining coefficients of table 1 show that higher desertion rates are associated with Parris Island trained recruits, men with lower PA and VE test scores, married men, and Caucasians. Variables which were considered but found to be not useful in predicting desertion include the remaining test scores, age at enlistment, and an enlistment guarantee. Some of these excluded variables may be associated with desertion, but their correlation with variables already included in the prediction equation reduces the additional predictive power which they could bring to the prediction equation.

Early Attrition

Another quality variable used in this analysis is early attrition during the first 24 months of service. Table 4 shows the regression results for early attrition. Again, high school education is the single best predictor. The second variable in this equation is the classification inventory test (CI), a psychological test of interests thought to be related to military service. Note that pattern analysis (PA) is high on this list. Pattern analysis is a non-verbal test of reasoning ability forming a part of the score which defines mental group. Those men enlisting at age 21 or more are identified as poorer risks.

TABLE 4
REGRESSION RESULTS: EARLY ATTRITION

<u>Explanatory variable</u>	<u>Coefficient</u>	<u>Cumulative R²</u>	<u>Partial F</u>
High school	-.1446	.050	1096
CI	-.0019	.081	420
PA	-.0017	.091	165
Age	+.1028	.096	220
Enlistment guarantee	-.0467	.098	133
GIT	-.0015	.099	80
AFQT	+.0007	.100	30
Race	-.0246	.100	20
AR	-.0010	.101	39
VE	-.0010	.101	38
Marital status	+.0292	.101	14
(Constant)	+.8268		

Variables excluded:

MA
ACS
ARC
AI
ELI
SM

Rank Achieved

A positive measure of manpower quality is the rank achieved within twenty-four months. The men in this sample ranged in terminal rank from E1 (private) to E5 (sergeant). A step-wise regression of rank (1 through 5) on subtest scores and personal characteristics is shown by table 5. Table 6 shows a similar regression in which the composite test score GCT replaced its component subtests (AR, VE, and PA). High school education proved to be the single test predictor of rank achieved in each regression. Classification inventory score (CI) also contributed to each regression equation. In the regression shown by table 5, the arithmetic (AR) and pattern analysis scores (PA) are significant variables. The remaining ACB-61 test scores were found to be less useful predictors of rank achieved. Since the general classification composite score (GCT) is widely used for occupational classification, it was included in the regression reported by table 6. GCT is composed of equal weights of VE, AR and PA, which were excluded from the table 6 regression. The inclusion of GCT shows it to be a valuable predictor of this positive measure of manpower quality, along with education, CI and age at time of enlistment.

Superior Recruit Training Performance

The first opportunity a young recruit has to excel is during recruit training. Approximately 15 percent of the Marines in each recruit training class are selected for promotion to grade E2 at

TABLE 5

REGRESSION RESULTS: RANK ACHIEVED WITH SUBTEST
SCORES AND PERSONAL CHARACTERISTICS

<u>Explanatory variable</u>	<u>Coefficient</u>	<u>Cumulative R²</u>	<u>Partial F</u>
High school	+.6379	.128	3,804
AR	+.0053	.174	281
CI	+.0045	.185	462
PA	+.0055	.191	332
(Constant)	+.7416		

TABLE 6

REGRESSION RESULTS: RANK ACHIEVED WITH GCT, CI
AND PERSONAL CHARACTERISTICS

<u>Explanatory variable</u>	<u>Coefficient</u>	<u>Cumulative R²</u>	<u>Partial F</u>
High school	+.6399	.128	3,788
GCT	+.0109	.183	1,218
CI	+.0042	.189	367
Age	-.2213	.192	186
(Constant)	+.785-		

the end of recruit training. We have correlated this measure of quality with the test scores and other data available. Tables 7 and 8 show the results. Again, high school education and CI are significant variables. When GCT was included among the variables (table 7) it became the single best predictor of recruit training promotion and it brought age into the equation as a significant variable.

In summary, analysis of both positive and negative measures of manpower quality identifies some of the same predictor variables. High school education and GCT (or its components) are identified as predictors of each of these four quality measures (tables 3, 4, 6 and 8). The psychological test of attitude, CI, and age at time of enlistment were selected as significant predictors of both rank achieved (table 6) and early attrition (table 4). One quality measure (or one combination of them) must be selected for application of these results. The finding that several variables are key predictors of both positive and negative measures of manpower quality reduces the danger of excluding a key variable by the selection of a particular quality measure.

TABLE 7

REGRESSION RESULTS: SUPERIOR RECRUIT TRAINING PERFORMANCE
WITH ACB-61 SUBTESTS AND OTHER VARIABLES

<u>Explanatory variable</u>	<u>Coefficient</u>	<u>Cumulative R²</u>	<u>Partial F</u>
CI	+.0016	.042	589
ARC	+.0016	.058	487
High school	+.0636	.066	339
AFQT	+.0010	.069	136
(Constant)	-.2222		

TABLE 8

REGRESSION RESULTS: SUPERIOR RECRUIT TRAINING
PERFORMANCE WITH GCT AND OTHER VARIABLES

<u>Explanatory variable</u>	<u>Coefficient</u>	<u>Cumulative R²</u>	<u>Partial F</u>
GCT	.0033	.046	879
High school	.0622	.052	300
Race	.0475	.054	116
AFQT	.0008	.055	62
Age	-.0199	.056	13
(Constant)	-.3073		

Aggregate Quality Measure

In order to define an aggregate manpower quality variable, desertion and early attrition have been combined. Each man in the sample who ever deserted or who left the service early during his first twenty-four months of service was identified. Table 9 shows the results of that regression. High school education remains the single most useful predictor variable and explains more than half of the variance in attrition and desertion which can be explained by the available data (6.7 percent of the 11.3 percent). The PA, CI, and age variables are also important predictors. The CI was not used for enlistment screening but was used with other variables in assigning men to the infantry field. Note that the variables VE and AR, which together make up the general technical composite score, add little to the prediction equation after education and the other variables are considered. However, general technical is now used as a key variable in enlistment screening and in assignment to occupational fields. Note that the AFQT test score is not useful in predicting this measure of quality.

TABLE 9

REGRESSION RESULTS: QUALITY WITH TEST SCORES

<u>Explanatory variable</u>	<u>Coefficient</u>	<u>Cumulative R²</u>	<u>Partial F</u>
High school	-.1902	.067	1832
PA	-.0017	.095	161
CI	-.0017	.106	322
Age	+.1078	.110	244
GIT	-.0014	.112	72
AR	-.0010	.112	43
VE	+.0008	.113	24
(Constant)	+.9019		

Variables excluded:

AFQT
MA
ACS
ARC
SM
AI
ELI

In order to compare the predictive power of this equation with the variables used for Marine Corps enlistment screening during fiscal year 1974, a regression on the same quality variable was computed. Table 10 shows the regression results based on AFQT and high school education. Education remains the leading variable. AFQT is a significant variable, but the predictive power of the equation ($r^2 = .075$) is not as great as the equation on table 4 ($r^2 = .113$). This comparison of the r^2 values of each set of variables reveals that the variables identified in table 4 could have been more powerful as screening criteria than the variables which were actually used. If the variables shown on table 4 had been used during fiscal year 1974, the Marine Corps would have experienced less early attrition and desertion than was observed.

Three of the significant variables shown by table 9 are PA, AR, and VE. These variables make up the GCT composite and are parallel to the three components of the traditional mental group score of both the AFQT and ASVAB 6/7. A regression including GCT can be expressed in terms of mental group score, which has traditionally been used in enlistment screening. The results of such a regression are shown by table 11. The four variables considered were education, age, CI score, and GCT (PA+AR+VE). This equation explains as much of the variance in the quality measure ($r^2 = .110$) as do the first four variables of table 4, and it offers the advantage of a link to mental group score. These variables also offer

TABLE 10
 REGRESSION RESULTS: QUALITY WITH 1974 VARIABLES

<u>Explanatory variable</u>	<u>Coefficient</u>	<u>Cumulative R²</u>	<u>Partial F</u>
High school	-.2317	.067	2954
AFQT	-.0020	.075	369
(Constant)	+.5613		

TABLE 11
 REGRESSION RESULTS: QUALITY WITH SELECTED VARIABLES

<u>Explanatory variable</u>	<u>Coefficient</u>	<u>Cumulative R²</u>	<u>Partial F</u>
High school	-.1870	.067	1798
GCT	-.0029	.098	483
CI	-.0017	.105	352
Age	+.1090	.110	249
(Constant)	+.8694		

a higher r^2 than the previously used variables described by table 5 ($r^2 = .075$). The remainder of this analysis will be based on the regression equation of table 11.

The variables identified by this analysis are important predictors of both positive and negative measures of manpower quality. High school education has been a significant predictor in every regression of both the positive and negative measures of quality. General classification test score (GCT) or its components (VE, AR, PA) have been highly correlated with each positive and negative quality measure. The unique test of personality or attitude, classification inventory (CI), has been also a consistent correlate of quality. The finding of the usefulness of a psychological test for screening is potentially important. This is true because such a test is not now used in screening at all and it is generally acknowledged by Marines that attitude or motivation is a key element of success both in recruit training and in subsequent duty assignments. Age at time of enlistment proved to be a significant predictor of both positive measures used and each negative measure except desertion.

We can easily demonstrate the discrimination powers of these four variables in grouping applicants for enlistment. The regression equation of table 11 was computed for groups of applicants with a wide range of these variables. Tables 12 through 15 show the results. The numbers in the body of each table show the predicted percentage of successful Marines among each subgroup of

TABLE 12

PREDICTED SUCCESS RATES
HIGH SCHOOL GRADUATES, AGE 17-20

Classification Inventory Score (CI)	General Classification Test Score (GCT)					
	<u>110</u>	<u>100</u>	<u>90</u>	<u>80</u>	<u>70</u>	<u>60</u>
110	.82	.80	.77	.74	.71	.68
100	.81	.78	.75	.72	.69	.66
90	.79	.76	.73	.70	.67	.65
80	.77	.74	.72	.69	.66	.63
70	.76	.73	.70	.67	.64	.61
60	.74	.71	.68	.65	.62	.59

$$\text{Predicted success} = -.187\text{HS} - .0029\text{GCT} \\ -.0017\text{CI} + .109\text{AGE} + .8694$$

TABLE 13

PREDICTED SUCCESS RATES
HIGH SCHOOL GRADUATES, AGE 21 OR MORE

Classification Inventory Score (CI)	General Classification Test Score (GCT)					
	110	100	90	80	70	60
110	.72	.69	.66	.63	.60	.57
100	.70	.67	.64	.61	.58	.55
90	.68	.65	.62	.59	.57	.54
80	.66	.64	.61	.58	.55	.52
70	.65	.62	.59	.56	.53	.50
60	.63	.60	.57	.54	.51	.49

$$\text{Predicted success} = -.187\text{HS} - .0029\text{GCT} - .0017\text{CI} \\ + .109\text{AGE} + .8694$$

TABLE 14

PREDICTED SUCCESS RATES
NON-GRADUATES, AGE 17-20

Classification Inventory Score (CI)	General Classification Test Score (GCT)					
	<u>110</u>	<u>100</u>	<u>90</u>	<u>80</u>	<u>70</u>	<u>60</u>
110	.64	.61	.58	.55	.52	.49
100	.62	.59	.56	.53	.50	.48
90	.60	.57	.55	.52	.49	.46
80	.59	.56	.53	.50	.47	.44
70	.57	.54	.51	.48	.45	.42
60	.55	.52	.49	.47	.44	.41

$$\text{Predicted success} = -.187\text{HS} - .0029\text{GCT} - .0017\text{CI} \\ + .109\text{AGE} + .8694$$

TABLE 15

PREDICTED SUCCESS RATES
NON-GRADUATES, AGE 21 OR MORE

Classification Inventory Score (CI)	General Classification Test Score (GCT)					
	<u>110</u>	<u>100</u>	<u>90</u>	<u>80</u>	<u>70</u>	<u>60</u>
110	.53	.50	.47	.45	.41	.38
100	.51	.48	.45	.43	.40	.37
90	.49	.47	.44	.41	.38	.35
80	.48	.45	.42	.40	.36	.33
70	.46	.43	.40	.38	.34	.32
60	.44	.41	.39	.36	.33	.30

$$\text{Predicted success} = -.187\text{HS} - .0029\text{GCT} - .0017\text{CI} \\ + .109\text{AGE} + .8694$$

applicants. Subgroups are defined by education, age, CI and GCT scores. For instance, table 12 shows that 82 percent of a (large) group of applicants with CI and GCT scores of 110 who are high school graduates aged 17 through 20 can be expected to perform satisfactorily (i.e., not desert or be discharged early during the first twenty-four months of service). At the other extreme with the high school graduate, age 17 through 20 group, men with both test scores of 60 can be expected to succeed at a rate of 59 percent. Tables 13, 14 and 15 show the same results for non-graduates in both age categories (age 17 through 20 and age 21 or more).

The standard error of the individual predictions given by the equation of table 11 is .44. The standard error of the mean for a group of 500 applicants with identical test scores and other characteristics is .02. The interpretation of this result is that the predicted success rates shown by tables 12 through 15 are accurate within .02 with a probability of 68 percent (1 standard error about the mean) and within .04 with a probability of 95 percent (2 standard errors about the mean). These accuracy estimates are based on groups of 500 men with similar characteristics (i.e., with each cell).

These tables also show the importance of including several variables in a screening device rather than only one or two. Table 12 shows that even among younger high school graduates with a GCT score of 110, the chances of success vary from .82 to .74 as CI score varies from 110 to 60. This analysis allows us to know the

trade-off between variables. For instance, the predicted success rates of younger graduates with GCT of only 80 and CI of 110 are the same as the predicted success rate of younger graduates with GCT scores of 110 but CI of only 60 (predicted success if .74 for each subgroup).

Scaling to the ASVAB 6/7 Test Scores

The regression reported by table 11 provided a prediction equation in terms of education, age, CI, and GCT:

$$\begin{aligned} \text{Quality measure} = & -.187\text{HS} - .0029\text{GCT} - .0017\text{CI} \\ & +.109\text{AGE} + .8694 \end{aligned} \quad (1)$$

This equation can be expressed in terms of the education, age, and the ASVAB 6/7 tests which are parallel to CI and GCT (see appendix B):

$$\begin{aligned} \text{Quality measure} = & -.187\text{HS} - .0032\text{MG} - .00598\text{CC} \\ & -.109\text{AGE} + .6442 \end{aligned} \quad (2)$$

The quality measure should be interpreted as the probability that an applicant with a certain combination of test scores, age, and education level will become ineffective due to early attrition or desertion during the first twenty-four months of service. The usefulness of this measure is not to predict the quality of service of individuals but to screen or rank different applicants in a logical manner. Such an application of these results can separate applicants with higher and lower chances of serving satisfactorily and should result in lower attrition rates, desertion rates, and associated sub-standard performance.

APPLICATION OF RESULTS

The results reported here reveal the mathematical relations between the available personal data of applicants for enlistment and the quality of their subsequent service. These results permit the identification of applicants with high or low chances of serving satisfactorily. If those with lower chances of providing quality service are excluded from enlistment, attrition rates and desertion rates will be reduced, and recruiters will have better guidance as to the characteristics of the preferred applicant.

The regression results in terms of the ASVAB 6/7 tests (equation 2) have been used to compute tables of quality ratios. Tables 16 through 19 show the quality ratios for each of the four groups of applicants defined by education and age. Each quality ratio is simply the proportion of applicants with corresponding test scores, age, and education levels that can be expected to serve satisfactorily. The primary use of these ratios should be not to predict the quality of any individual but to rank or group applicants according to predicted quality. Applicants with low chances of performing well can be excluded, and those with higher chances can be accepted.

The quality ratio tables are presented here in terms of education, age, CC, and ASVAB mental group score. Since the men in the fiscal year 1974 cohort group did not take the ASVAB, we have estimated the ASVAB scores based on recorded ACB-61 scores. This technique retains the use of twenty-four months performance

TABLE 16

QUALITY RATIO TABLE: GRADUATE, AGE 17-20

Combat scale (CC)		ASVAB Mental Group (percentile score)							
Raw	Percentile	I (96)	II (78)	IIIA (57)	IIIB (40)	IVA (25)	IVB (15)	V (5)	
20	95	.97	.92	.85	.79	.74	.71	.68	
18	83	.96	.90	.84	.78	.73	.70	.67	
17	74	.96	.90	.83	.77	.73	.69	.66	
15	54	.94	.89	.82	.76	.71	.68	.65	
13	36	.93	.87	.81	.75	.70	.67	.64	
11	22	.92	.86	.79	.74	.69	.66	.62	
9	13	.88	.85	.78	.73	.68	.65	.61	

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$$\text{Quality Ratio} = 1 - [-.187\text{HS} + .109\text{AGE} - .00325\text{MG} - .00598\text{CC} + .6442]$$

TABLE 17

QUALITY RATIO TABLE: GRADUATE, AGE 21 OR MORE

Combat scale (CC)		ASVAB Mental Group (percentile score)									
Raw	Percentile	I (96)	II (78)	IIIA (57)	IIIB (40)	IVA (25)	IVB (15)	V (5)			
20	95	.86	.81	.74	.68	.63	.60	.57			
18	83	.85	.79	.73	.67	.62	.59	.56			
17	74	.85	.79	.72	.67	.62	.58	.55			
15	54	.84	.78	.71	.65	.60	.57	.54			
13	36	.82	.77	.70	.64	.59	.56	.53			
11	22	.81	.75	.68	.63	.58	.55	.52			
9	13	.80	.74	.67	.62	.57	.54	.50			

$$\text{Quality Ratio} = 1 - [-.187\text{HS} + .109\text{AGE} - .00325\text{MG} - .00598\text{CC} + .6442]$$

TABLE 18

QUALITY RATIO TABLE: NON GRADUATE, AGE 17-20

Combat scale (CC)		ASVAB Mental Group (percentile score)									
Raw	Percentile	I (96)	II (78)	IIIA (57)	IIIB (40)	IVA (25)	IVB (15)	V (5)			
20	95	.79	.73	.66	.61	.56	.52	.49			
18	83	.78	.72	.65	.59	.54	.51	.48			
17	74	.77	.71	.64	.59	.54	.51	.47			
15	54	.76	.70	.63	.58	.53	.49	.46			
13	36	.75	.69	.62	.56	.51	.48	.45			
11	22	.73	.68	.61	.55	.50	.47	.44			
9	13	.72	.66	.59	.54	.49	.46	.43			

Quality Ratio = 1- [-.187HS +.109AGE -.00325MG -.00598CC +.6442]

TABLE 19
 QUALITY RATIO TABLE: NON GRADUATE, AGE 21 OR MORE

Combat scale (CC)		ASVAB Mental Group (Percentile score)									
Raw	Percentile	I (96)	II (78)	IIIA (57)	IIIB (40)	IVA (25)	IVB (15)	V (5)			
20	95	.68	.62	.55	.50	.45	.42	.38			
18	83	.67	.61	.54	.48	.44	.40	.37			
17	74	.66	.60	.53	.48	.43	.40	.36			
15	54	.65	.59	.52	.47	.42	.39	.35			
13	36	.64	.58	.51	.45	.41	.37	.34			
11	22	.62	.57	.50	.44	.39	.36	.33			
9	13	.61	.55	.49	.43	.38	.35	.32			

$$\text{Quality Ratio} = 1 - [-.187\text{HS} + .109\text{AGE} - .00325\text{MG} - .00598\text{CC} + .6442]$$

as the measure of effective service but does introduce error into the quality ratios. The analysis should be updated when the Marines who took the ASVAB have served longer in the Fleet Marine Force. The resulting analysis can then predict manpower effectiveness directly in terms of the variables available prior to enlistment.

This methodology can be used to tailor enlistment criteria to the relative importance of certain test scores and other data. The result will contribute to Marine Corps efforts to reduce early attrition and disciplinary problems and will orient the recruiting establishment toward a few more good men.

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APPENDIX A

MEANS AND STANDARD DEVIATIONS OF VARIABLES

<u>Variable</u>	<u>Mean</u>	<u>Standard deviation</u>
Quality measure	.3282	N/A
Early attrition	.2891	N/A
Desertion	.1130	N/A
Recruit training attrition	.1118	N/A
Rank achieved	2.5738	N/A
Promoted after training	.1617	N/A
High school graduate (diploma)	.4865	N/A
Enlistment guarantee	.5322	N/A
Age upon entrance	.1009	N/A
Marital status upon entrance	1.0706	N/A
Recruit training depot	6.5432	N/A
Recycled at depot	.1868	N/A
Correctional custody at depot	.0211	N/A
Motivation platoon at depot	.0277	N/A
Race	1.2247	N/A
Number of dependents	.1135	N/A
ACB-61 test scores:		
VE	100.2190	22.9649
AR	95.8324	22.3711
PA	105.5268	22.3827
CI	96.0695	27.5743
MA	99.3176	19.7982
ACS	97.5904	20.3177
ARC	83.8106	25.8739
GIT	93.2583	20.0883
SM	96.2610	19.0195
AI	99.0146	19.2821
ELI	92.6454	23.6465
GCT (VE+AR+PA)/3	100.5260	20.0046
GT (VE+AR)/2	98.2718	21.1535
AFQT Mental group (percentile score)	58.9270	N/A

APPENDIX B

SCALING FROM ACB-61 TEST SCORES TO ASVAB 6/7 TEST SCORES

The most useful prediction equation of the quality measure was shown to be (equation 1):

$$\begin{aligned} \text{Quality measure} &= -.1870\text{HS} - .0029\text{GCT} - .0017\text{CI} \\ &\quad + .1090\text{AGE} + .8694 \qquad \qquad \qquad (\text{B-1}) \\ r^2 &= .110 \\ F &= 1,413 \\ N &= 45,948 \end{aligned}$$

This equation is expressed in terms of scores from the Army Classification Battery (ACB-61) which is no longer administered. The test now used for pre-enlistment screening is the Armed Services Vocational Aptitude Battery (ASVAB 6/7). A procedure to scale CI and GCT to the parallel scores of the ASVAB 6/7 is described below.

The ASVAB 6/7 is composed of seventeen subtests. One of these, combat scale (CC), is designed to measure the aptitude measured by CI of the ACB-61. The ASVAB 6/7 mental group score (MG) is based on three tests: word knowledge (WK), arithmetic reasoning (AR), and spatial perception (SP). These three tests parallel the VE, AR, and PA tests of the ACB-61. A scaling technique was devised to convert equation (1) to a function of education, age, CC, and ASVAB mental group score.

During December 1975 and January 1976, recruits arriving at the Marine Corps Recruit Depots, Parris Island and San Diego, were

administered two test batteries. The 3,081 men took both the ACB-61 and ASVAB 6/7. Approximately the same number of men were tested at each depot, and half of each group took the ACB-61 test first. Testing conditions were monitored and designed to produce consistent results. The analysis of the correlation between the tests of these two batteries has been published (see reference 2). The relevant correlations produced in that analysis are shown here:

COEFFICIENTS OF CORRELATION

		<u>ACB-61</u>		<u>ASVAB 6/7</u>	
		CI	GCT	CC	MG
ACB-61:	CI		.4313	.5617	.4044
	GCT			.3435	.8679
ASVAB 6/7:	CC				.3568
	MG				

These correlations were used to derive prediction equation for CI and GCT in terms of the ASVAB 6/7 tests. The results are:

$$CI = 3.516CC + 40.475 \quad (B-2)$$

$$r^2 = .32$$

$$F = 1,419$$

$$GCT = 1.12MG + 53.942 \quad (B-3)$$

$$r^2 = .75$$

$$F = 9,400$$

Substituting in equation (B-1) and solving:

$$\begin{aligned} \text{Quality measure} = & -.187\text{HS} -.00325\text{MG} -.00598\text{CC} \\ & +.109\text{AGE} +.6442 \end{aligned} \quad (\text{B-4})$$

The interpretation of the quality measure is the probability that an applicant with a given vector of test scores and levels of age and education will be lost to the Marine Corps within twenty-four months due to desertion or early attrition. In order to use a positive measure of manpower quality in the application of these results, a quality ratio is defined:

$$\text{Quality ratio} = 1 - [\text{quality measure}] \quad (\text{B-5})$$

The interpretation of the quality ratio is the probability that an applicant (or the percentage of a group of applicants) with a given vector of test scores and levels of age and education will provide satisfactory service for twenty four months as measured by desertion and early attrition.

APPENDIX C
CORRECTION FOR RANGE RESTRICTION

All Marine Corps enlistees in fiscal year 1974 were required to pass the AFQT mental group test at the twentieth percentile. Those failing the test were excluded from enlistment and are, therefore, not in the 45,000 man sample. Since mental group may be an important variable in explaining attrition and performance, it is prudent to correct the data for this restriction in range.

In recent years the Marine Corps has enjoyed the benefits of double testing enlistees. Applicants were given the AFQT test prior to enlistment. Successful applicants were then given the ACB-61 test upon arrival at recruit training. The AFQT score, composed of verbal, arithmetic, and pattern analysis components, defines mental group. The ACB-61 test also includes word knowledge, arithmetic, and spatial perception sub-tests which form GCT score. During fiscal year 1974, an apparent discrepancy between AFQT mental group scores and the subsequent ACB-61 scores of enlistees developed. It appears that a sizable number of fiscal year 1974 enlistees were credited with much higher AFQT mental group scores than would be expected based on their ACB-61 scores. The ACB-61 test, administered at the Recruit Depots under controlled conditions, is thought to be a better measure of the verbal, arithmetic and spatial perceptions of the men in the sample. Therefore, the correction for range restriction is applied based on GCT score.

Reference (a) provides an estimate of the GCT distribution of the mobilization population. This GCT distribution was compared with the actual GCT distribution of the 45,000 man sample, and weights were computed for each of seven portions of the GCT range. The weights were then applied to each man in the 45,000 man sample to produce the table of correlation coefficients shown at appendix D. These coefficients were used to conduct the regression analysis of this report. Table C-1 shows the relevant GCT distribution and the derived weights.

TABLE C-1

GCT DISTRIBUTIONS AND WEIGHTS

<u>GCT Range</u>	<u>Mobilization population distribution</u>	<u>Fiscal year 1974 Marine Corps distribution</u>	<u>Weight (2)÷(3)</u>
(1)	(2)	(3)	(4)
130-160	6.9244	2.3204	2.984
110-129	29.954	24.832	1.206
100-109	18.394	23.343	.788
90- 99	16.734	21.664	.772
80- 89	12.801	15.126	.846
65- 79	12.921	10.613	1.217
1- 64	2.273	2.104	1.080
Total	100.	100.	-

ARC	CITY	S*	AI	ELI	WCRD	ACBOY	HOTPLAT	CORCUS	SEP	DES	RCYC
01A714	0.21618	0.59447	0.15852	0.14980	0.17847	0.22725	0.08902	0.08660	0.55639	0.28765	0.10999
01A717	0.22679	0.59057	0.15195	0.15794	0.14767	0.24215	0.08743	0.08807	0.50768	0.51070	0.10649
01A718	0.22281	0.58720	0.14870	0.15216	0.15097	0.24109	0.08739	0.02908	0.02484	0.02321	0.03134
01A719	0.21733	0.58220	0.14431	0.14843	0.14096	0.24058	0.08735	0.08240	0.05370	0.02620	0.00896
01A720	0.21151	0.57755	0.14087	0.14357	0.13574	0.23404	0.08730	0.08516	0.03830	0.02342	0.00237
01A721	0.20573	0.57289	0.13632	0.13820	0.13025	0.22750	0.08725	0.08240	0.07791	0.02342	0.00237
01A722	0.20000	0.56824	0.13179	0.13367	0.12470	0.22195	0.08720	0.08240	0.15308	0.12438	0.00941
01A723	0.19426	0.56358	0.12726	0.12914	0.11925	0.21640	0.08715	0.08240	0.11538	0.10183	0.01036
01A724	0.18851	0.55893	0.12273	0.12461	0.11470	0.21085	0.08710	0.08240	0.10766	0.08546	0.01310
01A725	0.18276	0.55427	0.11820	0.12008	0.11016	0.20530	0.08705	0.08240	0.10000	0.08546	0.01310
01A726	0.17701	0.54962	0.11367	0.11552	0.10561	0.19975	0.08700	0.08240	0.09238	0.08546	0.01310
01A727	0.17126	0.54496	0.10914	0.11097	0.10106	0.19420	0.08695	0.08240	0.08474	0.08546	0.01310
01A728	0.16551	0.54031	0.10461	0.10642	0.09651	0.18865	0.08690	0.08240	0.07712	0.08546	0.01310
01A729	0.15976	0.53565	0.10008	0.10187	0.09196	0.18310	0.08685	0.08240	0.06950	0.08546	0.01310
01A730	0.15401	0.53100	0.09555	0.09732	0.08741	0.17755	0.08680	0.08240	0.06188	0.08546	0.01310
01A731	0.14826	0.52634	0.09102	0.09277	0.08286	0.17200	0.08675	0.08240	0.05426	0.08546	0.01310
01A732	0.14251	0.52169	0.08649	0.08822	0.07831	0.16645	0.08670	0.08240	0.04664	0.08546	0.01310
01A733	0.13676	0.51703	0.08196	0.08367	0.07376	0.16090	0.08665	0.08240	0.03902	0.08546	0.01310
01A734	0.13101	0.51238	0.07743	0.07911	0.06921	0.15535	0.08660	0.08240	0.03140	0.08546	0.01310
01A735	0.12526	0.50772	0.07290	0.07458	0.06466	0.14980	0.08655	0.08240	0.02378	0.08546	0.01310
01A736	0.11951	0.50307	0.06837	0.07003	0.06011	0.14425	0.08650	0.08240	0.01616	0.08546	0.01310
01A737	0.11376	0.49841	0.06384	0.06548	0.05556	0.13870	0.08645	0.08240	0.00854	0.08546	0.01310
01A738	0.10801	0.49376	0.05931	0.06093	0.05101	0.13315	0.08640	0.08240	0.00092	0.08546	0.01310
01A739	0.10226	0.48910	0.05478	0.05638	0.04646	0.12760	0.08635	0.08240	0.00000	0.08546	0.01310
01A740	0.09651	0.48445	0.05025	0.05183	0.04191	0.12205	0.08630	0.08240	0.00000	0.08546	0.01310
01A741	0.09076	0.47979	0.04572	0.04728	0.03736	0.11650	0.08625	0.08240	0.00000	0.08546	0.01310
01A742	0.08501	0.47514	0.04119	0.04273	0.03281	0.11095	0.08620	0.08240	0.00000	0.08546	0.01310
01A743	0.07926	0.47048	0.03666	0.03818	0.02826	0.10540	0.08615	0.08240	0.00000	0.08546	0.01310
01A744	0.07351	0.46583	0.03213	0.03363	0.02371	0.09985	0.08610	0.08240	0.00000	0.08546	0.01310
01A745	0.06776	0.46117	0.02760	0.02913	0.01916	0.09430	0.08605	0.08240	0.00000	0.08546	0.01310
01A746	0.06201	0.45652	0.02307	0.02458	0.01461	0.08875	0.08600	0.08240	0.00000	0.08546	0.01310
01A747	0.05626	0.45186	0.01854	0.02003	0.01006	0.08320	0.08595	0.08240	0.00000	0.08546	0.01310
01A748	0.05051	0.44721	0.01401	0.01548	0.00551	0.07765	0.08590	0.08240	0.00000	0.08546	0.01310
01A749	0.04476	0.44255	0.00948	0.01093	0.00096	0.07210	0.08585	0.08240	0.00000	0.08546	0.01310
01A750	0.03901	0.43790	0.00495	0.00638	0.00000	0.06655	0.08580	0.08240	0.00000	0.08546	0.01310
01A751	0.03326	0.43324	0.00042	0.00183	0.00000	0.06100	0.08575	0.08240	0.00000	0.08546	0.01310
01A752	0.02751	0.42859	0.00000	0.00000	0.00000	0.05545	0.08570	0.08240	0.00000	0.08546	0.01310
01A753	0.02176	0.42393	0.00000	0.00000	0.00000	0.04990	0.08565	0.08240	0.00000	0.08546	0.01310
01A754	0.01601	0.41928	0.00000	0.00000	0.00000	0.04435	0.08560	0.08240	0.00000	0.08546	0.01310
01A755	0.01026	0.41462	0.00000	0.00000	0.00000	0.03880	0.08555	0.08240	0.00000	0.08546	0.01310
01A756	0.00451	0.41000	0.00000	0.00000	0.00000	0.03325	0.08550	0.08240	0.00000	0.08546	0.01310
01A757	0.00000	0.40534	0.00000	0.00000	0.00000	0.02770	0.08545	0.08240	0.00000	0.08546	0.01310
01A758	0.00000	0.40069	0.00000	0.00000	0.00000	0.02215	0.08540	0.08240	0.00000	0.08546	0.01310
01A759	0.00000	0.39603	0.00000	0.00000	0.00000	0.01660	0.08535	0.08240	0.00000	0.08546	0.01310
01A760	0.00000	0.39138	0.00000	0.00000	0.00000	0.01105	0.08530	0.08240	0.00000	0.08546	0.01310
01A761	0.00000	0.38672	0.00000	0.00000	0.00000	0.00550	0.08525	0.08240	0.00000	0.08546	0.01310
01A762	0.00000	0.38207	0.00000	0.00000	0.00000	0.00000	0.08520	0.08240	0.00000	0.08546	0.01310
01A763	0.00000	0.37741	0.00000	0.00000	0.00000	0.00000	0.08515	0.08240	0.00000	0.08546	0.01310
01A764	0.00000	0.37276	0.00000	0.00000	0.00000	0.00000	0.08510	0.08240	0.00000	0.08546	0.01310
01A765	0.00000	0.36810	0.00000	0.00000	0.00000	0.00000	0.08505	0.08240	0.00000	0.08546	0.01310
01A766	0.00000	0.36345	0.00000	0.00000	0.00000	0.00000	0.08500	0.08240	0.00000	0.08546	0.01310
01A767	0.00000	0.35879	0.00000	0.00000	0.00000	0.00000	0.08495	0.08240	0.00000	0.08546	0.01310
01A768	0.00000	0.35414	0.00000	0.00000	0.00000	0.00000	0.08490	0.08240	0.00000	0.08546	0.01310
01A769	0.00000	0.34948	0.00000	0.00000	0.00000	0.00000	0.08485	0.08240	0.00000	0.08546	0.01310
01A770	0.00000	0.34483	0.00000	0.00000	0.00000	0.00000	0.08480	0.08240	0.00000	0.08546	0.01310
01A771	0.00000	0.34017	0.00000	0.00000	0.00000	0.00000	0.08475	0.08240	0.00000	0.08546	0.01310
01A772	0.00000	0.33552	0.00000	0.00000	0.00000	0.00000	0.08470	0.08240	0.00000	0.08546	0.01310
01A773	0.00000	0.33086	0.00000	0.00000	0.00000	0.00000	0.08465	0.08240	0.00000	0.08546	0.01310
01A774	0.00000	0.32621	0.00000	0.00000	0.00000	0.00000	0.08460	0.08240	0.00000	0.08546	0.01310
01A775	0.00000	0.32155	0.00000	0.00000	0.00000	0.00000	0.08455	0.08240	0.00000	0.08546	0.01310
01A776	0.00000	0.31690	0.00000	0.00000	0.00000	0.00000	0.08450	0.08240	0.00000	0.08546	0.01310
01A777	0.00000	0.31224	0.00000	0.00000	0.00000	0.00000	0.08445	0.08240	0.00000	0.08546	0.01310
01A778	0.00000	0.30759	0.00000	0.00000	0.00000	0.00000	0.08440	0.08240	0.00000	0.08546	0.01310
01A779	0.00000	0.30293	0.00000	0.00000	0.00000	0.00000	0.08435	0.08240	0.00000	0.08546	0.01310
01A780	0.00000	0.29828	0.00000	0.00000	0.00000	0.00000	0.08430	0.08240	0.00000	0.08546	0.01310
01A781	0.00000	0.29362	0.00000	0.00000	0.00000	0.00000	0.08425	0.08240	0.00000	0.08546	0.01310
01A782	0.00000	0.28897	0.00000	0.00000	0.00000	0.00000	0.08420	0.08240	0.00000	0.08546	0.01310
01A783	0.00000	0.28431	0.00000	0.00000	0.00000	0.00000	0.08415	0.08240	0.00000	0.08546	0.01310
01A784	0.00000	0.27966	0.00000	0.00000	0.00000	0.00000	0.08410	0.08240	0.00000	0.08546	0.01310
01A785	0.00000	0.27500	0.00000	0.00000	0.00000	0.00000	0.08405	0.08240	0.00000	0.08546	0.01310
01A786	0.00000	0.27035	0.00000	0.00000	0.00000	0.00000	0.08400	0.08240	0.00000	0.08546	0.01310
01A787	0.00000	0.26569	0.00000	0.00000	0.00000	0.00000	0.08395	0.08240	0.00000	0.08546	0.01310
01A788	0.00000	0.26104	0.00000	0.00000	0.00000	0.00000	0.08390	0.08240	0.00000	0.08546	0.01310
01A789	0.00000	0.25638	0.00000	0.00000	0.00000	0.00000	0.08385	0.08240	0.00000	0.08546	0.01310
01A790	0.00000	0.25173	0.00000	0.00000	0.00000	0.00000	0.08380	0.08240	0.00000	0.08546	0.01310
01A791	0.00000	0.24707	0.00000	0.00000	0.00000	0.00000	0.08375	0.08240	0.00000	0.08546	0.01310
01A792	0.00000	0.24242	0.00000	0.00000	0.00000	0.00000	0.08370	0.08240	0.00000	0.08546	0.01310
01A793	0.00000	0.23776	0.00000	0.00000	0.00000	0.00000	0.08365	0.08240	0.00000	0.08546	0.01310
01A794	0.00000	0.23311	0.00000	0.00000	0.00000	0.00000	0.08360	0.08240	0.00000	0.08546	0.01310
01A795	0.00000	0.22845	0.00000	0.00000	0.00000	0.00000	0.08355	0.08240	0.00000	0.08546	0.01310
01A796	0.00000	0.22380	0.00000	0.00000	0.00000	0.00000	0.08350	0.08240	0.00000	0.08546	0.01310
01A797	0.00000	0.21914	0.00000	0.00000	0.00000	0.00000	0.08345	0.08240	0.00000	0.08546	0.01310
01A798	0.00000	0.21449	0.00000	0.00000	0.00000	0.00000	0.08340	0.08			

APPENDIX E

CROSS VALIDATION OF THE MODEL

The sample of 45,948 men was divided at random into two samples, A and B. Table E-1 shows the mean values of selected variables in each sample. Using the quality measure of either early attrition or desertion, a regression equation was predicted for each sample. The regressions were first computed with all variables available. The results of this stepwise regression are shown at table E-2. Note that the significant variables are the same, the order of the variables is the same with one exception, and the coefficients are comparable. A second regression was computed for each sample which included GCT, the composite test which is composed of PA, AR, and VE and is similar in structure to the ASVAB mental group composite score. The results of the second set of regressions are shown at table E-3. Again, the coefficients are similar and each equation is statistically significant.

To cross validate the model, the regression equation of sample A was computed for each man in sample B. Then the predicted and actual quality measures for the men in sample B were computed. The comparisons were based on three passing scores of the quality measure: .25, .35, and .50. Note that .35 is near the sample mean. The performance of the prediction model can be considered by determining the number of correct and incorrect predictions. Each category can be grouped into those that passed or failed. Table E-4 shows this grouping. Each man in sample B is predicted

TABLE E-1

MEAN VALUES OF SELECTED VARIABLES
IN TWO MUTUALLY EXCLUSIVE RANDOM SAMPLES

Selected variables	Mean	
	Sample A	Sample B
Quality measure	.3255	.3309
Early attrition	.2870	.2913
Desertion	.1111	.1150
Early promotion	.1617	.1618
Rank achieved	2.5774	2.5703
Race	1.2275	1.2218
Marital status	1.0688	1.0724
Age	.1010	.1007
Education	.4861	.4869
AFQT	59.0143	58.8392
VE	100.3362	100.1012
AR	95.8911	95.7734
PA	105.5450	105.5085
CI	96.0029	96.1363
GT (VE+AR)/2	98.3622	98.1819
GCT (VE+AR+PA)/3	100.5908	100.4610
(N)	(23,025)	(22,923)

TABLE E-2

REGRESSION RESULTS: QUALITY MEASURE
WITH ALL VARIABLES IN EACH SAMPLE

<u>Sample A</u>		<u>Sample B</u>	
<u>Variable</u>	<u>Coefficient</u>	<u>Variable</u>	<u>Coefficient</u>
High school	-.185	High school	-.182
PA	-.002	CI	-.002
CI	-.002	PA	-.002
Age	+.103	Age	+.110
Enlistment guarantee	-.039	Enlistment guarantee	-.054
GIT	-.001	GIT	-.002
Race	-.028	Race	-.028
ARC	-.001	AFQT	+.001
(Constant)	+.943	(Constant)	+.939

Variables excluded

Marital status
AFQT
VE
AR
MA
ACS
SM
AI
ELI

Variables excluded

Marital status
VE
AR
MA
ACS
ARC
SM
AI
ELI

TABLE E-3

REGRESSION RESULTS: QUALITY MEASURE
WITH SELECTED VARIABLES IN EACH SAMPLE

<u>Sample A</u>		<u>Sample B</u>	
<u>Variable</u>	<u>Coefficient</u>	<u>Variable</u>	<u>Coefficient</u>
High school	-.188	High school	-.186
GCT	-.003	GCT	-.003
CI	-.002	CI	-.002
Age	+.105	Age	+.102
(Constant)	+.864	(Constant)	+.874
$r^2 = .109$		$r^2 = .110$	
F = 707		F = 706	

TABLE E-4
 COMPARISON OF PREDICTED^a AND ACTUAL
 SUCCESS RATES IN SAMPLE B

Maximum passing score	Correct predictions			Incorrect predictions		
	Pass	Fail	Total correct	Pass	Fail	Total incorrect
.25	30%	27%	57%	37%	6%	43%
.33	39	24	63	28	9	37
.50	61	8	69	6	25	31
						100

^aThe predicted success rates of men in sample B were computed using the regression equation derived from sample A and the maximum predicted scores shown.

to "pass" unless his predicted quality measure equals or exceeds .25, .33, or .50, respectively. With a maximum "pass" score of .33, 63 percent of the men in sample B are correctly predicted. Specifically 39 percent were predicted to pass ($\hat{Q} \leq .33$) and did pass ($Q = 0$), while 24 percent were predicted to attrite ($\hat{Q} \geq .33$) and did so ($Q = 1$). Analysis of the erroneous predictions reveals that 9 percent of the men were predicted to pass but failed while 28 percent of them were predicted to fail but passed. These results are consistent with the results reported by Lockman and Warner, (reference 4). Their linear model used individual data for 60,000 Navy enlisted men who were tracked for one year and who had a loss rate of .17. Their cross validation at a maximum passing score of 20 (minimum failing score of 80) resulted in 65 percent accurate predictions, 7 percent predicted "passes" of men who attrited and 28 percent predicted attritions for men who did not.

INCREASING THE RETENTION OF ARMY VOLUNTEERS:

MEANINGFUL WORK MAY BE AN ANSWER

Robert F. Holz and E. M. Schreiber
U.S. Army Research Institute for the Behavioral and Social Sciences

ABSTRACT

This study is concerned with the determination of career intentions among volunteer enlisted men and noncommissioned officers in the US Army. Three basic issues were examined. First, are military personnel from lower socioeconomic backgrounds, lower educational levels of attainment and from racial or ethnic minorities more likely to seek a career in the Army? Second, are military personnel who have experienced delinquency or discipline problems either as civilians or in the military more likely to seek a career in the Army? Third, are military personnel who view their work environment in the Army favorably more likely to seek a career in the Army? Survey data from 696 first and non-first term volunteer males were used in an attempt to answer these questions. Our analysis yielded a negative answer, with qualifications, to the first two questions and a positive answer to the third.

The views expressed in this paper are the authors' and do not reflect the institutional positions of either the Department of the Army or the Army Research Institute.

BACKGROUND AND RATIONALE

The question of the determinants of occupational choice became of no small significance to the US Army on July 1, 1973, for it was on that day that the Army lost its ability to meet its personnel needs via the draft and instead became dependent on volunteers and voluntary reenlistments to man the force. The present investigation addresses the question of Army career intentions among enlisted men and non-commissioned officers and is directed toward learning what factors are related to a favorable view of the US Army as a career. The larger question into which this inquiry can be placed is in the ability of an organization to maintain, via retention of those already among its members, its strength through non-coercive means.

Most of the traditional policies that were intended to stimulate reenlistment among military servicemen emphasized remunerative rewards (e.g., increased pay, reenlistment bonuses, as well as direct dependent benefits such as medical care, life insurance, and survivor benefits) and were based on the assumption that by making the financial and benefits package of the military more attractive the idea of a military career might also become more attractive (President's Commission, 1970). As such, the implementation of the volunteer force concept provided an opportunity for critics to argue that, among other things, a volunteer Army would draw disproportionately if not mainly on the economically and socially disadvantaged strata of the population. More specifically it was thought that an American Army that relied on voluntary enlistments

would be heavily composed of servicemen who were Black, poor, or otherwise disadvantaged (Marmion, 1971). The assumed causal sequence was that persons are attracted to the Army because of economic benefits: to attract more persons the quantity of economic benefits must be increased, and the persons most likely to be attracted by these economic benefits will be those who are disadvantaged (i.e., Blacks, poor and less educated). An obvious question to ask, then, is whether the poor, the less well educated and racial minorities do in fact find the idea of a career in the Army more attractive than their counterparts.

A summary of previous research conducted on the reenlistment intentions of draftees (Wool, 1971) indicated that reenlistees were disproportionately less well educated, Black as opposed to white, from the South, and from lower socioeconomic status families. In this same context, however, it is of interest to note that previous investigations into the question of reenlistment intentions and behavior (Wool, 1971) also point to the importance of factors linked to non-economic considerations. A study of the quality of life in the Army among first-term enlisted volunteers (Holz and Gitter, 1974) found that the reenlistment intentions of these individuals were in large part dependent upon their having a favorable view of the Army's "organizational climate" (e.g., being treated as a person, opportunities for advancement, meaningful work, qualified leaders), while other considerations (e.g., pay, quality of living quarters, quality of food, types of post facilities) lacked demonstrable effect on reenlistment intentions. Such findings are not unique to the American Army. A study of the Australian regular Army

(Owens, 1969) indicated that factors associated with the military work role (e.g., sense of self improvement, quality of training, opportunity for promotion), as opposed to, for example, remunerative rewards, were significant determinants of intentions to reenlist. The general conclusion to which these studies all point is that rewards by themselves are not sufficient factors or even the major factors in determining the reenlistment of Army servicemen.

This conclusion provides a basis for the approach taken here: the consideration of reenlistment intentions as a special case of career/occupational choice and a focus on non-remunerative rewards as primary factors in determining those reenlistment intentions.

The exposition of the functional theory of social stratification (Davis and Moore, 1945), critiques (Tumin, 1953), plus subsequent comments and amplifications (Davis, 1953; Wrong, 1959), while ostensibly directed toward accounting for social stratification in industrial societies, also provide a useful starting point for a discussion of occupational and career choice within the Army. The major points to be gleaned from the discussions of the functional theory is that while monetary reward is a consequential factor in making a position attractive, it is by no means the only factor. Indeed, in their discussions of the kinds of rewards that accrue to different positions in a social stratification system (Davis and Moore, 1945: 243), considerations such as humor and diversion and self respect were considered to be important enough to merit rankings equal to considerations based on sustenance and comfort. In other words, an occupation that provides a good deal of psychic reward

but low income may be seen (by some) as more attractive than one that provides for high income but low psychic reward.

The implications here then are that quite apart from the individual's capabilities and training, the sorting out of persons into different occupations and careers is a product of a mix of factors: accordingly, the amount of monetary reward is likely to be but one of many considerations. Why might someone wish to make a career of serving in the Army? The previous discussion of the functional theory of stratification plus the findings of studies of the reenlistment question alert the investigator to consider characteristics of the occupational environment (Katenbrink, 1969: 163-189) as well as the criteria for entry (requisite training) and the notion that the Army constitutes an occupation of upward mobility (Marmion, 1971: 37-41) for those whose mobility in the civilian sector is problematic. These issues can be loosely grouped under three broad headings: Army environment, alternative choices, and mobility.

The environment factor refers to the impact of conditions within the Army (or that part of the Army that the servicemen experiences) on career intentions. This leads to the expectation that the more congenial the serviceman sees his immediate surroundings, the more likely he is to wish to stay in the Army.

The alternative choice factor refers to the role of the Army (and the military in general) in providing a place of employment for those individuals who may have experienced difficulty in securing "employment" in the civilian sector (e.g., as evidenced by a lack of education or

marketable skills, difficulty in keeping a job, or trouble with police or other authority figures). Such persons are likely to seek the Army as attractive because it provides relatively steady employment and a possible "career" with few questions asked.

The mobility factor refers to the opportunities provided by the Army for a person to improve his place in the social pecking order, both in terms of symbols of status (e.g., wearing a uniform) and material goods, (e.g., guaranteed income). The general assumption here is that persons from relatively disadvantaged backgrounds (e.g., lower socioeconomic status, non-whites) will be more likely to see the Army's offerings as attractive.

The foregoing discussion suggests three general hypotheses to account for variation in expressed intentions to pursue a career in the Army. Specifically, Army career intentions should increase with: (1) disadvantaged civilian background, (2) history of problems with authorities, (3) perceived congeniality of the Army environment.

SAMPLE, METHOD AND PROCEDURES

To test these hypotheses, data collected via an anonymous survey from a sample of 1,564 enlisted men and non-commissioned officers in the US Army were subjected to a number of analyses. The respondents were drawn from US Army commands in the contiguous United States, Alaska and West Germany and were surveyed between November 1973 and January 1974. The units sampled, and the respondents within these units, were selected with intentions of maximizing the samples' representativeness vis-a-vis the US Army. However, since this attempt at

representation was not based on probabilistic sampling procedures, one ought not be cavalier about generalizing results based on this sample to the US Army as a whole.

The original sample was found to be both heterogeneous in terms of length of service and conditions of entry. Included in the sample, for example, were both raw recruits in Basic Combat Training and career soldiers some of whose years of Army experience exceeded the ages of the new recruit. The sample also included draftees, draft motivated volunteers and true volunteers. The expectation would be that these respondents would differ quite dramatically in their intentions to pursue a career in the Army. It seems reasonable to assume that a volunteer would be more likely to consider making a career of the Army than a draftee. Similarly, servicemen who are still on their first tour would be less likely to intend an Army career than those who had already reenlisted one or more times.

Differentiation of the sample by condition of entry (volunteer, draftee) and length of service (first term, non-first term) revealed wide variation in stated career intentions (see Table 1). The range is from 4% intending Army careers among first term draftees to 65% among non-first term volunteers. The major relationship that emerged was that servicemen, regardless of conditions of entry, who were in their first tour of duty were far less likely to intend an Army career than those who had already reenlisted one or more times.

Since the analyses we were concerned with in this report addresses the career intentions of volunteers in the Army, those respondents who

indicated that they entered the Army because of the draft or volunteered because of pressures from the draft were excluded from the subsequent analyses. This filtering process reduced the total number of cases of first term true volunteers to 460 and non-first term true volunteers to 236. While the number of cases that remained following this filtering process is roughly half of the original sample, this total is composed of those "core cases" for which analysis is more likely to prove fruitful; volunteers who were not from National Guard units and who reported that they did not volunteer because of the possibility of being drafted.

Insert Table 1 about here

FINDINGS

In keeping with the introductory discussion and hypotheses, the variables selected to predict career intentions were first grouped into three categories: social background characteristics, reported pre-service delinquency and Army discipline problems, and subjective measures of the respondent's perception of the military environment. These variables were first correlated with the expressed career intentions for first term and non-first term volunteers and then a series of regression analyses were carried out in order to ascertain which variables "best" predicted career intentions. The correlation coefficients for each variable with career intentions for first and non-first term volunteers are portrayed in Table 2. The regression coefficients for first and non-first term volunteers are presented in Table 3.

Inspection of the data in Table 2 indicate that none of the social background measures were found to be significantly associated with career intentions for the first term volunteers. For the non-first termers, however, Army career intentions varied inversely with parental socioeconomic status ($r=-.30$), father's education ($r=-.21$), and mother's education ($r=-.19$). Two observations based on these correlations can be noted here. The first of these is the nonsignificant relationship between race and region of origin on career intentions for both the sample of first termers and non-first termers. The second is that among first term volunteers, sampled in this survey, socioeconomic status, level of education of the respondent and parental educational level had no relationship with career intentions. Assuming that intentions are translated, at least for some, into subsequent behavior, the results obtained here suggest that there is no reason to expect that reenlistments among first term volunteers will be disproportionately drawn from the Southern, non-white, less affluent, or less educated strata of the eligible population.

Insert Table 2 about here

Of the six measures of pre-service (civilian) delinquency, minor pre-service delinquency was found to be significantly related to career intentions for both first and non-first term personnel (r 's $=-.19$, $-.25$), while major pre-service delinquency was correlated with career intentions only for the non-first termers surveyed ($r=-.21$). Of the other pre-service delinquency measures, only number of school suspensions was found to be correlated with career intentions for non-first termers ($r=-.17$), while none were found to be related to career intentions among the first term

volunteers. It is important to note, however, that all of these pre-service delinquency measures were negatively related to career intentions. That is, volunteers, whether on their first tour of duty or not, who reported delinquency related activities as civilians were less likely to intend to pursue an Army career than those who reported no such problems.

All three measures of military delinquency (number of times AWOL, number of Articles 15 [a form of administrative punishment], and number of times reduced in rank) were significantly and negatively related to Army career intentions among the first term volunteers (r 's=-.14, -.17,-.17), while none were found to be so related among the non-first term volunteers surveyed. Once again it is noted that increased delinquency, within the military, is either unrelated or negatively related to intending a career in the Army.

The largest relationship between career intentions and the "discipline" measures for both first and non-first term servicemen was obtained from the Acceptance of Authority Scale. Unlike the other delinquency/discipline variables, this scale is less a measure of behavior than of attitudes toward authority -- military and non military alike. This scale was intended to measure the respondent's submissiveness toward authority, both generalized and in the military. The relatively high correlations between responses to this measure and Army career intentions for both first term ($r=.32$) and non-first term servicemen ($r=.44$) suggest that the more a serviceman adheres to the view that his own acts should be subservient to the wishes of the organization, the greater the likelihood that he will seek to remain a part of that organization.

• Of the fourteen measures of the Army "environment", eleven were found to be significantly related to career intentions among the first term soldiers and eight for the non-first termers. The measure that exhibited the largest relationship that was consistent for both first and non-first term personnel was the Military Work Role (e.g., job satisfaction) scale, with a correlation of +.48 for both groups.

Of lesser importance vis-a-vis securing correlates of career intentions, but consistent for both the first and non-first term servicemen surveyed, were the responses to the Esprit de Corps Scale (r 's=.18, .33), the Leadership Scale (r 's=.38, .27), and the responses to the Recreational Interest Index (r 's=.16, .26). The major divergence between first and non-first term personnel, both in terms of magnitude of relationship and statistical significance, was rank, which was found to be negatively related to career intentions among first terms (r =-.22) and positively related (r =.53) to career intentions for the non-first termers. Among non-first term personnel the relationship makes intuitive sense: the higher the rank (i.e., by one measure, the more successful one has been in the Army), the more likely a serviceman is to intend to make a career of the Army. The explanation for the negative relationship between rank and career intentions for the first termers is not so obvious. One possible interpretation is that type of unit (training versus non-training) and number of months left to serve on first tour are both related to career intentions among first term personnel. Separate analyses of the career intentions for first term trainees and those who had "graduated" to a regular unit confirmed this.

The response to the MOS (Military Occupational Specialty) related variable revealed a significant correlation ($r=-.19$) with career intentions for first termers, but not for non-first termers ($r=-.11$). The negative correlation of career intentions with this variable indicates that intention to pursue a career in the Army is inversely related to the assignment of an individual to tasks outside the job for which he was trained. This finding is in accord with those reported elsewhere (Drexler, 1975).

Of the remaining variables, not being bothered by financial problems was significantly related ($r=-.21$) to career intentions for non-first term servicemen but not for first termers ($r=-.08$). Satisfaction with living quarters was modestly related to career intentions for first termers ($r=.15$) but not for non-first termers ($r=.09$). Among first termers, being stationed in the contiguous US as opposed to Alaska or West Germany was modestly related ($r=-.17$) to career intention. This relationship, however, was not found for non-first term personnel.

The regression analyses, conducted in order to secure information on which variables "best" predicted career intentions among the samples of first and non-first term volunteers, indicated that the "best" predictors of career intentions for both samples consisted of the responses to the Military Work Role Scale (Table 3). This measure accounted for 23% of the variance in the criteria for both groups. Knowing the serviceman's orientation toward working in a highly structured organization (the Acceptance of Authority measure) as well as his perceptions of leadership in his unit, while adding to the regression equation, provided little additional understanding vis-a-vis the criteria measure.

Insert Table 3 about here

DISCUSSION

In terms of the hypotheses posed at the onset of this analysis, the data point to perceptions of the organizational climate - particularly as related to work activities - as far more important determinants of career intentions than civilian background. On the matter of the volunteer Army being disproportionately poor and non-white, the data secured in this investigation provide no support for the thesis that non-whites intend Army careers more than whites and only limited support for the assumption that those from poor socioeconomic backgrounds intend Army careers more than the non poor.

These results are at variance with previously reported evidence on the correlates of actual (as opposed to intentions of) reenlistment (Wool, 1971: 82-84). It will be recalled that of the four variables related to career intentions (education, race, region, and socioeconomic status), none were found to be significantly related to career intentions among first term volunteers, and only socioeconomic status was significantly related to career intentions among the non-first termers.

Several possible explanations for these differences can be suggested. The reenlistment evidence provided in earlier inquiries was based on the pre-volunteer Army, an Army that was composed of both volunteers and draftees (Wool, 1971: 83). From what we know of Army manpower and recruitment during the draft era, the more highly educated were more likely to have been drafted, the less educated to have volunteered. We also know that draftees were less likely to have reenlisted. The implication

here, then, is that the earlier reported relationships found to be associated with reenlistment behavior may have been created, in part, by the presence of draftees and draft-motivated volunteers in those previous inquiries,

The other set of variables that emerged as important in terms of the initial hypotheses was pre-service delinquency, which was found to be negatively related to Army career intentions among both first and non-first term volunteers. These findings, it should be pointed out, are opposite of the prediction that those who were delinquent as civilians would be more likely to intend an Army career. What this indicates is that persons with disciplinary problems, whether as civilians or as servicemen, are if anything less likely to intend to remain in the Army beyond their initial tour of duty.

Perhaps the single most important result that emerged from the analyses performed is the major contribution to career intentions of variables relating to the Army environment. Of the environmental measures, military work role emerged as the most important variable. This suggests that one of the major determinants of career intentions, regardless of whether or not one is in one's first tour, is how one sees oneself in terms of the work one does in the Army: and the more favorable one's view, the more likely one is to intend to make the Army a career. This is a useful finding both for what it includes

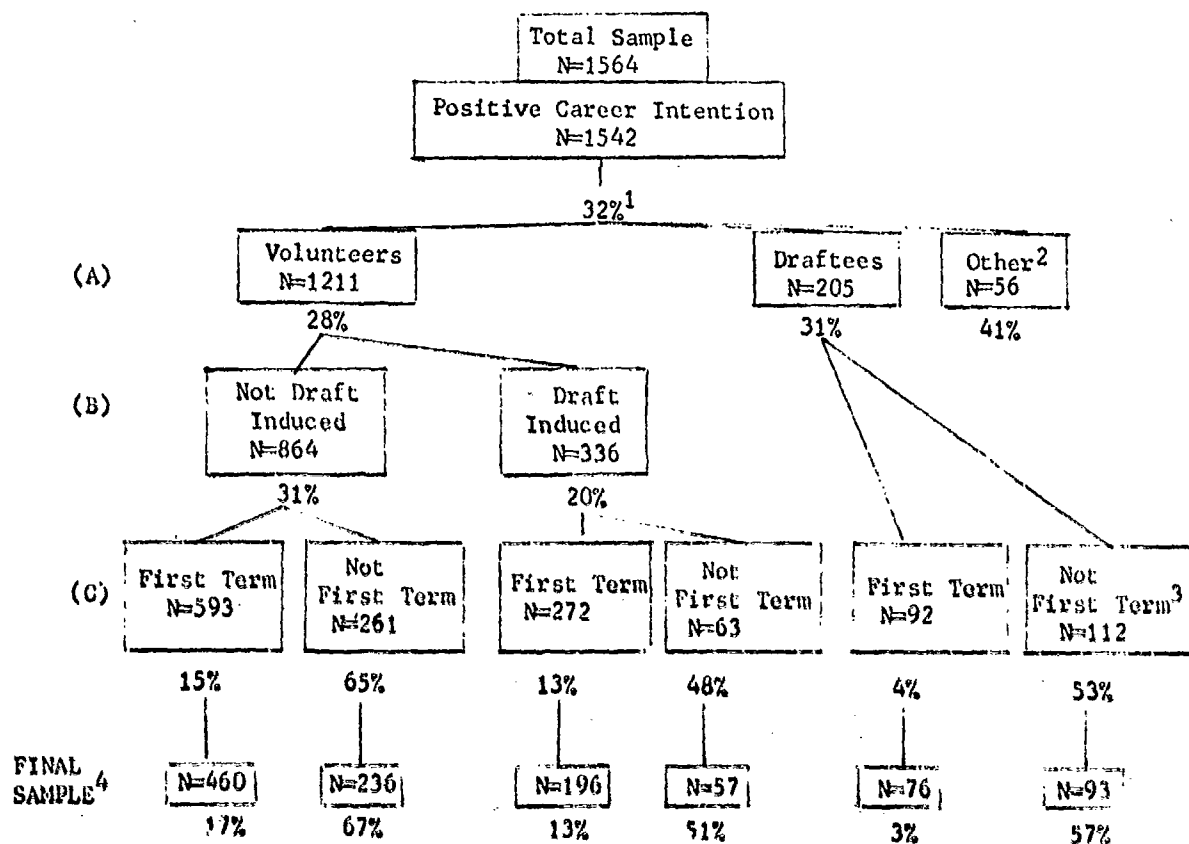
and what it does not. The measure of military work role used in this inquiry does not include rate of pay, it does not include weekend passes, it does not include educational benefits, it does not include beer in the barracks. It does include, however, such items as, sense of accomplishment, enjoyment from the job, teamwork, importance of the job, satisfaction with the job, and interest in the job. The continuities here with research on the role of meaningful work for late adolescents and young adults (Goodman, 1960) are obvious.

If the work situation of the volunteer soldier in peacetime can be made more challenging and interesting, then one would expect dissatisfaction with the Army as an occupation to decrease and retention (as manifested by reenlistments and reduced attrition) to increase. The data from the present investigation suggest that the areas in which changes need to be made in order to accomplish these goals are in terms of providing training experiences that will provide for challenge, reduce the assignment of individual's to tasks that provide for little in the way of hard work, increase the match between an individual's skills and interests and his assigned job, and provide the necessary leadership to insure that work assignments are made sufficiently complex so as to task the upper capabilities of those called on to perform them.

While the implementation of some of these recommendations may try the creativity of military leaders, the implications of inaction are clear. When the military moved into the all-volunteer era, it did so with the full recognition that changes would be needed in the organization in order to meet its personnel requirements. While recent economic conditions within the society have provided the military with a hiatus in which changing the work life of the soldier was not immediately perceived as necessary, the ability of the military to attract and maintain a quality force will undoubtedly rest on its capability to meet the challenges posed by young men and women who are turning to the military as an occupation and profession.

TABLE 1

Sample Classification by Career Intention



1 Percentages are those of the N who reported "Definitely yes" or "Probably yes" to the question on intention to pursue a career in the Army. Thus, 32% of the total sample indicated a positive intention of pursuing a career in the Army beyond their current tour.

2 "Other" refers to individuals who were members of the National Guard or Reserve forces.

3. "First term" for volunteer was defined as those who reported up to three years of service; for draftees, "first term" was defined as those with up to two years of service.

4. The "final sample" consist of those personnel in training units, support units, and combat units.

TABLE 2

Correlates of Army Career Intentions for First Term and Nonfirst Term Volunteers

<u>Background Characteristics</u>	<u>First Term</u> (N=429-458)	<u>Nonfirst Term</u> (N=234-245)
Origin-region (nonsouth, south)	-.01	.06
Origin-place (nonfarm, farm)	.08	-.07
Race (white, nonwhite)	-.11	.09
Socio-Economic Status	-.03	-.30**
Education-father	-.01	-.21*
Education-mother	-.01	-.19*
Education-respondent	-.05	.09
Parents married and together (yes,no)	-.04	-.04
<u>Delinquency/Discipline Measures</u>		
Number of school suspensions	-.09	-.17*
Number of school expulsions	-.03	-.16
Number of pre-service arrests	-.12	-.10
Number of pre-service convictions	-.04	-.08
Minor Pre-service Delinquency Index	-.19**	-.25**
Major Pre-Service Delinquency Index	-.02	-.21*
Number of times AWOL	-.14*	-.06
Number of commendations	.06	.38**
Number of Articles 15	-.17**	.01
Number of rank reductions	-.17**	.08
Acceptance of Authority Scale	.32**	.44**
<u>Army Environmental Measures</u>		
Place (not CONUS, CONUS)	-.17**	.03
Unit (non-training, training)	.29**	inap.
Rank (E1 to E9)	-.22**	.53**
Months to serve	.31**	.19*
Military Work Role Scale	.48**	.48**
Esprit de Corps Scale	.18**	.33**
Assigned tasks outside MOS	-.19**	-.11
Leadership Scale	.38**	.27**
Bothered by financial problems	-.08	-.21**
Recreational Availability Index	.17**	.10
Recreational Interest Index	.16**	.26**
Satisfaction with living quarters	.15*	.09
Satisfaction with sexual opportunities	.06	.15
Spouse living on post (no or not married; yes)	.04	.19*

* p < .01

** p < .001

TABLE 3

Regression of Career Intentions on Background,
Delinquency/Discipline and Military Environment Measures
for First and Non-First Term Volunteers

	<u>Variable</u>	<u>r</u>	<u>R²</u>
First Term N=460	Military Work Role	.48	.23
	Leadership	.38	.06
	Acceptance of Authority	.32	.02
Non-First Term N=236	Military Work Role	.48	.23
	Acceptance of Authority	.44	.08
	Number of commendations	.38	.03
	Socio-economic Status	-.30	.03
	Leadership	.27	.01

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SUMMARIZING REMARKS

COL Henry L. Taylor, USAF
Office of the Director, Defense Research and Engineering

The concern at this conference has been focused on first term attrition, its costs, and what can be done about it. It is clear that attrition is part of the larger, serious problem of manning the predicted force structure in the mid-1980's with adequately trained, motivated individuals. The personnel planners in the Services view attrition and manning the force as a serious problem. They also believe that policies and programs will be developed to handle the problem. As these policies and programs are developed and evaluated, help from the DoD research and development community will be required.

At the present, much of our training and personnel technology R&D is reactive. A large part of the program responds to demand pull—i.e., to user requirements. The objective of this conference was to look at things that can be done to reduce the need for a reactive R&D program and to develop a programmatic thrust which will provide data and demonstrations to assist planners in making manning decisions.

At the present time we know much more about possible solutions to manpower and personnel problems than is being utilized. Application of this knowledge is called for, perhaps in the form of field demonstrations or try-outs of new policies. Examples of things that have been discussed but not tested are: the furloughing of would-be attritees instead of discharging them, lateral entry of experienced personnel to fill needs and reduce costs, recruiting and advertising approaches which deal with the expectancy mismatch, one-station training and job-related training, technical assessment and classification centers, modifying the mix of males and females, and "opt-out" programs. In field experiments, complications are introduced by the need for substantial administrative support by operational commands. Personnel have to be provided as experimental subjects, others may be required as observers, and resources and facilities must be dedicated to the effort. Above all, operational commanders will have to cooperate in allowing data to be collected. The issue of the need for field experimentation has been raised repeatedly, and field experimentation clearly seems to be the way of the future. It is a way to test the value of existing findings, and it is a necessary precursor to implementing them.

The R&D community should have the opportunity to examine policy alternatives being considered by personnel planners so that its own planning can be more relevant. In that way, the R&D program can be structured so that empirical data can be provided to reduce as much as possible the constraints and untested assumptions that go into our policy models and decision-making process.

It appears useful to review the funding trends of Training and Personnel Technology R&D. From a base level of \$30-\$50 million for the fiscal

1970-1972 time frame, the fiscal 1978 request to Congress for this area has increased to \$140M. Of this amount, \$104M was for technology base work while \$36M was for engineering development for prototype training devices and simulators. The fiscal 1978 request included \$12M for basic research (6.1), \$47M for exploratory development (6.2), and \$45M for advanced development (6.3A, Advanced Technology Demonstration). This represents a tremendous change when we consider that DoD funded no advanced development efforts in this area prior to fiscal 1967. The point of reviewing the funding trends is to indicate that the DoD planning and programming system is responsive to manpower problems. This is not to say, however, that there is always new money to be had, but to say that funding levels requested and planned are generally adequate to meet demonstrated needs.

In terms of program trends, our present investment strategy would indicate a shift of emphasis away from the more traditional and mature selection and classification R&D concerned with entry level assessment, to less developed fields, e.g.: intervention strategies, with special attention to training alternatives; and assignment and career development systems concerned with job-person match. Also, much more information has to be developed about the differential performance among individuals and their relative costs. What is the cost of retaining poor performers? How much does remediation cost?

As a follow-on to this conference, it may be effective to create an ad hoc working group that would review deficiencies in our knowledge about attrition and assess the need for new research.

SUMMARIZING REMARKS

I. M. Greenberg
Office of the Assistant Secretary of Defense
(Manpower and Reserve Affairs)

Within OSD, the staffs of ASD(M&RA) and ODDR&E have evolved a cooperative arrangement in which the former identifies problem areas in need of solution and the latter works toward enlisting the support of the research community in focusing its efforts on those problems. Management of R&D programs continues to be the prerogative of the individual Services. Specifically, speaking to the theme of this conference, many ideas and hypotheses about attrition and how to deal with attrition have surfaced. There is a need to consider those hypotheses carefully, to identify those that appear to be the most promising, and to test them experimentally. All of this will require close cooperation between research managers and personnel managers, and it may require a shifting of priorities and resources. (Real, not fictional, shifts are called for; don't apply "attrition" labels to irrelevant work.) It will also be necessary to share efforts across the Services.

Putting the attrition problem in perspective, one concludes that current loss rates are costly but they have not prevented DoD from maintaining force levels. If attrition continues at its current rate, however, DoD will find it difficult to support a volunteer force in the face of a diminishing manpower supply. But reducing attrition is only one management option for dealing with a lessened supply. It is possible to increase the supply for enlistment (e.g., more women) or to reduce enlistment standards. Incidentally, quality has not diminished, contrary to some views: since 1941 the proportion of Mental Group IV's has dropped from 15% to 5%, after peaking at 25% in 1969, and the proportion of Mental Groups I and II has increased from 47% to 54%. The percentage of high school graduates has been remarkably stable, i.e., about 68% throughout DoD, and in some Services it has increased dramatically. It cannot be concluded from these figures that low quality underlies attrition; if necessary, standards can be adjusted downward without serious detriment. It is also possible to apply economic incentives, i.e., bonuses, and this has long been the policy for recruiting doctors, for example. Another policy option is to modify manpower requirements, e.g., shift some duties from uniformed personnel to civilians, either civil servants or contractors. Changing the labor force mix is a very complicated option, however, and it should be approached with caution.

The success of the volunteer force will require institutional change as well. The military tends to resist change; but when committed to change, the military is very effective at implementing the change. This is because the military has good managers and a great deal of control is possible.

Much more attention needs to be paid to the Reserves because they have become the most vulnerable aspect of the volunteer force. We need

to know how to influence the reserve system in a positive way. Attrition from active force ranks hurts the Reserves because with fewer veterans there are fewer people eligible for the Ready Reserve. Further, men who have attrited from the active force are ineligible for the Individual Ready Reserve.

In examining solutions to our attrition problem—and other personnel problems—it is necessary to evaluate the cost implications of each alternative. In developing cost estimates it is essential that we use standard, acceptable costing methods. In addition, care must be taken to avoid spurious data. In some studies the error rates in the cost estimates for a given course of action are greater than the differences in cost between alternatives. The research community should learn to use cost data in presenting alternatives to managers.

There are no easy solutions to attrition—or, for that matter, to any of the big problems facing DoD's manpower system. I am sure that this conference will help provide the manpower manager with ideas to solve the attrition problem.

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Washington, DC 20370

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USAF Recruiting Service
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Office of Naval Research (102)
Arlington, VA 22217

Dr. A. J. Martin
Office of the Assistant Secretary
of Defense (MRA&L)
Washington, DC 20301

Dr. Warren T. Matthews
Center for Naval Analyses
1401 Wilson Blvd.
Arlington, VA 22209

Mr. Jerry McConeghy
Booz, Allen & Hamilton, Inc.
400 Market Street
Philadelphia, PA 19106

Dr. Howard McFann
Human Resources Research Organization
27857 Berwick Drive
Carmel, CA 93921

COL Philip B. Merrick, USA
HQ, Training & Doctrine Command
Fort Monroe, VA 23651

Prof. William H. Mobley
College of Business Administration
University of South Carolina
Columbia, SC 29208

Prof. Charles E. Moskos
Sociology Department
Northwestern University
Evanston, IL 60201

CDR John F. Neese
Navy Recruiting Command
4015 Wilson Boulevard
Arlington, VA 22201

2LT Larry G. Nerge, USAF
AF Military Personnel Center (DPMDW)
Bolling AFB, Washington, DC 20332

LCDR A. W. Newlon, Jr., USN
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Operations (OP-96)
Washington, DC 20350

COL Tyree H. Newton, USAF
AF Human Resources Laboratory
Brooks AFB, TX 78235

MAJ James H. Noien, USAF
AF Military Personnel Center/DPMDA
Randolph AFB, TX 78148

Mrs. Pauline T. Olson
Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

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5001 Eisenhower Avenue
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HQ Training & Doctrine Command
Fort Monroe, VA 23651

BGEN R. C. Schulze, USMC
HQ, USMC (Code MP)
Washington, DC 20380

Prof. David R. Segal
Department of Sociology
The University of Maryland
College Park, MD 20742

MAJ Wayne S. Sellman, USAF
Military Personnel Center (DPMYP)
Randolph AFB, TX 78148

CAPT Walter Sevon, USMC
HQ, USMC (MPI)
Washington, DC 20380

MAJ Michael D. Shaler, USA
U.S. Military Academy
West Point, NY 10996

Dr. G. Thomas Sicilia
Office of the Assistant Secretary
of Defense (MRA&L)
Washington, DC 20301

Dr. H. Wallace Sinaiko
Smithsonian Institution
801 North Pitt Street
Alexandria, VA 22314

COL Albert W. Singletary, USA
Office, Deputy Chief of Staff
for Personnel, Dept. of the Army
Washington, DC 20310

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Washington, DC

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Graduate School of Management & Business
University of Oregon
Eugene, OR 97403

Dr. Robert W. Stephenson
AF Human Resources Laboratory/ORA
Lackland AFB, TX 78236

MAJ John J. Strano, USAF
AF Directorate of Personnel Plans DPXHM
Washington, DC 20330

COL Henry L. Taylor, USAF
Office of the Director of Defense
Research and Engineering
Washington, DC 20301

CAPT Fred W. Terrell, Jr., USN
Navy Recruiting Command
4015 Wilson Boulevard
Arlington, VA 22201

Dr. J. E. Uhlner
Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

Dr. Lonnie D. Valentine, Jr.
AF Human Resources Laboratory
Lackland AFB, TX 78236

LTCOL David E. Vowell, USMC
HQ, USMC (MPU), MCDEC
Quantico, VA 22134

Dr. Joe H. Ward, Jr.
AF Human Resources Laboratory (ORS)
Lackland AFB, TX 78236

Dr. John T. Warner
Center for Naval Analyses
1401 Wilson Blvd.
Arlington, VA 22209

Prof. Ron Weitzman
Naval Postgraduate School (54WZ)
Monterey, CA 93940

LCDR Richard W. Werner, USCG
HQ USCG, Enlisted Personnel Division
Washington, DC 20590

Mr. James M. Wilbourn
AF Human Resources Laboratory (PEM)
Lackland AFB, TX 78236

LTCOL R. E. Wilkinson
AF Directorate of Development and
Acquisition (RDPS)
Washington, DC 20330

MGEN Paul S. Williams, USA
Army Directorate of Manpower Management
Washington, DC 20310

Dr. Martin F. Wiskoff
Navy Personnel Research and
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San Diego, CA 92152

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Newark, DE 19711

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Lab. for Clinical Stress Research, Fack
S-104 01 Stockholm, Sweden

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2531 North Edgewood Street
Arlington, VA 22207

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