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AN ASSESSMENT OF NONRESPONSE BIAS IN MAIL SURVEYS OF NAVAL PERSONNEL
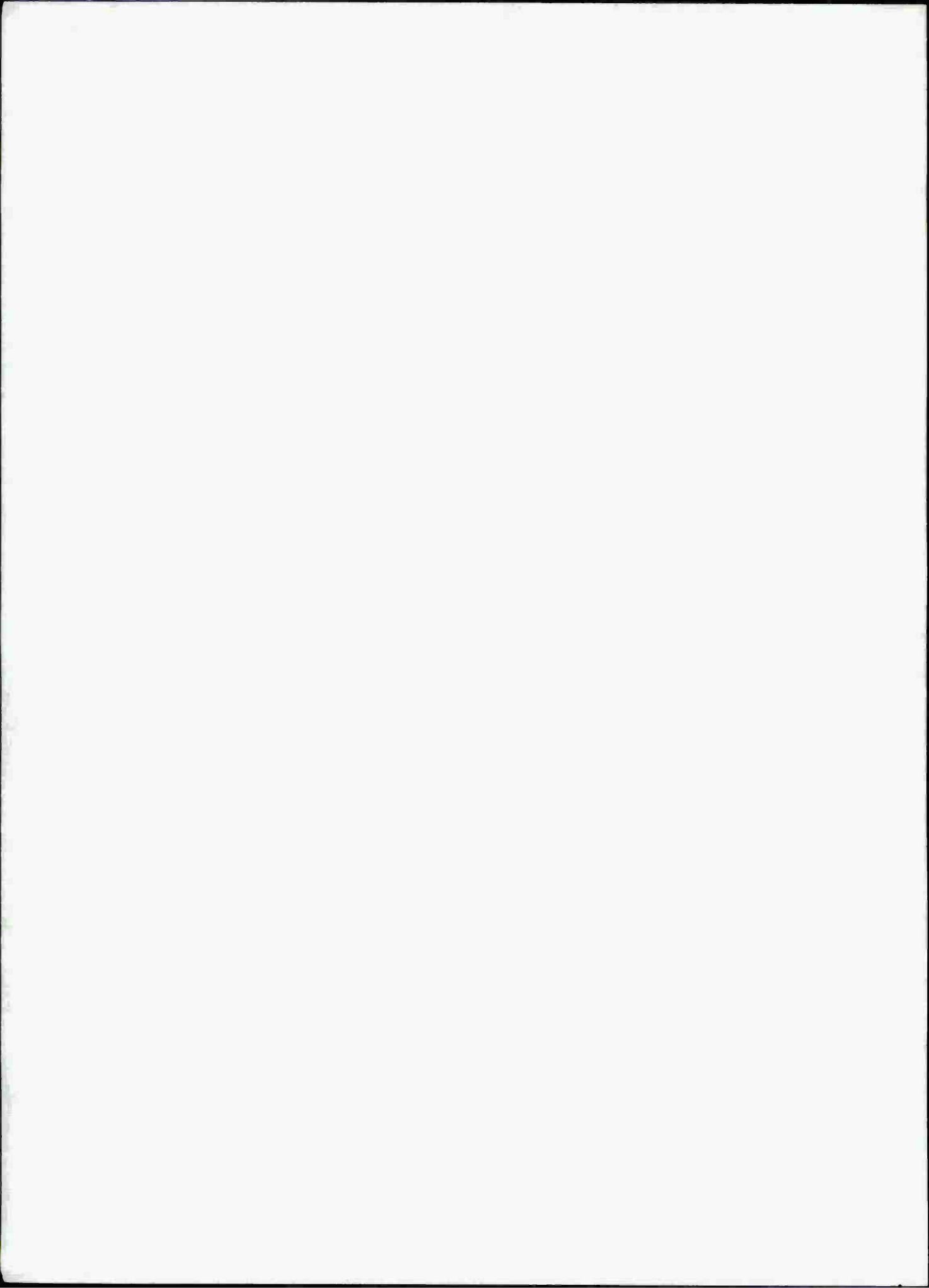
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AN ASSESSMENT OF NONRESPONSE BIAS IN
MAIL SURVEYS OF NAVAL PERSONNEL

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

This study was aimed at identifying the extent and nature of nonresponse bias in direct surveys of naval personnel. It was also aimed at the determination of whether format of the questionnaire affects response rate.

The target population was enlisted, male naval personnel, this being the population with the consistently lowest response rates in direct mail surveys. The approach entailed sending four different questionnaires to two experimental

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samples over a period of 14 months. The number of questionnaires out of four that each subject sent back was taken to be a measure of his tendency to respond to mail surveys. Each questionnaire used had a different format and/or content, and the differences in response rate in relation to questionnaire form were analyzed. For these purposes, three control groups were sent the second, third or fourth questionnaire only, in this way avoiding the contamination of the effects of repeated surveying on response rate.

The main analyses consisted of relating the response proportions of the experimental groups to their demographic and attitudinal characteristics. The results indicated that nonresponse bias does exist in direct mail naval personnel surveys and that the factors which relate to it are quite complex. Multivariate analyses of the attitudinal items in this study showed effects of nonresponse bias. A number of demographic characteristics were consistently related to response behavior, such as pay grade, number of enlistments, number of dependents, and age. Little or no relationship was found between intelligence test score or years of education and response behavior. Questionnaire form was found to have a noticeable effect on response rate. A very short, self-contained postcard format obtained the highest response. Relevance of questionnaire content also had an enhancing effect on response rate.

It was concluded that, because of the complexity of the factors involved in nonresponse bias, it is difficult to determine to what extent it will exist in a given naval personnel survey. It was therefore recommended that a follow-up procedure be used in conjunction with any direct mail, naval personnel survey. A controlled investigation of which types of follow-ups are most accurate and cost-effective in which situations is warranted.

FOREWORD

This research was performed under Exploratory Development Task Area
PF 55.521.032 (Development of Attitudinal Assessment Techniques) and under
Work Unit Number PF 55.521.032.02.01. The impetus for conducting this project
came from the ongoing need to study the processes by which the Navy collects
information on attitudes and opinions, and specifically from this Center's need
to understand the effects of the data collection methods used by its researchers.
The Attitudinal Assessment Techniques project area provides a vehicle for con-
trolled studies such as this one on the research methods used in the attitudinal
domain.

The most commonly used method for collecting information on the attitudes
of naval personnel has been the mail survey. Most often, mail surveys have been
administered by sending the questionnaires directly to the sample members and
having the questionnaries sent directly back. There are ample indications from
previous scientific research that, in general, nonresponse bias is a chronic
problem associated with the use of the mail survey. In other words, those who
answer the survey hold different opinions than those who do not answer the sur-
vey. This study was an assessment of whether nonresponse bias is introduced by
using the direct mail survey in the Navy. The results of this study indicated
that some bias is introduced, but that its magnitude varies from being negli-
gible in some instances to being sufficiently large in other instances that steps
must be taken to reduce it. The factors which produce nonresponse bias are so
complex that it is difficult to determine in advance of a specific survey how
much bias will be present. Consequently, it is recommended that, to be safe,
all naval personnel attitude surveys have some follow-up procedure introduced
which will reduce the likelihood of biased results due to nonresponse.

Appreciation is extended by the authors to all those individuals who gave
assistance in the preparation of the data for this study or in the preparation
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J. J. CLARKIN
Commanding Officer
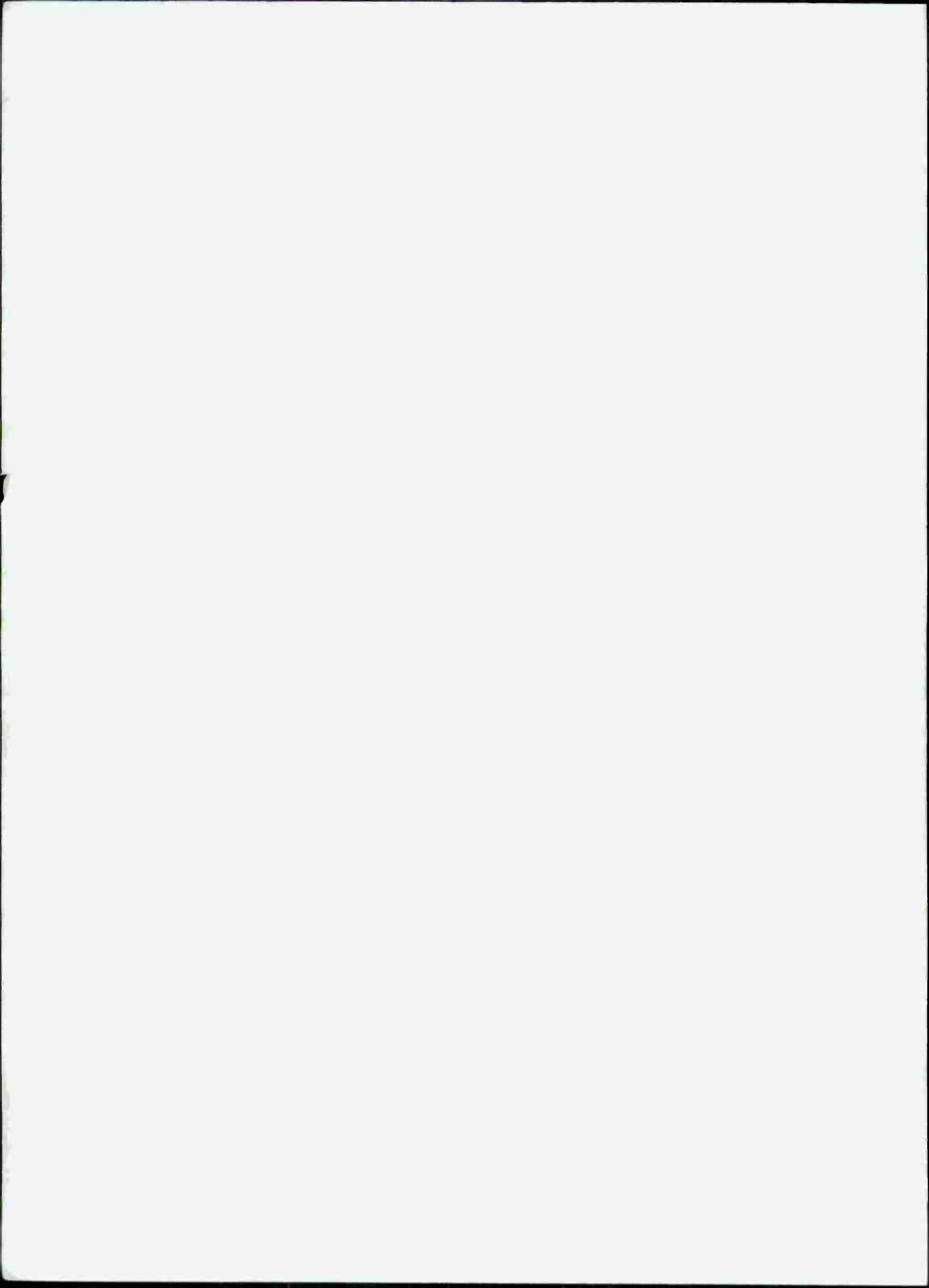
SUMMARY

Problem

Mail surveys have been regularly conducted to measure the attitudes and opinions of naval personnel. A certain proportion of the personnel who are mailed questionnaires in any given survey do not respond. If the nonrespondents systematically differ from the respondents in ways which are related to the content of the questionnaire, the survey results will be biased. The results can then be taken to be only representative of the naval personnel who responded rather than of the total target population.

Purpose

The main purpose of this study was to determine if nonresponse bias exists in mail surveys of naval personnel, and if so, the type and the magnitude of this bias. This study was directed at the male enlisted population since this group has the lowest response rates for naval personnel attitude surveys. Therefore, a primary objective of this study was to determine whether differences in the attitudinal and demographic characteristics of male enlisted personnel are related to their tendency to respond to Navy mail surveys. Previous research from the civilian domain indicates that response to mail surveys varies in relation to the personal and attitudinal characteristics of those surveyed.

There were two additional purposes to this study. One was to learn whether the form and content of the questionnaire affects response rate. The other purpose was to determine whether there were gains in accuracy as a result of the particular methodology employed in this investigation. This methodology consisted of surveying the same people four times and using the proportion of times they answered as an index of their tendency to respond to mail surveys. In most studies of nonresponse bias, only one survey is used, and the sample members are broken into two groups based on whether or not they returned the questionnaire. The four-survey method employed here allows for more accurate classification and more detailed analyses than the traditional one-survey method. On the other hand, it entails a much larger research effort.

Approach

It was postulated that each person has a relatively stable personal characteristic which was named "tendency to respond to mail surveys." In other words, for each individual there exists an average probability of answering any given questionnaire received in the mail.

To empirically estimate this tendency, four different questionnaires were sent to the same sets of enlisted men over a period of 14 months. Every individual in these experimental groups was mailed each questionnaire only

once, i.e., no follow-ups were sent. These questionnaires were fairly
typical of naval personnel surveys, containing questions on various Navy
programs and aspects of Navy life. They varied in terms of length, format,
and content. In the case of subjects who did not respond to any of the four
questionnaires, a special fifth questionnaire was designed to obtain infor-
mation on their attitudes. Due to their possible hostility toward surveys,
this fifth questionnaire was administered to their immediate supervisors,
in this case usually over the telephone.

Two groups of experimental subjects and three groups of control sub-
jects were selected. The two experimental groups differed in terms of their
sample characteristics, one having a substantial number of men in higher pay
grades and one having a substantial number of men from minority groups. All
men in both experimental groups were mailed all four questionnaires.

The control groups were employed to determine the effects of differing
questionnaire form and of repeated surveying on response rate. Each control
group was mailed only one questionnaire, either Questionnaire 2, 3, or 4.
(No control group was mailed Questionnaire 1 since the experimental groups
had not been mailed questionnaires previous to Questionnaire 1 and could
therefore function as their own controls at that point.)

Each experimental group subject was assigned a response proportion
based on how many questionnaires he returned out of four. Then analyses
were done to determine whether this response proportion was related to the
subjects' demographic and attitudinal characteristics. The information on
the subjects' attitudes came from their responses to the questionnaire items.
The information on the subjects' demographic characteristics came from the
automated enlisted master file.

Results

In each survey, a small portion of the samples could not be reached
because no address was available or the envelope was returned by the Postal
Service as being undeliverable. These questionnaires were subtracted from
all subsequent analyses. Only those experimental subjects who received
all four questionnaires were included in the analyses of the relationship
between response proportion and attitudinal and demographic characteristics.
About 10% of the subjects did not return any of the four questionnaires.
The remaining 90% were fairly evenly distributed among the other response
categories (.25, .50, .75, or 1.00).

The relationship between response behavior and attitudes was studied by
comparing the responses the experimental subjects gave to the questionnaires

according to their response proportion. The analysis of each individual item showed no statistically significant differences between the way the items were answered and the subjects' response proportions. However, interpretation of these results is difficult for two reasons. In some cases the sample sizes were quite small. Moreover, different subjects answered different numbers and sets of questionnaires, and a relationship was found to exist between response proportion and which particular questionnaires were answered. Multivariate analyses based on a Bayesian decision theory method were also done on the attitudinal data. These analyses, which used a combination of attitudinal item responses from all four questionnaires, resulted in a somewhat strong prediction of response behavior.

The relationship between response behavior and demographic items showed a number of characteristics to be individually related in a positive direction to response tendency. These included pay grade, number of enlistments, years in the Navy, date of birth, number of primary dependents, shore duty, and whether or not the subjects were still in the Navy six months after the last questionnaire. Characteristics with little or no relationship to response behavior included intelligence test scores, race, years of education, expiration of active obligated service date, and tour completion date. Multivariate analyses using demographic data to predict response behavior indicated that almost twenty percent of the variance in response proportions could be predicted by the best combinations of these characteristics (without cross-validation).

The findings regarding effects of form showed that the very short, self-contained postcard format secured the highest response, and relevance of the questionnaire content to the subjects had a positive effect on response rate. There were indications that repeated surveying may actually increase response rate.

A comparison of the more complicated four-survey method used here to a simpler single-survey approach indicated that the former method did not give enough additional information regarding nonresponse bias to justify the large increase in effort required.

Conclusions

A certain amount of nonresponse bias exists for direct mail surveys of naval personnel. This bias depends upon a complex set of factors and varies in magnitude.

As a result, it is difficult to determine for a given survey how much bias will be present. The form of the survey does have an effect on response rate. A very short, self-contained form secures high response. Relevance of the questionnaire items to the subjects also has an important effect on response rate.

Recommendations

1. If a direct mail method is to be used in conducting a naval personnel survey, it would be best to control for the possibility of non-response bias by employing a follow-up procedure. There are many ways in which a follow-up can be conducted. This study indicates that response behavior varies across different types of people. Therefore, varying types of follow-up procedures should be used in different types of survey situations (p. 51).

2. If this study is to have a sequel, it should be directed at an investigation of which follow-up procedures are most accurate and cost-effective in which situations (p. 51).

3. The findings on effects of form on response rate should be used in the design of future naval personnel surveys. To enhance response rates, questionnaires should be administered only to those individuals for whom the content is relevant, and the effect of format on response rate should be taken into consideration (p. 51).

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INTRODUCTION

Problem

Mail surveys have been regularly conducted to measure the attitudes and opinions of naval personnel. A certain proportion of the personnel who are mailed questionnaires in any given survey do not respond. If these non-respondents systematically differ from the respondents in ways which are related to the content of the questionnaire, the survey results will be biased. The results can then be taken to be only representative of the naval personnel who responded rather than of the total target population.

To use the mail survey technique effectively, it is necessary to identify the characteristics of naval personnel who are likely to respond to any par-ticular mail survey and the characteristics of those who are not likely to respond. These differences in their characteristics can then be related to differences in their attitudes. With this information, it then becomes pos-sible to assess nonresponse bias. Another item of information needed is whether the form and content of a questionnaire differentially affects the tendency to respond to it.

Purpose

The main purpose of this study was to determine if nonresponse bias exists in mail surveys of naval personnel, and if so, the type and the magnitude of this bias. This study was directed at the male enlisted popu-lation since this group has the lowest response rates for naval personnel attitude surveys.

A second purpose was to determine whether tendency to respond to mail questionnaires is related to demographic characteristics. With this infor-mation it would then be possible to decide which types of naval personnel it is effective to survey by mail and which types require some other method. Since attitudes are related to demographic characteristics, this information would also allow corrections for nonresponse bias to be made in future sur-veys of naval personnel.

A third purpose was to learn whether the form and content of the ques-tionnaire affects the response rate.

A fourth purpose was to study whether there were gains in precision as a result of the particular methodology employed in this investigation. This methodology consisted of surveying the same people four times and using the proportion of times they answered as an index of their tendency to re-spond to mail surveys. In most studies of nonrespondent bias, only one sur-vey is used, and the sample members are broken into two groups based on whether or not they returned the questionnaire. The four-survey method employed here allows for more accurate classification and more detailed analyses than the traditional one-survey method. On the other hand, it

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entails a much larger research effort. A secondary purpose of the study was to investigate whether there was sufficient increase in accuracy and depth of information with the four-survey method to justify its use over the simpler one-survey method.

Background

The Navy conducts attitude and opinion surveys to obtain feedback from its personnel to better shape policy and make decisions. Most of these surveys have been administered by mail, and the questionnaires consist primarily of structured, multiple-choice items.

Two mailing methods are most frequently employed to administer these surveys. One is a direct mailing to each person in the sample at his duty station address. A stamped, preaddressed envelope is included for the individual to return his answer sheet. An information copy is ordinarily sent to each commanding officer who has one or more personnel in the survey sample under his command. The other is a batch mailing via each command. In this method, the questionnaire packets addressed to the individual sample members are grouped by activity name into one larger package. This package is sent to the commanding officer of each activity. The commanding officer is instructed in a cover letter to distribute the packets, to collect the completed questionnaires, (the answer sheets are in sealed envelopes to insure confidentiality), to mark the reason for each nonresponse on a coded roster, and mail back the package. The batch mailing method has a certain advantage over the direct mailing method in that it makes available knowledge regarding the reasons for nonresponse. On the other hand, it is more of an effort to administer because the batching requires time for collating the questionnaires into groups and time must be expended at the activity command level to distribute and collect the questionnaires. Also, a different type of nonresponse is introduced by the batch mailing method, namely entire command nonresponse, about which the effects are little known. Because of the perceived increase in the burden of personnel surveys and research studies on the operational forces, it is desirable to employ whenever possible the method that results in the least disruption, this ordinarily being the direct mailing method. Since individual nonresponse bias is the single biggest potential disadvantage to the direct mailing method, ways are needed to reduce or control it.

In analyses of response rates in naval personnel surveys, it has been found that officers are more likely to return their questionnaires than enlisted men. Moreover, officers and enlisted men in higher paygrades have responded more frequently than officers and enlisted men in lower paygrades. Gale (1971) analyzed the relationship between several demographic variables and the response rates of enlisted men to the Naval Personnel Survey 69-1. He found that age, GCT scores, number of enlistments, number of dependents and success (pay grade relative to age) were positively related to response rate. In addition, enlisted men who were on shore duty, preferred sea duty,

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preferred overseas shore duty, or overseas shore duty, were more likely to respond than enlisted men who were on arduous sea duty or toured arduous sea duty. Caucasians, American Indians, Malayans, and Orientals were more likely to respond than were Blacks.

Reports of previous research from the civilian domain indicate that nonrespondents tend to differ from respondents. The demographic variables for which differences have been demonstrated include education, income, sex, marital status, age, race, occupation, socioeconomic status and general intelligence (Kirk & Sereda, 1969; Mayer & Pratt, 1966; Rosnow, Rosenthal, McConochie & Arms, 1969; Ognibene, 1971; Bell, 1961; Donald, 1960; Ellis, Endo & Armer, 1970; Gannon, Nothern & Carroll, 1971; Hochstim & Athanasopoulos, 1970; Hood & Back, 1971).

The fact that respondents tend to have a greater interest in the topic and/or the organization conducting the survey has been demonstrated by Bell (1961), Donald (1960), Larson and Catton (1959), Lundberg (1942), and Scheverian and Blaine (1966). Kish found that the source (government vs. private organization) of the survey affected response rates of a mail survey (1972). Research on volunteering for psychological experiments has revealed that the type of experiment (Martin & Marcuse, 1958), the alternatives to participating (Blake, Berkowitz, Bellamy, & Mouton, 1956), and the reaction of others to the request (Blake & Rosenbaum, 1955) are all important situational factors related to volunteering.

There have been several methods proposed to correct for the nonrespondent problem. Hansen and Hurwitz (1946) developed a method in which a random sample of nonrespondents is selected and interviewed. From these results, a correction factor is computed and applied to the results. El-Badry (1956) developed a variation of Hansen and Hurwitz' method in which several waves of follow-up questionnaires are sent to the nonrespondents, the last wave consisting of interviews of the most hard-core nonrespondents. Both these methods depend on the fact that, of the nonrespondents selected for interview, 100% of them must be interviewed. Since it is difficult to complete a 100% sample, these methods have a disadvantage. Another approach entails assuming a linear continuum of resistance to mail questionnaires (Pace, 1939; Ferber, 1948). Using this assumption, it is possible to extrapolate from the responses of the very uncooperative respondents to determine the responses of the nonrespondents. However, research has shown the accuracy of this assumption to be tenuous at best (Pace, 1939; Kivlin, 1965; Mayer & Pratt, 1966). Ellis, Endo and Armer (1970) did a more detailed study of this assumption in which they investigated the differences between early respondents, late respondents (slow to cooperate but respond to normal follow-up procedures), potential nonrespondents (resist normal follow-up and respond only to a special effort) and nonrespondents. Their findings indicated no justification in extrapolating from the potential nonrespondents to the nonrespondents.

Almost all empirical studies on the differences between respondents and nonrespondents have used a single questionnaire, sometimes accompanied by follow-ups with the same questionnaire. Therefore, each individual's

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response category is determined by his behavior in relation to a single questionnaire. What has not been done is to use several samples of response/nonresponse behavior to more accurately determine a person's overall tendency to respond to mail surveys. An exception is Wallace (1954) who mailed four questionnaires to one sample. The author found that 50% of the subjects answered most or all of the questionnaires they received. In addition, Tsai (1973) developed a theoretical method for assessing nonrespondent bias in which a final interviewing stage is not necessary but which is dependent upon knowing the likelihood of each sample member's response to the survey. This probability is determined empirically, by mailing out two different questionnaires.

APPROACH

Theoretical Rationale

In previous research individuals generally have been classified as
nonrespondents if they fail to respond to one survey. This approach results
in a dichotomy of persons: respondents and nonrespondents. It appeared to
be more meaningful to consider response behavior in terms of an underlying
dimension called "tendency to respond to mail surveys" which can be estima-
ted by how many questionnaires out of a series that a person returns. This
tendency is assumed to be a relatively stable predisposition. Persons
extreme on this dimension would be those who respond to every survey they
receive or those who respond to none. Between these extremes are the indi-
viduals who respond to some surveys but not to others. For these latter
individuals, whether they respond to any one particular survey is assumed
to be a function of three classes of variables: (1) The individual's tend-
ency to respond to mail surveys; (2) the form and content of the question-
naire; and (3) environmental/situational factors existing for the individual
at the time of the survey. Of these three classes, the survey administrator
has the greatest degree of control over the second. Certain factors in-
cluded in the third class can be controlled; for example, persons known to
be in transit at the time of the survey normally are excluded in attitude
surveys of naval personnel. The survey administrator has little or no control
over the first factor. However, by measuring this factor and determining its
relationship to demographic and attitudinal characteristics, it is possible
to determine whether nonresponse bias exists, and if so, to mathematically
correct for it.

Hypotheses

Since this study was the first one to directly measure the existence
and amount of nonresponse bias in mail surveys of enlisted naval personnel,
it was considered to be exploratory in nature. Therefore, specific direc-
tional hypotheses were not generated at the outset of the study. Instead,
general hypotheses were produced which were based on the findings from the
civilian research community about nonresponse bias cited in the Introduction.
The hypotheses are as follows, and they all pertain to male enlisted naval
personnel:

1. The theoretical construct of "tendency to respond to mail surveys,"
as estimated by the number of questionnaires returned out of a series, is
related to demographic characteristics, such as pay grade, intelligence test
scores, or type of duty assignment.

2. The tendency to respond to mail surveys is related to attitudes
and opinions held about the Navy and related matters; i.e., there is non-
response bias.

3. The response rate to any given survey will be affected by the form of the questionnaire.

4. The response rate to any given survey will be affected by repeated surveying of the same individuals.

Survey Administration

To empirically estimate the tendency to respond to mail surveys, four different questionnaires were sent to the same sets of enlisted men over a period of 14 months. Questionnaire 1 was sent in October 1972, Questionnaire 2 in March 1973, Questionnaire 3 in September 1973 and Questionnaire 4 in December 1973. Every individual in the experimental groups was mailed each questionnaire only once, i.e., no follow-ups were mailed.

With one exception, the surveys were mailed directly to each subject at his duty station address. The exception was that one set of subjects received the first questionnaire via the batch mailing method, which was described in the Introduction, rather than by the direct mailing method. No mention was made in any of the questionnaires that these surveys represented a series or that they represented a methodological study. The questionnaires were simply sent out as standard naval personnel surveys. The questionnaire responses were designed to be returned by the individual directly via the mail, and the postage and the pre-printed return address were supplied.

In the case of those individuals in the experimental groups for whom no questionnaires were returned by the Post Office and yet who did not respond to any of the four questionnaires (i.e., the nonrespondents), a special fifth questionnaire was designed. On the basis of the fact that these individuals did not return even a single questionnaire out of four, it was surmised that some of them might be negative toward being surveyed. However, since some information on their attitudes was needed to compare with the attitudes of the respondents, it was decided to measure their attitudes by surveying their immediate supervisors. This fifth questionnaire then was administered only to supervisors of the nonrespondents in the experimental groups. It was administered over the telephone except when the individuals in question were at sea, in which case it was mailed.

Population and Samples

The target population investigated in this study was male, enlisted, naval personnel excluding E-1s, officer candidates, those on temporary duty of any kind, and those in nuclear power training. All members of the samples selected were required to have tour completion dates and expiration of active obligated service (EAOS) dates beyond 31 December 1973. In other words, their record had to show they were not due to change duty stations or to get out of the Navy until after 31 December 1973. This insured that they would be available throughout the course of the data collection, which terminated in December 1973.

Two samples of enlisted men were selected to be sent the entire series of questionnaires. These samples which represented the two experimental groups of subjects, are described as follows:

Group A -- A stratified random sample of 460 enlisted men, stratified by enlistment status; 120 were in their first enlistment, and 340 were in their second or later enlistment.

Group B -- A stratified random sample of 200 enlisted men, stratified by race; 100 were Caucasian and 100 were minority.

Group B was selected from the original sample used in a standard naval personnel attitude survey called the Navy Sample Survey (NSS) 72-2. NSS 72-2 was administered via the batch mailing method. Questionnaire 1 in the series of four surveys used in this study also consisted of NSS 72-2. Thus, Group B was the set of subjects who received Questionnaire 1 via batch mailing. The remaining three questionnaires were sent directly to Group B, and all four questionnaires were sent directly to Group A. It should also be noted that since Group B was selected from the NSS 72-2 sample, and since the NSS 72-2 sample was stratified on enlistment, Group B contains a higher proportion of people second enlistment or above than is found in the Navy population.

Although each individual selected for the study was not supposed to change duty stations until sometime after 31 December 1973, on the chance that some would nevertheless be transferred, each time a survey was sent out, the most up-to-date mailing addresses were procured.

To study the effects of questionnaire form on response rate, three control groups were employed. One control sample each was selected at the time of administration of Questionnaires 2, 3, and 4 and mailed that questionnaire. Thus it was possible to measure the base rate of total response to each of the questionnaire forms. The experimental groups could not be used for these purposes since their rates of response might be affected by the fact that they had been surveyed previously. However, no control was required for Questionnaire 1 since it was the first questionnaire the experimental groups were sent, and therefore, there were no effects of repeated surveying to control for at that point. The three control groups consisted of stratified random samples of enlisted men. Each of these groups consisted of 100 people in their first enlistment, equally divided between Caucasians and non-Caucasians, and 100 people in their second or later enlistment, equally divided between Caucasians and non-Caucasians. The control groups were labeled as follows:

    Group C -- Mailed Questionnaire 2 only
    Group D -- Mailed Questionnaire 3 only
    Group E -- Mailed Questionnaire 4 only

Although the five samples are not representative of the Navy population because of the disproportionately high number of high enlistment and non-Caucasian subjects, these groups are representative of the samples selected for most Navy attitude surveys. Therefore they are appropriate for a methodological study of response rate in Navy attitude surveys. In analyzing survey responses, the data are ordinarily weighted back to the correct proportions before any Navy-wide generalizations are made.

Questionnaire Description

Questionnaires 1-4 consisted of structured, multiple-choice questions on matters relating to conditions of Navy life and Navy policy. All questionnaires contained an introductory statement, followed by a set of instructions. In Questionnaires 1, 3 and 4 the responses and Social Security Number (SSN) were to be recorded by the respondent on a separate optical scan answer sheet. A franked, preaddressed envelope was supplied for mailing back the answer sheet. Questionnaire 2 was a postcard. On the back were the questionnaire items plus a place to mark in SSN. On the front was the franking and return address. In addition, for Questionnaires 1 and 2 there was a precoded number on the answer sheet making it possible to double check the SSN's. The Supervisor's Questionnaire, that is, the one which was administered to the supervisors of the nonrespondents in Groups A and B, were usually completed over the telephone. A description of the contents of each questionnaire follows:

Questionnaire 1 - Navy Sample Survey (NSS) 72-2. An 80-item questionnaire covering a wide variety of topics including opinions about the advancement multiple and other issues associated with advancement, opinions and knowledge of certain communication vehicles in the Navy, attitudes toward recreation and special services, reasons for joining the Navy and intent to stay in, experience with the Sea Cadets, and attitude toward establishing smoking areas aboard ship. In addition, 20 of the items pertained to the individual's demographic and naval characteristics.

Questionnaire 2 - Sea Pay Survey. A 5-item questionnaire in attitudes toward a proposed increase in sea pay.

Questionnaire 3 - CHAMPUS/Recruiter Survey. A 25-item questionnaire on knowledge about CHAMPUS and opinions about certain experiences while being recruited.

Questionnaire 4 - Human Goals/Women in the Navy/Role Perceptions Survey. A 22-item questionnaire covering attitude toward becoming a Human Goals specialist, attitudes relating to sex discrimination in the Navy, and scales to measure work role conflict and role ambiguity. The role scales were developed by Rizzo, House, and Lirtzman (1970).

Supervisor's Questionnaire. A 10-item questionnaire. The supervisor was asked to answer two sets of items, one set regarding the supervisor's opinion of the individual in terms of work attitude, disciplinary problems, etc., and one set in which the supervisor was asked to respond to attitude

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items (selected from Questionnaires 1-4) in the way he felt the individual in question would respond to them.

Data Analysis

The overall data analysis strategy consisted of first looking at the relationship between each subject's response category (how many questionnaires out of four that he returned) and each attitudinal and demographic variable individually. After these bivariate analyses were done, a multivariate approach was employed to ascertain what combinations of variables were related to response category.

In deciding which particular methods of analysis to apply to calculate the relationship between the personal characteristics of the subjects and their response behavior, the question arose of how the criterion, response behavior, should be treated. That is to say, the question was whether response behavior should be treated as discrete or continuous. While the response categories are clearly discrete (a person could only have one of five response proportions, .00, .25, .50, .75, or 1.00), these categories were taken to be empirical representations of an underlying continuous distribution, the distribution of tendency to respond to mail surveys. Rather than make an arbitrary decision to treat the criterion one way or the other, it was treated in both ways. It was presumed that gross differences would not result by treating the criterion in these two ways, and that if such differences did appear, it would be indicative that something was wrong with the assumption that the discrete distribution is representative of an underlying continuous distribution.

For the multivariate analyses, treatment of the criterion as continuous and use of continuous demographic predictor variables called for multiple regression analysis. Treatment of the criterion as discrete and use of these same predictor variables called for discriminant function analysis. Treatment of the criterion as discrete and use of attitudinal predictor variables, which were also discrete, called for use of a prediction technique based on decision theory called ABCD analysis. The selection technique program which accomplishes this analysis is called CHAROSEL (Moonan, 1973).

In instances where the criterion to be predicted was not overall response category (.00, .25, .50, .75, or 1.00), but rather response or nonresponse to a single questionnaire (.00 or 1.00), the appropriate technique to employ is discriminant function since the criterion is discrete. However, the multiple regression computer program was used because, when a criterion consists only of two categories, discriminant function analysis and multiple regression analysis produce the same solution.

In the analysis of the relationship between response proportion and demographic characteristics, fairly complete demographic data were available on each subject because the data elements were obtained from the enlisted master file. In the analysis of the relationship between response proportion and attitudinal characteristics, only partial data were available. This was the case because the attitudinal data came from the responses to the questionnaire items, and the subjects answered different numbers and sets of questionnaires.

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Therefore, the frequency distributions of questionnaire responses by response proportion contain partially overlapping sets of respondents across the different questionnaires.

In each survey administration, a small number of questionnaires were returned in which the questions had been answered but the SSN had not been filled in. These questionnaires were excluded from the analysis.

It should be noted that there may be some slippage present in some of the analyses. It is impossible to know how many of those people who were counted as nonrespondents for each questionnaire really should have been counted as undeliverables. It is conceivable that some questionnaires did not get to the intended individuals and yet were not returned to the researchers as undeliverable. Any such occurrences would have resulted in people who would have responded to the questionnaire if they had received it being misclassified as nonrespondents. The slippage due to this factor does not constitute cause for concern, however, since it would only reduce the possibility of Type 1 error, that is, any statistically significant differences found would only have been more likely to be significant if this slippage was not present.

The results were treated in three parts. The first part included all analyses of the relationship of the subjects' demographic and attitudinal characteristics to the proportion of questionnaires they returned, that is, to their response tendency. The second part included all analyses of the relationship between response rate and form of the questionnaire. The third part included analyses of whether gains were made by employing this complicated method over the simpler method of classifying people into responders and nonresponders on the basis of a single survey administration. The first section of this chapter contains a description of the overall return and undeliverable rates by group for the four questionnaires. The remaining three sections of the chapter correspond to the three categories of analyses described above.

Description of Overall Questionnaire Administration and Return Rates

Table 1 summarizes the numbers of subjects involved in the administration and return of each questionnaire for each group. The first row in the table indicates the total sample size for each group. In each questionnaire administration there were usually a small number of people for whom no valid address could be found in the Navy's activity code listing; therefore, they were not sent a questionnaire. In addition, in each questionnaire administration there were usually a number of questionnaire packets which were undeliverable, that is to say, the Postal Service sent them back to the return address unopened because the addressee could not be located or was unavailable for other reasons. The total number of subjects in each group which were known not to receive a questionnaire for either of these reasons is displayed in the second row of the table. The third row contains the numbers of subjects who returned the questionnaire. It should be noted that a few questionnaires were returned with answers to the questions but without a Social Security Number. Because lack of a Social Security Number made it impossible to utilize these questionnaires in this study, they were treated as nonresponses. The last row in the table displays the numbers of subjects who did not respond -- those who had a valid address, for whom there was no undeliverable packet, and who did not respond to the questionnaire.

It is likely that there are some inaccuracies in classification of subjects between the second and fourth rows. The second row contains only those subjects who were definitely known not to have received a questionnaire. It is a distinct possibility that there were other subjects who did not receive their questionnaires but whose packets were not returned as undeliverable, or subjects who received their questionnaires but misplaced them, etc. Such subjects were erroneously classified as nonresponders when they in fact should have been classified as undeliverable. While it is impossible to determine the extent to which this misclassification occurred, it is safe to assume it represents only a small percentage of the total cases. Moreover, it represents an error on the conservative side. In other words,

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TABLE 1

NUMBERS OF SUBJECTS INVOLVED IN ADMINISTATION
OF EACH QUESTIONNAIRE

Administration Category	Questionnaire 1		Questionnaire 2			Questionnaire 3			Questionnaire 4		
	Group A	Group B	Group A	Group B	Group C	Group A	Group B	Group D	Group A	Group B	Group E
Original sample	460	200	460	200	216	460	200	200	460	200	200
No address available or undeliverable	38	0	35	16	12	50	36	13	43	37	13
Responded	305	102	297	121	128	219	84	74	214	78	95
Did not respond	117	98	128	63	76	191	80	113	203	85	92
Rate of response	72%	51%	70%	66%	63%	53%	51%	40%	51%	48%	51%

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any differences found between nonresponders and responders in the data analysis would only have been more pronounced if all misclassified cases could have been accurately classified.

The fifth row in Table 1 shows the overall rate of response for each group to each questionnaire, this rate being the ratio of the subjects who responded to the number of subjects reached (the original sample minus those with no address or undeliverable).

Relationship of Response Behavior to Attitudinal and Demographic Characteristics

An important aspect in determining whether returning a questionnaire was related to the content of the responses was an analysis of the relationship between the subject's answers to the questionnaire items and his overall proportion of response to the four questionnaires.

Since Groups A and B were the two groups which were sent all four questionnaires, they were the main focus in this phase of the analysis. At the outset of this analysis, two basic operations were performed. One was that a response proportion was assigned to each subject based on the ratio of the number of questionnaires he returned to the number he received. The other was that the numbers of subjects who were reached by various numbers of questionnaires were computed. This distribution is shown in Table 2. This table shows that most of the subjects in Groups A and B received all four questionnaires (78.7% and 76.5% respectively). Because the group sizes of those receiving

TABLE 2

DISTRIBUTION OF NUMBERS OF SUBJECTS
REACHED IN GROUPS A AND B

Number of	Group A		Group B	
times reached	n	%	n	%
None	5	1.1	0	0.0
Once	7	1.5	6	3.0
Twice	38	8.3	31	15.5
Three times	48	10.4	10	5.0
Four times	362	78.7	153	76.5
Totals	460	100%	200	100%

four questionnaires were substantial enough to allow application of most of the commonly used data analytic techniques, it was decided to restrict this phase of the analysis to only those who had received all four questionnaires. To include those reached less than four times would have been undesirable for two reasons. First, it would have created two additional response proportions with very small sample sizes, that is, a .33 and a .67 category for those who received three questionnaires. Second, it would have created ambiguity in interpreting the other response categories. For instance, it would have meant that the .50 response category contained both those subjects who received two questionnaires and returned one, and those who received four and returned two. These two sets of subjects are not equivalent; some of them in the former category, had they received four questionnaires, might have returned three or four and been in the .75 or 1.00 category instead of the .50 category. To avoid such possible misclassifications, then, the analyses described here were done only on those subjects who received four questionnaires. Appendix A contains the distributions of all of Groups A and B by how many times they responded in relation to how many questionnaires they received.

The number of subjects in Groups A and B who were reached four times are displayed in Table 3 according to their response proportions. These results

TABLE 3

DISTRIBUTION OF NUMBERS OF SUBJECTS
IN GROUPS A AND B WHO WERE REACHED FOUR TIMES
ACCORDING TO THE PROPORTION OF TIMES THEY RESPONDED

| Proportion of | Group A | | Group B | |
Times Responded	n	%	n	%
.00	35	9.7	14	9.2
.25	60	16.6	38	24.8
.50	81	22.4	31	20.3
.75	73	20.2	39	25.5
1.00	113	31.2	31	20.3
Total	362	100.0	153	100.0

show that only about 10% of Group A did not return any questionnaires, while over 30% returned all four. About 20% returned either one, two, or three questionnaires. For Group B, about 10% did not return any questionnaires, about 20% returned either two or four, and about 25% returned either one or three.

Relationship to Attitudes

To study whether the attitudes of the subjects were related to their likelihood of responding, a subset of representative attitudinal items was selected for analysis from the four questionnaires. These items are displayed

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in Table 4. The first digit in the question number designates the question-
naire from which the item was taken; the second digit designates the question
number within that questionnaire. Wherever possible, the item alternatives
were grouped into larger categories to facilitate analysis. The far right
column of Table 4 indicates whether the item alternatives were grouped, and
how the alternatives or groups of alternatives were labeled throughout the
rest of the report. Question numbers 4-9 through 4-22 contain the items which
comprise the role conflict and role ambiguity scales, and each item is labeled
according to the scale to which it belongs. Because of their Likert scale
properties, the scores of the eight role conflict and six role ambiguity items
were summed, and a mean and standard deviation score was computed for each sub-
ject on each scale. The majority of analyses on the role items were done using
these scores rather than treating the item responses separately. It should be
noted that the items in the two scales are worded in opposite directions. Posi-
tive responses ("true of my job") to the conflict items designate presence of
role conflict, while positive response to the ambiguity items designate absence
of role ambiguity.

Next, a frequency and percentage distribution was computed for each item.
In each distribution, the number of people who responded to the questionnaire
in which that item was contained were partitioned by their response and by
their response category -- either .25, .50, .75, or 1.00. (No one with a .00
response category can appear in these distributions since these individuals
did not return any questionnaire.) These frequency distributions are in
Appendix B. The responses of Group A to Questionnaire 1 were lost during a
move, and therefore only Group B's data were analyzed in relation to Question-
naire 1 attitudinal items. (However, the data on whether or not each subject
in Group A returned Questionnaire 1 were available, making it possible to in-
clude Group A in all analyses but this one.) The role conflict and ambiguity
means were divided for this frequency analysis as follows: -3.00 to -1.01 --
Very untrue; -1.00 to -.01 -- Somewhat untrue; .00 to +1.00 -- Somewhat true;
+1.01 to +3.00 -- Very true. A chi square test was done on each of these
frequency distributions, none proving to be statistically significant at
p < .05 or less. In addition, the mean response rate was calculated for those
who answered each alternative of each question. The significance of the dif-
ference between each of these means and every other mean within each item was
tested. The statistical tests showed none of these response means to be sig-
nificantly different from one another at p < .05 with only one exception.
For Group B on the item pertaining to interest in Human Goals work, those who
answered "No" had a significantly higher mean response rate than those who
answered "Don't know" (p < .001).

Although no information on the attitudes of the .00 category subjects was
available in this study, indirect information was available from the telephone
interviews of their immediate supervisors. A total of 21 and 13 supervisors
in Groups A and B were attempted to be contacted, and out of these a total of
15 and 11 interviews were successfully completed. The results of these inter-
views are shown in Table 5. These results must be interpreted with caution due
to the very small sample sizes and due to the fact that the supervisor may not
accurately reflect the subject's true opinions. With these cautionary notes
in mind, a comparison of the questionnaire responses to the responses of those
who answered at least one questionnaire shows that slightly more of the non-
respondents than respondents would have entered the Navy even if there had
been no draft, plan to get out of the Navy as soon as possible, (comparative

TABLE 4

DESCRIPTION OF THE ATTITUDINAL ITEMS INCLUDED IN THE ANALYSES

Question Number	Question Name	Item and Response Alternatives	Response Alternative Group Labels
1-8	Advancement multiple	What is your opinion of the weights used in computing the advancement multiple? A. Fair B. Unfair C. No opinion	Fair Unfair No opinion
1-10	Advancement-in-rate exams	In your opinion, are the advancement-in-rate examinations written fairly? A. I have never taken an advancement-in-rate exam B. Yes C. No, because the material covered may be different from what a person in a given rate actually does D. No, because the wording of the questions may be too complex E. No, for some other reason	Not applicable Yes No
1-12	Field advancement program	Do you think that the field advancement program is administered fairly (only people who really deserve to be advanced are advanced)? A. Yes B. No	Yes No
1-15	Rewards of rate	Do you feel that the rewards of the rate above your current one are worth the effort that has to be taken to reach it? YES, primarily because I will achieve: A. A meaningful increase in authority B. A meaningful increase in pay C. A meaningful increase in responsibility D. A higher level of rights and privileges E. Two or more of the above (A-D) F. Something else NO, primarily because: G. The added responsibility is not worth the increase in authority H. The added responsibility is not worth the increase in pay I. The added responsibility is not worth the increase in rights and privileges J. Two or more of the above (G-I) K. Some other reason	Yes No
1-24	Information on rate	Do you get the word about NEW information concerning your rate, rating, or designator within a reasonable amount of time after it is put out by BuPers? A. Almost always B. Some of the time C. Almost never	Almost always Occasionally Almost never
1-30	Captain's call	Does your commanding officer hold a "Captain's Call" during which he talks with his men, hears gripes and answers questions? A. Yes B. No	Yes No
1-31	Commanding Officer's interest	If you have attended a Captain's Call, did your skipper show a genuine interest in your concerns? A. My skipper does not hold a Captain's Call B. My skipper holds a "Captain's Call," but I never attend C. Yes D. No	Not applicable Never attend Yes No

TABLE 4 (Continued)

Question Number	Question Name	Item and Response Alternatives	Response Alternative Group Labels
1-33	Effects of recreation	To what extent do you think your recreation influences your performance of duties? A. Very favorably B. Somewhat favorably C. No influence D. Somewhat unfavorably E. Very unfavorably	Favorably No influence Unfavorably
1-55	Reason for enlisting	What was the <u>Single Most Important</u> reason why you initially joined the Navy? A. Job opportunities looked better than in civilian life B. For travel, adventure, new experience C. To learn or develop leadership skills D. Opportunity for advanced education or technical training E. Wanted to fulfill my military obligation at the time and/or in the service of my choice rather than be drafted F. Wanted to serve my country G. To continue a family tradition of military service H. Interest in the sea and/or shipboard life I. Interest in flying or astronautics J. For a secure job with promotions and favorable retirement benefits K. Other reason	Job opportunities Travel Learn leadership Education Fulfill military obligation Serve country Family tradition Interest in sea Interests in flying Security Other reason
1-56	Effect of draft	What influence did the draft have on your decision to enter active military service? A. Was not subject to the draft B. Definitely would <u>not</u> have entered if no draft C. Probably would <u>not</u> have entered if no draft D. Do not know what I would have done if no draft E. Probably would have entered even if no draft F. Definitely would have entered even if no draft	Would have entered Would not have entered Don't know
1-57	Service Plans	What are your current service plans? A. Plan to remain on active duty until I retire B. I am undecided about my service plans C. Plan to get out as soon as possible	Remain until retirement Undecided Get out
2-2	Request sea duty	How probable is it that <u>you</u> would request extended sea duty for one year (or more) at the end of a normal sea tour--if this increase in sea pay were authorized? A. Highly probable B. Probable C. Improbable D. Not at all likely	Highly probable Probable Improbable Not at all likely
3-20	Race of recruiter	If you were going to join the Navy today, what race would you prefer your recruiter to be? A. Black B. White C. Chicano (Mexican-American) D. Oriental E. Other F. No preference	Black White Chicano Oriental Other No preference
3-21	On-the-job training	When you first entered the Navy, did you want on-the-job training (learning by doing) as your main way of learning a skill or trade? A. Yes, I wanted on-the-job training B. No, I wanted to go to a Navy A-school C. No, it didn't matter if I got on-the-job training or went to school	Yes No, A-School Didn't matter

TABLE 4   (Continued)

Question Number	Question Name	Item and Response Alternatives	Response Alternative Group Labels
3-25	Promises of recruiter	Now that you've been in the Navy, do you feel that your recruiter was on the level about your opportunities for school and on-the-job training? A. Yes B. Yes, but only on some opportunities C. No	 Yes Yes on some No
4-1	Human Goals work	If you met the requirements to be one of these human goals specialists, would you like to be a worker in one of these programs? A. Yes B. Possibly, I'd like to know more about them C. Probably not D. Definitely not E. Don't know one way or the other	 Yes No Don't know
4-2	Women on ship	How would you feel if quite a few enlisted women were assigned to your division aboard a ship? A. I would hate it and would probably try to get transferred B. I wouldn't like it but would try to get along C. I wouldn't mind working with women D. I probably would like working with women E. Great! I like the idea	 Dislike Neutral Like
4-4	Women in combat	How do you feel about the possibility of using women in combat? A. Women are best suited for clerical and other support jobs B. Women could perform some combat duties, but they are too emotional to stand up under the pressure and would probably just get in the way C. Well-trained women could perform many combat duties as well as men, and should be allowed to if they choose	 Unfavorable Partial Favorable
4-6	Advancement of men and women	Which of the following comes the closest to your opinion concerning advancement of Navy men and women? A. It is justified to have different advancement policies for men and women B. It is important to have equal opportunities for advancement, but men and women should advance on separate career ladders. C. Individuals should be considered for advancement without respect to sex, even if men and women could be competing for the same advancements	 Different Separate but equal Absolutely equal
4-7	Women as supervisors	How would you feel about having a woman as a supervisor? A. I wouldn't mind having a woman supervisor if she were capable B. I would not like being supervised by a woman but I would try to get along C. It would bother me to work for a woman and I would try to get transferred	 Acceptable Barely acceptable Unacceptable
4-9	Role/different (Conflict)	I have to do things that should be done differently. A. Extremely true of my job B. Moderately true C. Slightly true D. Neither true nor untrue E. Slightly untrue F. Moderately untrue G. Definitely not true of my job	+3 +2 +1 0 −1 −2 −3

TABLE 4 (Continued)

Question Number	Question Name	Item and Response Alternatives	Response Alternative Group Labels
4-10	Role/authority (Ambiguity)	I feel certain about how much authority I have.	(All role items were coded the same as the first one).
4-11	Role/manpower (Conflict)	I receive an assignment without the manpower to do it.	
4-12	Role/objectives (Ambiguity)	Clear, planned goals and objectives for my job.	
4-13	Role/rules and policy (Conflict)	I have to buck a rule or policy in order to carry out an assignment.	
4-14	Role/time allocation (Ambiguity)	I know that I have divided my time properly.	
4-15	Role/group differences (Conflict)	I work with two or more groups who operate quite differently.	
4-16	Role/incompatible requests (Conflict)	I receive incompatible requests from two or more people.	
4-17	Role/responsibilities (Ambiguity)	I know what my responsibilities are.	
4-18	Role/acceptance (Conflict)	I do things that are apt to be accepted by one person and not accepted by others	
4-19	Role/expectations (Ambiguity)	I know exactly what is expected of me.	
4-20	Role/resources (Conflict)	I receive an assignment without adequate resources and materials to execute it.	
4-21	Role/explanation (Ambiguity)	Explanation is clear of what has to be done.	
4-22	Role/unnecessary tasks (Conflict)	I work on unnecessary things.	

TABLE 5

DISTRIBUTIONS OF RESPONSES OF THE NONRESPONDENTS' SUPERVISORS

Item	Group A		Group B	
Effect of draft	n	%	n	%
Would have entered	9	64	11	100
Would not have entered	4	29	0	0
Don't know	1	7	0	0
Total	14	100	11	100
Service plans				
Remain until retirement	3	20	5	45
Undecided	6	40	2	18
Get out	6	40	4	36
Total	15	100	11	99
Promises of recruiter				
Yes	5	45	2	18
Yes, on some	4	37	9	82
No	2	18	0	0
Total	11	100	11	100
Women on ship				
Dislike	5	33	6	55
Neutral	5	33	2	18
Like	5	33	3	27
Total	15	99	11	100
Role/expectations(ambiguity)				
True	15	100	11	100
Neither true nor untrue	0	0	0	0
Untrue	0	0	0	0
Total	15	100	11	100
Role/acceptance(conflict)				
True	10	67	6	55
Neither true nor untrue	4	6	5	45
Untrue	1	27	11	100
Total	15	100	11	100
Attitude toward assigned tasks				
Unfavorable	2	13	0	0
Indifferent	1	7	0	0
Favorable	12	80	11	100
Total	15	100	11	100
Quality of job performance				
Below average	1	7	0	0
Average	6	40	3	27
Above average	8	53	8	73
Total	15	100	11	100

TABLE 5 (continued)

Item	Group A		Group B	
Disciplinary problems	n	%	n	%
No offenses	12	80	5	50
Minor problems	1	7	2	20
Captain's Mast	2	13	3	30
Court-martialled	0	0	0	0
Total	15	100	10	100
Recommend re-enlistment				
Yes	11	73	10	91
No	1	7	0	0
Not sure	3	20	1	9
Total	15	100	11	100

data available for both former items on Group B only), dislike the idea of women on ship, know what is expected of them on the job, and, for Group B, do things apt to be accepted by one person and not by others; for Group A less of them do things accepted by one person and not accepted by others. The items on attitude toward task, quality of performance, disciplinary problems and reenlistment recommendation were designed to secure the supervisor's own opinion of the individual. While no comparable data were available on the respondents, these data were secured to determine if there were some gross, distinct behavioral qualities which would distinguish these hardcore non-respondents from the rest of the population. The results indicate it is not the case, since the supervisors gave generally favorable reports regarding these subjects' work attitudes and behavior.

Multivariate analyses were done on the attitudinal items in the form of the CHAROSEL program, described in the Data Analysis section. CHAROSEL allows prediction of a categorical criterion from categorical independent variables. In this instance, the criterion categories were .25, .50, .75, and 1.00. (A .00 category could not appear because these subjects had no responses to any of the attitudinal items.) Each such category was treated as discrete. The predictor variables were the subjects' responses to each attitudinal item. All of the attitudinal items used in the previous analyses were included in these multivariate analyses, except the one on reason for enlistment. This item was excluded because it had more than ten alternatives, something which the computer program as written cannot handle.

Seven CHAROSEL analyses were done altogether, all to predict response category membership (.25, .50, .75, 1.00). For Group B, four such analyses were done, using the following sets of predictor variables: the attitudinal items from all four questionnaires; the items from Questionnaire 1; the items from Questionnaire 3; the items from Questionnaire 4. (Questionnaire 2 was not used alone since only one of its items was used in this study. This item was eligible to enter in the first analysis mentioned above). For Group A, three analyses were undertaken, with the following sets of predictor variables: items from Questionnaires 2, 3 and 4 (the data from Questionnaire 1 were the lost data); the items from Questionnaire 3; the items from Questionnaire 4.

The results of these analyses showed that a fairly high level of prediction was achieved using items taken from all the questionnaires. Some, but much less, prediction was achieved using the items from the questionnaires individually. For the Group B analysis which included all items, the maximum overall prediction was achieved when only six attitudinal variables were used, these being the following (in order of entry): effect of draft, race of recruiter prefer, request sea duty, Human Goals work, advancement multiple, and role ambiguity. The weighted Kappa, which is an index of the strength of overall prediction ranging from .00 to 1.00, was .80 for this analysis. One hundred eighteen subjects out of 139 were classified correctly using these six pre-dictors. For the Group A analysis on items from Questionnaires 2, 3, and 4, the maximum prediction was achieved with six items, on-the-job training, women supervisors, request sea duty, mean role ambiguity, race of recruiter prefer, and women in combat. The weighted Kappa was .41, and 186 subjects out of 327 were classified correctly.

Relationship to Demographic Characteristics

The next part of the analysis involved determining whether various demographic and personal characteristics of the respondents were related to the proportion of questionnaires they returned. Information on these characteristics was available from two sources. One source was the responses to those questionnaire items which pertained to the respondents' demographic characteristics. Of course, as in the case of the attitudinal items, this information was only available for those who answered each particular questionnaire in which each of those items was included. The other source was the Navy's computerized enlisted master file which contains many items of information on every active duty enlisted person in the Navy. This file is kept current by updating it once a month. From all the data elements on this file, a certain subset of interest was selected for use in this study. For each subject, the information contained in these data elements was copied off the file. For Groups C, D, and E, this demographic information was obtained from the file in September, 1973. For Groups A and B, most of this information was obtained twice -- in September 1972 and September 1973. The information was obtained twice for those data elements which might have changed in the interim, such as paygrade or EAOS date. In this report, a data element is designated by a /1 if it was extracted in 1972 and by a /2 if extracted in 1973.

The analysis of demographic information obtained from questionnaire items was limited because it was subject to the same incompleteness as existed for the attitudinal items. In most cases there was much more complete information available from the enlisted master file. However, a few such analyses were made. Chi-squares were computed to test for the relationship between the answers to questionnaire items #2-3c and #3-24 and response category for Groups A and B. The first item concerned whether or not the respondent was now on sea duty, and the second item concerned whether or not the respondent attended Navy A-school. None of the chi-squares was significant at $p < .05$. Pearson correlation coefficients were computed on the relationship between response category and items 2-3a and 2-3b, number of years in the Navy and number of years at sea. For Group A these correlations were .19 and .09 respectively, and for Group B they were .16 and .15 respectively. (The correlations between answers to the item on years in the Navy and active duty base date as taken off the master file were -.97 for Group A and -.99 for Group B.)

The bulk of the analyses on demographic information was concerned with the relationship between response category and information taken from the master file. The relationship of each demographic characteristic individually to response category was computed in several ways. First, for those demographic variables which could be averaged because they are quantitative and continuous, the mean of each variable was computed for each response category. These results are shown in Tables 6 and 7 for Groups A and B respectively. In these tables, the variables which show trends across response category are pay grade,

TABLE 6

MEANS OF DEMOGRAPHIC CHARACTERISTICS
FOR EACH RESPONSE CATEGORY -- GROUP A

Demographic Characteristics	n	Response Category				
		.00	.25	.50	.75	1.00
Paygrade/1 [a]	362	E 3.9	E 4.7	E 5.1	E 5.5	E 5.7
Paygrade/2 [b]	361	E 4.4	E 5.2	E 5.4	E 5.7	E 5.9
No. of enlistments/1	362	1.9	2.2	2.7	2.6	3.0
No. of enlistments/2	361	1.8	2.3	2.7	2.6	3.0
Primary dependents/1	361	1.1	1.2	2.1	2.2	2.6
Primary dependents/2	360	1.1	1.4	2.3	2.4	2.8
Years of education	362	12.0	11.8	11.8	12.1	12.2
Date of birth	362	Sep '46	Apr '45	Mar '43	May '43	Feb '41
Time in rate	345	Jan '70	Jun '69	Mar '69	Feb '69	Jun '68
Active duty base date	361	Aug '66	Sep '64	Sep '62	Nov '62	Feb '61
GCT score	317	54.7	55.2	53.9	56.2	56.8
ARI score	315	52.4	54.4	52.9	54.1	55.8
MECH score	315	50.2	51.6	51.3	52.1	54.1
CLER score	315	51.4	51.3	49.7	52.4	53.5
EAOS date/1	362	Nov '74	Jul '75	Mar '75	May '75	May '75
EAOS date/2	362	Nov '74	Jul '75	Apr '75	May '75	May '75
Tour completion date/1	361	Sep '74	Sep '74	Jan '75	Oct '74	Nov '74
Tour completion date/2	358	Jan '75	Jan '75	Feb '75	Mar '75	Feb '75

[a] /1 - Data extracted in 1972.

[b] /2 - Data extracted in 1973.

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TABLE 7

MEAN OF DEMOGRAPHIC CHARACTERISTICS
FOR EACH RESPONSE CATEGORY -- GROUP B

Demographic Characteristics	n	Response Category				
		.00	.25	.50	.75	1.00
Pay grade/1[a]	153	E 4.1	E 4.4	E 5.3	E 5.0	E 5.8
Pay grade/2[b]	152	E 4.9	E 4.9	E 5.6	E 5.4	E 5.9
No. of enlistments/1	153	2.0	2.3	2.8	2.4	3.2
No. of enlistments/2	153	2.1	2.3	2.8	2.4	3.3
Primary dependents/1	153	1.3	1.4	1.5	1.6	2.5
Primary dependents/2	153	1.3	1.6	1.8	1.6	2.7
Years of education	153	12.0	12.1	11.3	12.0	11.8
Date of birth	153	Jan '46	Mar '44	Jan '42	Jan '43	Mar '40
Time in rate	150	70.6	69.8	69.0	69.2	68.2
Active duty base date	153	Mar '66	Oct '64	Jan '62	Nov '62	Jun '59
GCT score	129	51.5	52.8	51.0	53.0	51.9
ARI score	126	54.0	51.2	49.2	52.0	51.2
MECH score	126	44.8	48.8	49.0	47.7	47.9
CLER score	125	49.2	51.0	49.5	49.0	48.0
EAOS date/1	153	Mar '75	Mar '75	Aug '75	Apr '75	May '75
EAOS date/2	153	Jul '75	Mar '75	Aug '75	Apr '75	Jun '75
Tour completion date/1	153	Feb '75	Nov '74	Oct '74	Oct '74	Oct '74
Tour completion date/2	153	May '75	Jan '75	Apr '75	Apr '74	May '75

[a]/1 - Data extracted in 1972.

[b]/2 - Data extracted in 1973.

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enlistments, primary dependents, date of birth, time in rate, and active
duty base date. Tables 8 and 9 display for Groups A and B respectively
the average response rate for various demographic characteristics. Again
these results show a relationship between response rate and paygrade, enlist-
ment, primary dependents, date of birth, time in rate, and active duty base
date. The comparison of those on sea duty to those on shore duty showed the
latter to have a slightly higher response rate. These tables also indicated
some differences in response rate according to test score category, with the
overall trend being those with lower test scores having higher response rates.
However, these differences are not entirely consistent and are of lesser mag-
nitude than those for the characteristics previously mentioned. EAOS date and
tour completion date showed only slight differences. Response rates for
Caucasians and minority group members were computed only for Group B since the
number of minority individuals in Group A was too small to allow for a meaning-
ful comparison. In Group B, the response rates for the two sets were identical.

Frequency distributions were calculated containing the number of subjects
in each response category for various levels of the demographic characteristics.
These distributions are contained in Appendix C. Distributions are not pre-
sented for Paygrade/2, No. of enlistments/2 or Primary dependents/2 because the
univariate distributions of these variables were extremely similar to those for
the corresponding characteristics taken from the September 1972 file. Chi-
square tests were done to test for the relationship between response rate and
these demographic characteristics using these bivariate frequency distributions.
For Group A the outcomes of these tests were as follows: pay grade, enlist-
ments, primary dependents, active duty base date, and date of birth ($p < .001$);
all other variables did not prove significant at $p < .05$. For Group B the out-
comes were as follows: enlistments ($p < .01$); pay grade, primary dependents,
and active duty base date ($p < .05$); all other variables did not prove sig-
nificant at $p < .05$.

An additional analysis compared the response rates of those subjects who
had gotten out of the Navy to those who were still in. The information on
whether the subjects were in or out of the Navy was taken from the master file
in July, 1974. This analysis was also done only on those who had received all
four questionnaires. On that file a total of 306 Group A subjects were in the
Navy, and 56 had left; a total of 127 Group B subjects were in the Navy, and
26 had left. Chi-square tests on the distributions of subjects according to
response category and presence in the Navy showed the relationship for Group A
to be significant at $p < .001$ and the relationship for Group B not to be sig-
nificant at $p < .05$. The average response rates for Group A were .65 for those
still in the Navy and .46 for those out of the Navy; for Group B both response
rates were .56.

The mean response rate was calculated for those in each level of each
demographic characteristic. Then the significance of the difference between
each mean and every other mean for a given characteristic was tested. Only
one significant difference was found at less than $p < .05$. The two-tailed test

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TABLE 8

MEAN PROPORTION OF RESPONSE FOR EACH LEVEL OF VARIOUS DEMOGRAPHIC CHARACTERISTICS -- GROUP A

Pay grade/1[a]	n	Mean
E-2	19	.24
E-3	43	.48
E-4	43	.54
E-5	80	.60
E-6	113	.71
E-7	50	.72
E-8	9	.81
E-9	5	.75

Pay grade/2[b]	n	Mean
E-2	4	.25
E-3	19	.30
E-4	56	.49
E-5	89	.59
E-6	122	.69
E-7	56	.72
E-8	9	.83
E-9	6	.75

No. of enlistments/1	n	Mean
1	93	.42
2	94	.64
3	63	.75
4	85	.68
5	24	.73
6	2	.50
7	1	.50

No. of enlistments/2	n	Mean
1	90	.43
2	96	.64
3	63	.75
4	85	.68
5	24	.73
6	2	.50
7	1	.50

Primary dependents/1	n	Mean
0	113	.48
1	47	.61
2	57	.61
3	64	.75
4	47	.68
5	17	.77
6	10	.80
7	4	.88
8 or more	2	.50

Primary dependents/2	n	Mean
0	85	.47
1	60	.55
2	56	.61
3	65	.72
4	58	.69
5	21	.81
6	9	.78
7	4	.88
8 or more	2	.50

Sea/shore Duty	n	Mean
Sea	165	.56
Shore	197	.66

a/1 - Data extracted in 1972.
b/1 - Data extracted in 1973.

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TABLE 8 (Continued)

GCT Score	n	Mean
40 or less	25	.53
41-50	62	.60
51-60	126	.61
61 or more	104	.64

ARI score	n	Mean
40 or less	21	.43
41-50	81	.60
51-60	141	.64
61 or more	72	.63

MECH score	n	Mean
40 or less	25	.56
41-50	106	.58
51-60	132	.61
61 or more	52	.72

CLER score	n	Mean
40 or less	33	.52
41-50	103	.59
51-60	121	.65
61 or more	58	.63

Time entered rate	n	Mean
1965 or before	18	.64
1966-1969	146	.68
1970 or later	345	.56

Date of Birth	n	Mean
1935 or before	43	.70
1936-1945	156	.69
1946-1949	78	.62
1950 or later	85	.43

Years of education	n	Mean
11 or less	38	.48
12	269	.63
13 or more	55	.66

Active duty base date	n	Mean
1954 or before	29	.66
1955-1964	156	.71
1965-1968	77	.64
1969 or later	99	.45

EAOS date/1	n	Mean
Jan 1974-Dec 1974	170	.60
Jan 1975-Dec 1975	111	.62
Jan 1976-Dec 1976	40	.62
Jan 1977 or later	41	.65

EAOS date/2	n	Mean
Jan 1974-Dec 1974	167	.61
Jan 1975-Dec 1975	111	.62
Jan 1976-Dec 1976	41	.63
Jan 1976 or later	42	.64

Tour Completion date/1	n	Mean
Jan 1974-Dec 1974	238	.61
Jan 1975-Dec 1975	91	.61
Jan 1976 or later	33	.72

Tour Completion date/2	n	Mean
May 1973-Dec 1974	181	.61
Jan 1975-Dec 1975	123	.62
Jan 1976 or later	53	.64

TABLE 9

MEAN PROPORTION OF RESPONSE FOR EACH LEVEL OF VARIOUS DEMOGRAPHIC CHARACTERISTICS -- GROUP B

Pay grade/1[a]	n	Mean
E-2	16	.42
E-3	21	.42
E-4	21	.45
E-5	25	.57
E-6	38	.66
E-7	25	.70
E-8	4	.62
E-9	3	.33

Pay grade/2[b]	n	Mean
E-2	3	.42
E-3	11	.48
E-4	28	.43
E-5	37	.51
E-6	39	.65
E-7	26	.70
E-8	5	.60
E-9	3	.33

No. of enlistments/1	n	Mean
1	52	.43
2	23	.64
3	38	.55
4	24	.71
5	12	.75
6	1	.50
7	3	.25

No. of enlistments/2	n	Mean
1	50	.43
2	25	.63
3	38	.55
4	24	.71
5	12	.75
6	1	.50
7	3	.25

Primary dependents/1	n	Mean
0	55	.46
1	24	.55
2	27	.65
3	20	.60
4	17	.57
5	8	.62
6	1	1.00
7	1	1.00

Primary dependents/2	n	Mean
0	54	.46
1	18	.60
2	29	.60
3	24	.64
4	16	.55
5	8	.63
6	2	1.00
7	2	.63

Sea/shore Duty	n	Mean
Sea	82	.52
Shore	71	.60

Race	n	Mean
Caucasian	80	.56
Minority	73	.56

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[a]/1 - Data extracted in 1972.
[b]/1 - Data extracted in 1973.

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TABLE 9 (Continued)

GCT score	n	Mean
40 or less	19	.47
41-50	33	.58
51-60	48	.59
61 or more	29	.52

ARI score	n	Mean
40 or less	14	.52
41-50	45	.61
51-60	49	.53
61 or more	18	.50

MECH score	n	Mean
40 or less	24	.56
41-50	57	.54
51-60	32	.55
61 or more	13	.60

CLER score	n	Mean
40 or less	26	.58
41-50	42	.58
51-60	43	.53
61 or more	14	.48

Time entered rate	n	Mean
1965 or before	8	.63
1966-1969	53	.65
1970 or later	89	.49

Date of Birth	n	Mean
1935 or before	22	.66
1936-1945	67	.60
1946-1949	21	.60
1950 or later	43	.42

Years of education	n	Mean
11 or less	25	.55
12	113	.56
13 or more	15	.57

Active duty base date	n	Mean
1954 or before	17	.65
1955-1964	66	.63
1965-1968	18	.57
1969 or later	52	.43

EAOS date/1	n	Mean
Jan 1974-Dec 1974	72	.54
Jan 1975-Dec 1975	43	.55
Jan 1976-Dec 1976	26	.61
Jan 1977 or later	12	.60

EAOS date/2	n	Mean
Jan 1974-Dec 1974	70	.54
Jan 1975-Dec 1975	43	.55
Jan 1976-Dec 1976	26	.61
Jan 1977 or later	14	.59

Tour Completion date/1	n	Mean
Jan 1974-Dec 1974	102	.55
Jan 1975-Dec 1975	40	.62
Jan 1976 or later	11	.36

Tour Completion date/2	n	Mean
May 1973-Dec 1974	77	.53
Jan 1975-Dec 1975	49	.60
Jan 1976 or later	27	.57

between the response means for Group A subjects on sea duty and on shore duty showed that the latter had a significantly higher response rate (p < .01).

Stepwise multiple regression was used to determine what combinations of demographic variables would best predict response proportion. The inter-correlations among all the demographic variables used in these analyses are shown in Table 10. The means and standard deviations of these variables are displayed in Table 11, along with the Pearson product moment correlations (r) with the criterion, response behavior (i.e., .00, .25, .50, .75, or 1.00). Also in this table are displayed the correlations between the demographic characteristics and response behavior to each questionnaire individually (i.e., .00 or 1.00). These latter data will be discussed at more length in the last section of this chapter.

In the final sets of multiple regression analyses, all variables were allowed to be potential predictors except those taken from the September, 1973 master file, (those designated by a /2). These were not used in the final analyses because they were so highly intercorrelated with their corre-sponding /1 variables, and because in a usual one-time survey situation, only one set of demographic information would be available on the sample members. For Group A, the final regression equation had a multiple correlation of .42, and the following predictors were in the equation, given in the same order in which they entered the equation: pay grade, CLER score, primary dependents, active duty base date, tour completion date, MECH score, enlistments, GCT score, and time-in-rate. For Group B, the final equation had a multiple correlation of .42, and the following predictors were included in order of their entry: pay grade, time-in-rate, date of birth, active duty base date, tour completion date, enlistments, ARI scores, years education, EAOS date, primary dependents, and GCT score.

Two discriminant function analyses were done, one for Group A and one for Group B, to predict criterion group membership (.00, .25, .50, .75, 1.00) from the same demographic variables as used in the multiple regression analyses. Due to the requirements of the computer program, any missing data was filled in with the group mean. For Group A, the best prediction occurred with 153 subjects out of 362 being classified correctly, the function containing the following variables in order of entry: enlistments, GCT score, time-in-rate, date of birth, pay grade, MECH score, ARI score. For Group B, the best pre-diction occurred with all 13 predictors, but close to that prediction level occurred with only five predictors, in which 60 out of 153 subjects were classified correctly. The function contained these variables in order of entry: tour completion date, ARI score, EAOS date, time-in-rate, CLER score.

TABLE 10

INTERCORRELATIONS AMONG THE DEMOGRAPHIC VARIABLES USED TO PREDICT RESPONSE RATE FOR GROUPS A AND B[a]

	Pay grade/1[b]	Pay grade/2[c]	Enlistments/1	Enlistments/2	Dependents/1	Dependents/2	Time in Rate	GCT Score	ARI Score	MECH Score	CLER Score	Date of Birth	Years Education	ADBD	EAOS/1	EAOS/2	TCD/1	TCD/2
Pay grade/1	1.00	.95	.82	.82	.64	.63	-.46	-.10	-.05	.10	-.17	-.81	-.06	-.83	.07	.02	.09	.15
		.94	.85	.84	.68	.67	-.53	.08	.03	.16	-.17	-.81	-.12	-.87	.10	.06	-.03	.12
Pay grade/2		1.00	.78	.78	.62	.61	-.47	-.05	-.04	.12	-.12	-.78	-.02	-.80	.03	.01	.09	.20
			.82	.82	.66	.65	-.53	.14	.11	.10	-.12	-.78	-.05	-.84	.08	.04	-.02	.14
Enlistments/1			1.00	.99	.68	.67	-.49	-.26	-.24	.00	-.18	-.89	-.18	-.95	.03	.02	.09	.20
				.99	.71	.67	-.61	-.12	-.20	.06	-.25	-.90	-.21	-.93	.08	.02	-.04	.08
Enlistments/2				1.00	.68	.67	-.49	-.26	-.24	.00	-.18	-.89	-.18	-.95	.10	.08	.15	.12
					.71	.67	-.61	-.12	-.20	.06	-.25	-.90	-.20	-.93	.08	.05	-.04	.09
Dependents/1					1.00	.95	-.40	-.20	-.14	.02	-.12	-.67	-.03	-.69	.10	.09	.15	.10
						.94	-.50	-.14	-.14	.11	-.26	-.67	-.09	-.70	.10	.08	.05	.07
Dependents/2						1.00	-.37	-.19	-.14	.00	-.13	-.66	-.03	-.66	.00	.03	.12	.08
							-.46	-.09	-.12	.15	-.27	-.64	-.10	-.67	.15	.12	.02	.04
Time in rate							1.00	.12	.12	-.10	.12	.52	.09	.53	.01	.01	.11	.06
								.07	.12	-.07	.21	.67	.16	.69	.05	.09	-.10	-.17
GCT Score								1.00	.69	.40	.36	.25	.52	.29	-.01	-.02	-.16	-.10
									.73	.54	.35	.16	.42	.12	-.10	-.14	-.02	.01
ARI Score									1.00	.36	.44	.25	.49	.29	.04	-.06	-.04	.02
										.42	.46	.25	.50	.20	-.08	-.10	-.04	-.03
MECH Score										1.00	.20	-.02	.22	.04	.06	-.07	-.05	-.01
											.12	-.02	.23	-.04	-.10	-.11	-.03	-.04
CLER Score											1.00	.15	.31	.22	-.03	.00	.02	.04
												.22	.36	.22	-.14	-.13	-.05	-.14
Date of Birth												1.00	.10	.92	.01	.05	-.18	.05
													.18	.94	-.01	.04	.04	-.09
Years Education													1.00	.19	.02	-.04	-.15	-.12
														.26	-.06	-.03	.06	.04
ADBD														1.00	-.03	-.01	-.04	.03
															-.02	.04	.01	-.13
EAOS/1															1.00	.31	.14	.10
																.90	.14	.23
EAOS/2																1.00	.09	.45
																	.08	.28
TCD/1																	1.00	.10
																		.65
TCD/2																		1.00

[a] First line in each cell contains Group A intercorrelations; second line contains Group B intercorrelations.

[b] /1 - Data extracted in 1972.

[c] /2 - Data extracted in 1973.

TABLE 11

MEANS, STANDARD DEVIATIONS AND CORRELATION COEFFICIENTS WITH RESPONSE CATEGORIES FOR DEMOGRAPHIC VARIABLES

Demographic Variable	Group A								Group B							
	n	Mean	Standard deviation	r with response category	r with response to Q1	r with response to Q2	r with response to Q3	r with response to Q4	n	Mean	Standard deviation	r with response category	r with response to Q1	r with response to Q2	r with response to Q3	r with response to Q4
Pay grade/1 [a]	362	5.2	1.5	.35	.34	.32	.19	.22	153	5.0	1.8	.28	.09	.24	.27	.22
Pay grade/2 [b]	361	5.5	1.3	.34	.32	.28	.21	.20	153	5.4	1.5	.24	.03	.24	.25	.18
Enlistments/1	362	2.6	1.3	.27	.30	.23	.13	.16	153	2.6	1.5	.21	.07	.21	.15	.19
Enlistments/2	361	2.6	1.3	.27	.30	.22	.13	.16	153	2.6	1.5	.21	.07	.21	.15	.19
Dependents/1	361	2.0	1.9	.29	.32	.16	.18	.16	153	1.7	1.7	.21	.13	.16	.17	.23
Dependents/2	360	2.2	1.8	.30	.32	.19	.18	.17	153	1.8	1.8	.20	.13	.15	.18	.19
Time in rate	346	69.2	2.6	-.17	-.18	-.12	-.10	-.12	150	69.3	2.4	-.27	-.13	-.29	-.14	-.23
GCT score	317	55.5	9.3	.08	-.02	-.04	.07	.18	129	52.2	10.2	.01	-.05	.10	.08	-.04
ARI score	315	54.2	8.7	.11	.02	.03	.12	.11	126	51.4	9.0	-.04	-.11	.08	.08	-.10
MECH score	315	52.2	8.1	.14	.10	.05	.09	.15	126	48.0	8.6	.03	.06	.08	.08	-.07
CLER score	315	51.8	9.2	.10	-.09	.11	.17	.11	126	49.4	9.8	-.09	-.03	-.03	-.09	-.12
Date of birth	362	43.3	6.6	-.26	-.29	-.18	-.14	-.18	153	42.8	7.7	-.20	-.09	-.23	-.11	-.15
Years education	362	12.0	1.3	.09	-.02	.02	.08	.11	153	11.8	1.1	-.06	-.06	-.04	-.02	-.04
ADBD	361	63.0	6.4	-.25	-.28	-.22	-.12	-.15	153	62.8	7.0	-.27	-.10	-.25	-.20	-.24
EAOS/1	362	75.4	1.1	.06	.01	.12	.02	.04	153	75.4	1.0	.04	.04	-.05	.07	-.01
EAOS/2	362	75.2	4.2	.10	.08	.10	.05	.06	153	75.4	1.1	.02	.03	-.06	.07	.00
TCD/1	362	74.9	.7	.07	.08	-.01	.06	.06	153	74.9	.7	-.09	-.04	-.12	-.06	-.04
TCD/2	362	74.1	8.9	.10	.14	.10	-.02	.03	153	75.3	.9	.07	.02	-.03	.08	.09

[a]/1 - Data extracted in 1972.

[b]/1 - Data extracted in 1973.

Effects of Form and of Repeated Surveying on Response Rates

In order to study differences in the rates of response according to variation in the form of the questionnaire, response rates were compared across questionnaire administrations. "Form" is used here to denote a combination of content, length and format since all these factors varied across the four questionnaires used. Specifically, the rate of response of Group B in Questionnaire 1 was compared to the rates of response of each control group in Questionnaires 2, 3, and 4 (that is, to Groups C, D, and E). Group B was used as the experimental comparison group because it was more comparable to the control groups than Group A in terms of sample selection characteristics. Each group had been surveyed only once (Group B had only been surveyed once at the time of Questionnaire 1), thus ruling out any effects of repeated surveying.

The results, which are displayed in Figure 1, show that the response rate was highest for Questionnaire 2, was lowest for Questionnaire 3, and were exactly the same for Questionnaires 1 and 4, about halfway between the high and the low. The range between the highest and lowest response rate was 22%. All response rates were significantly different from one another at at least p < .05, with the exception of Questionnaires 1 and 4 which had exactly the same response rate.

For those subjects who responded to between one and three questionnaires, the various patterns of response were studied. Figures 2 and 3 display the patterns of response for the subjects in Groups A and B respectively. The proportions in these figures were computed only for those subjects who received all four questionnaires. The top bar in each figure shows, out of all those who responded to only one questionnaire, which questionnaire it was that they returned. The middle bar shows the response proportions for all combinations of response to two out of four questionnaires, while the bottom bar shows all combinations of response to three out of four questionnaires. In Group A there were 60 people who responded to one of the four questionnaires, 81 who responded to two, and 73 who responded to three. In Group B there were 39 who responded to one questionnaire, 30 who responded to two, and 38 who responded to three.

Figure 2 shows that, of those who returned only one questionnaire, Questionnaire 2 was returned most often (.42), while Questionnaire 1 was a close second (.38). Few people returned either Questionnaire 3 or 4 alone. Out of the six combinations of two questionnaires returned, one combination held the majority, Questionnaires 1 and 2 (.54). The only other combination with any sizeable proportion of the response was Questionnaires 1 and 4 (.20). Out of the four combinations of three questionnaires returned, one combination again held a majority, Questionnaires 1, 2 and 3 (.51). The other sizeable combination was Questionnaires 1, 2 and 4 (.26).

In Figure 3, the top bar shows results similar to those of Group A, with the largest group responding to Questionnaire 2 (.46), the next largest group responding to Questionnaire 1 (.36), and only small numbers responding to Questionnaire 3 and to Questionnaire 4. The majority of subjects returning two questionnaires responded to Questionnaires 1 and 2 (.53), with the only

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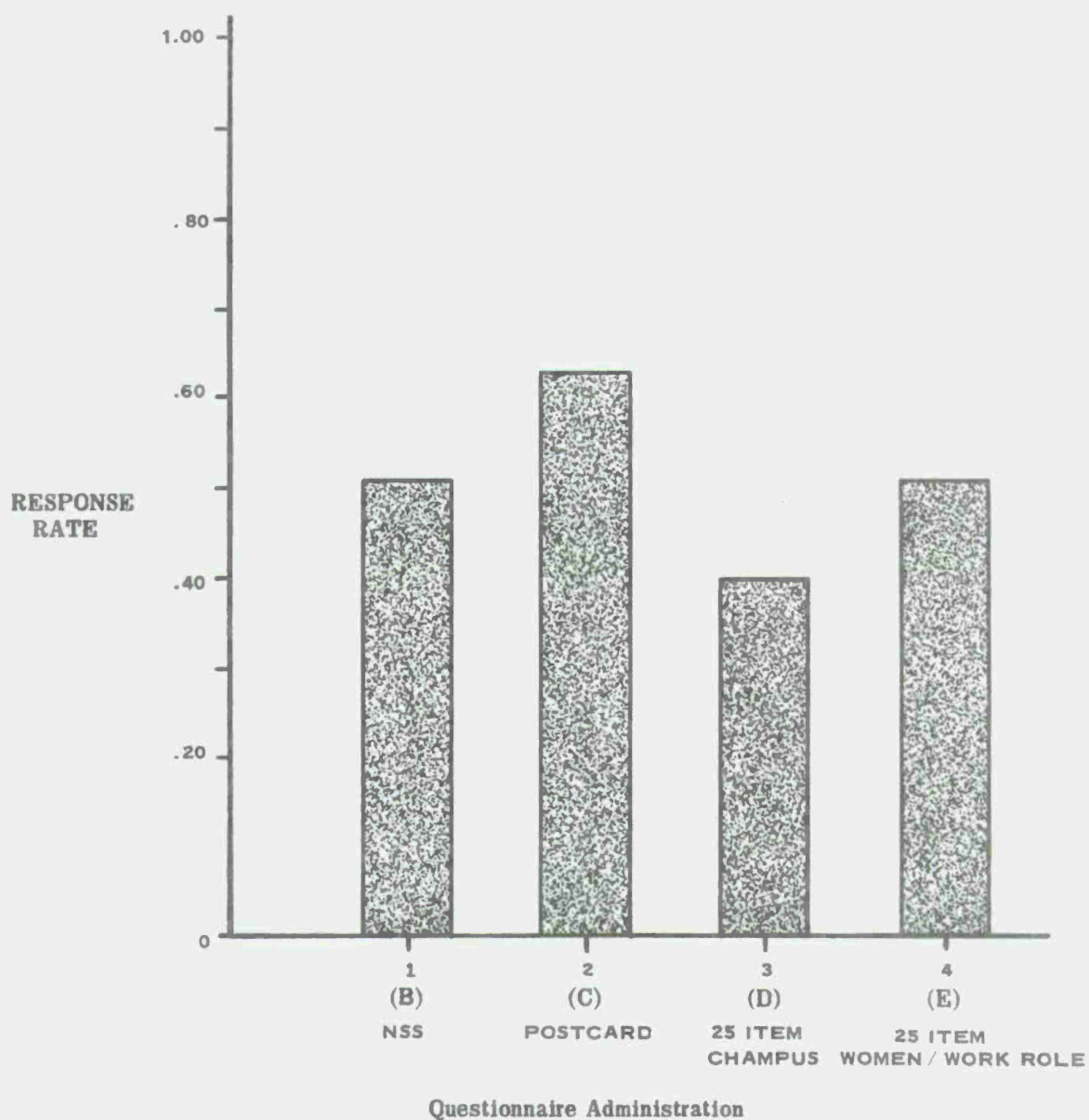
Figure 1. Response rates of the control groups
according to questionnaire form.
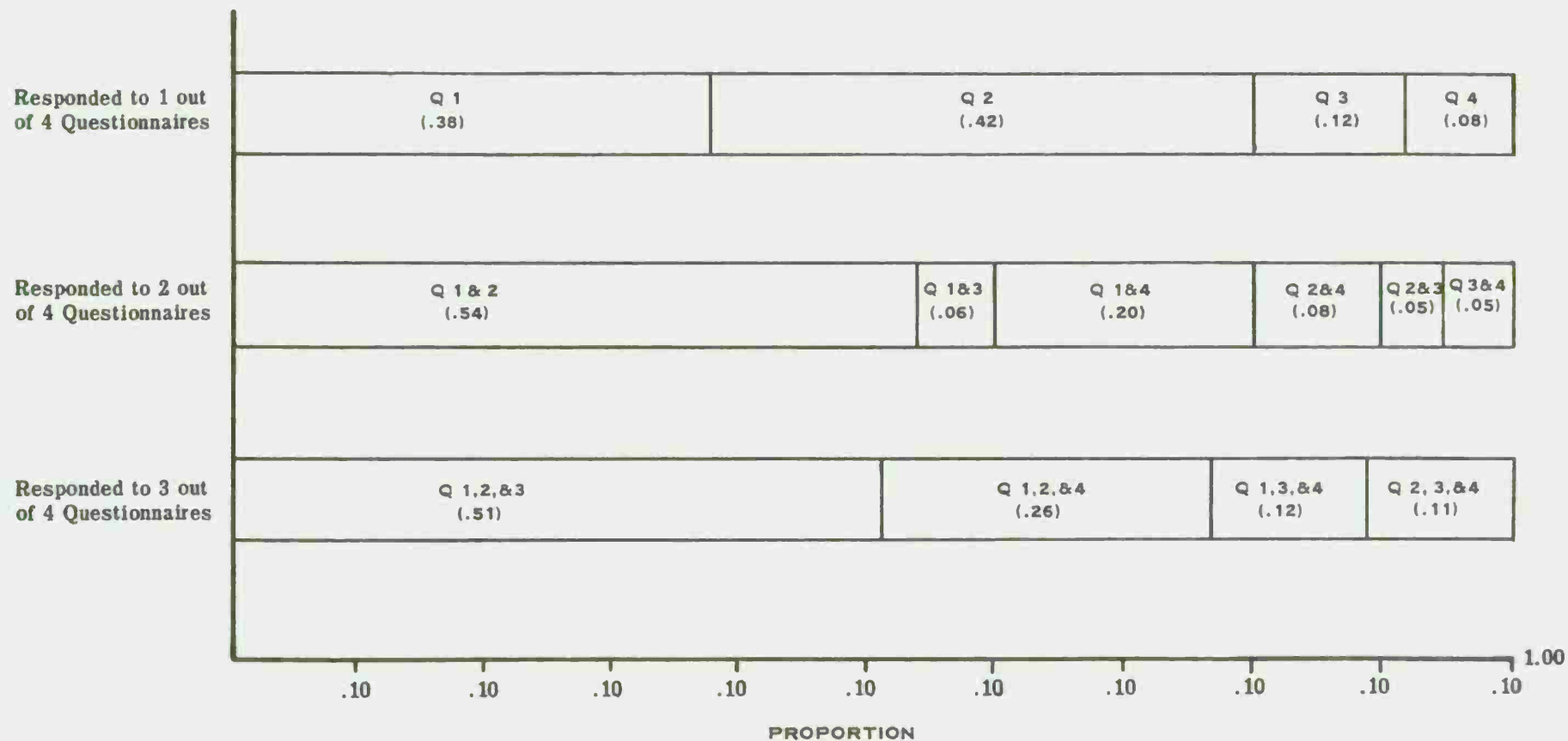
Figure 2. Proportions of subjects in Group A responding with
the different combinations of questionnaires.
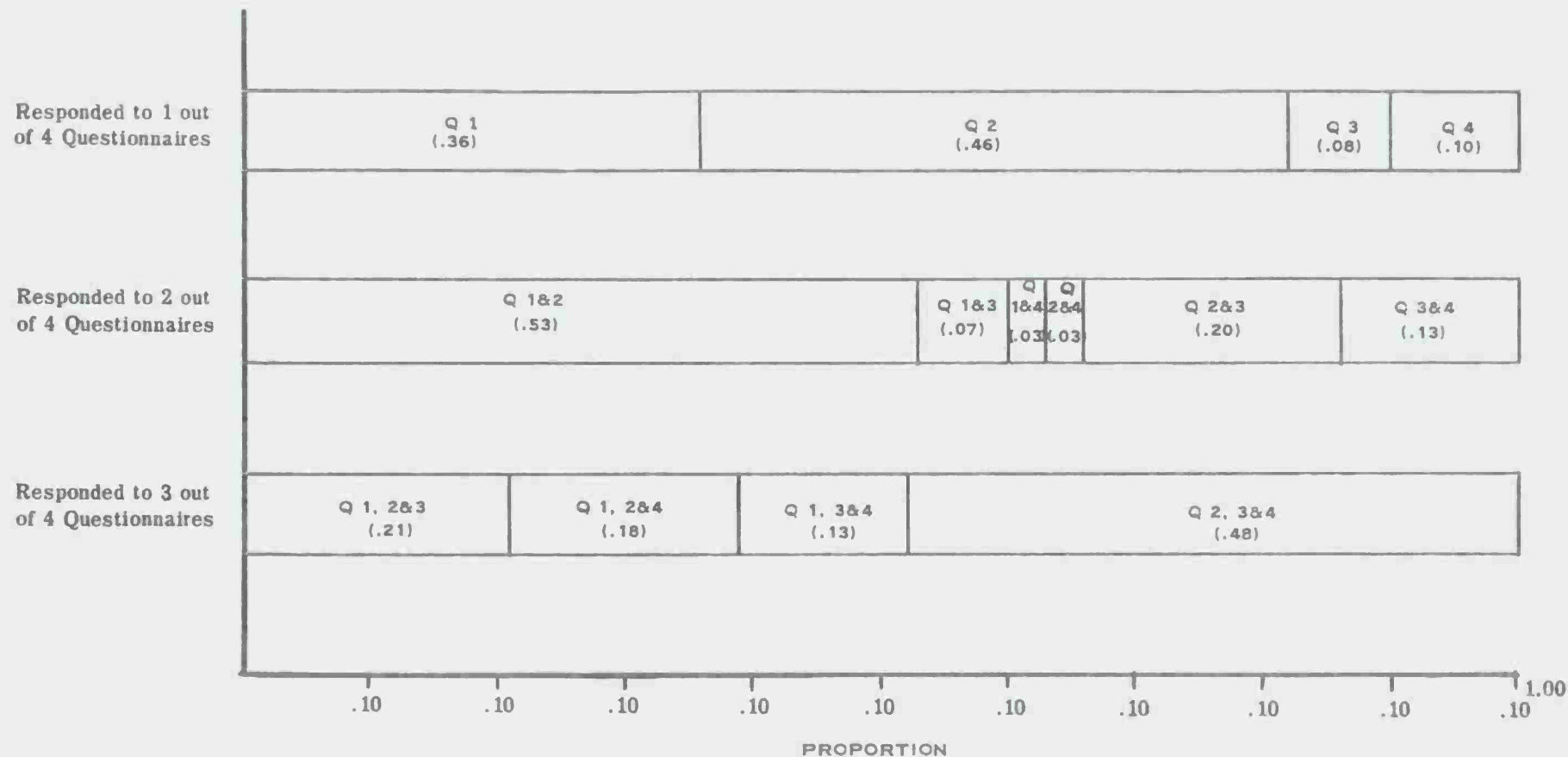
Figure 3. Proportions of subjects in Group B responding with
the different combinations of questionnaires.

other sizeable group being those who responded to Questionnaires 2 and 3 (.20). For those returning three questionnaires, the largest group responded to Questionnaires 2, 3, and 4 (.48). The remaining 52% were fairly evenly divided among the other three combinations of Questionnaires 1, 2, and 3 (.21), Questionnaires 1, 2, and 4 (.18), and Questionnaires 1, 3 and 4 (.13).

To further study response patterns, the distribution of particular questionnaires returned was calculated according to the response proportions of the subjects returning those questionnaires. These distributions are shown in Table 12. As in the previous analysis, these calculations were done only on those who received four questionnaires. The frequencies in this table represent the number of questionnaires returned, not the number of people returning questionnaires. The frequencies in the row do, however, happen to coincide with the number of subjects involved since each subject in the .25 category only returned one questionnaire. The totals in the .50 and .75 rows represent two and three times respectively the number of subjects in each of those categories. Chi square tests proved the relationship between the proportion of questionnaires returned and the particular questionnaires returned to be significant.

In recent years a relatively large number of minority personnel have been selected for samples so that independent generalizations could be made about their opinions. It was therefore of interest to determine whether minority personnel might react differentially from Caucasians to the various questionnaire forms. A chi square test done on the distribution of racial characteristics by which particular questionnaires were returned was not significant $(p < .05)$.

Since the experimental subjects were surveyed four times, an opportunity was available to observe what the effects of such repeated surveying would have on response rate. The analysis here consisted of comparing the response rate of Group B to the response rate of the control group for each questionnaire. These results are displayed in Figure 4. A control group was not required for Questionnaire 1 because this was the first time Group B had been surveyed and there were no effects of repeated surveying on Group B at that point. Two-tailed tests of the significance of the differences in response rate between Group B and its control group were done for Questionnaires 2, 3 and 4. These tests showed no significant differences for Questionnaires 2 and 4, but for Questionnaire 3, Group B had a significantly higher response rate than Group D $(p < .05)$. Overall these results show, then, that response rate was not depressed as a result of repeated surveying. In fact, the results of Questionnaire 3, in which the experimental group's response rate was significantly higher than its control, point to the possibility that the experimental group's response rate was actually enhanced rather than depressed.

Comparison of Analytic Methods

The four-survey method employed in this study was complicated to use and time-consuming because of the data management required. The results presented below are intended to help determine how much information, if any, was gained about nonrespondent bias using the four-survey method instead of a single survey.

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TABLE   12

DISTRIBUTION OF SUBJECTS BY RESPONSE PROPORTION AND
QUESTIONNAIRES ANSWERED FOR GROUPS A AND B

Response Proportion		Group A				Row $\underline{n}$ and Mean Row %	Group B				Row $\underline{n}$ and Mean Row %
		Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	
.25	$\underline{n}$	22	25	7	5	59	14	18	3	4	39
	Row %	37	42	12	8		36	46	8	10	
	Column %	14	17	9	7	13	26	24	7	10	18
.50	$\underline{n}$	65	56	13	28	162	19	23	12	6	60
	Row %	40	35	08	17		32	38	20	10	
	Column %	43	39	17	40	37	36	31	26	15	28
.75	$\underline{n}$	66	64	55	37	222	20	33	31	30	114
	Row %	30	29	25	17		18	29	27	26	
	Column %	43	44	73	53	50	38	45	67	75	54
	Column $\underline{n}$ and Mean	153	145	75	70	443	53	74	46	40	213
	Column %	34	33	17	16		25	35	22	19	

Chi square = 24.79, $\underline{df}$ = 6, $p < .001$.   Chi square = 22.85, $\underline{df}$ = 6, $p < .001$.
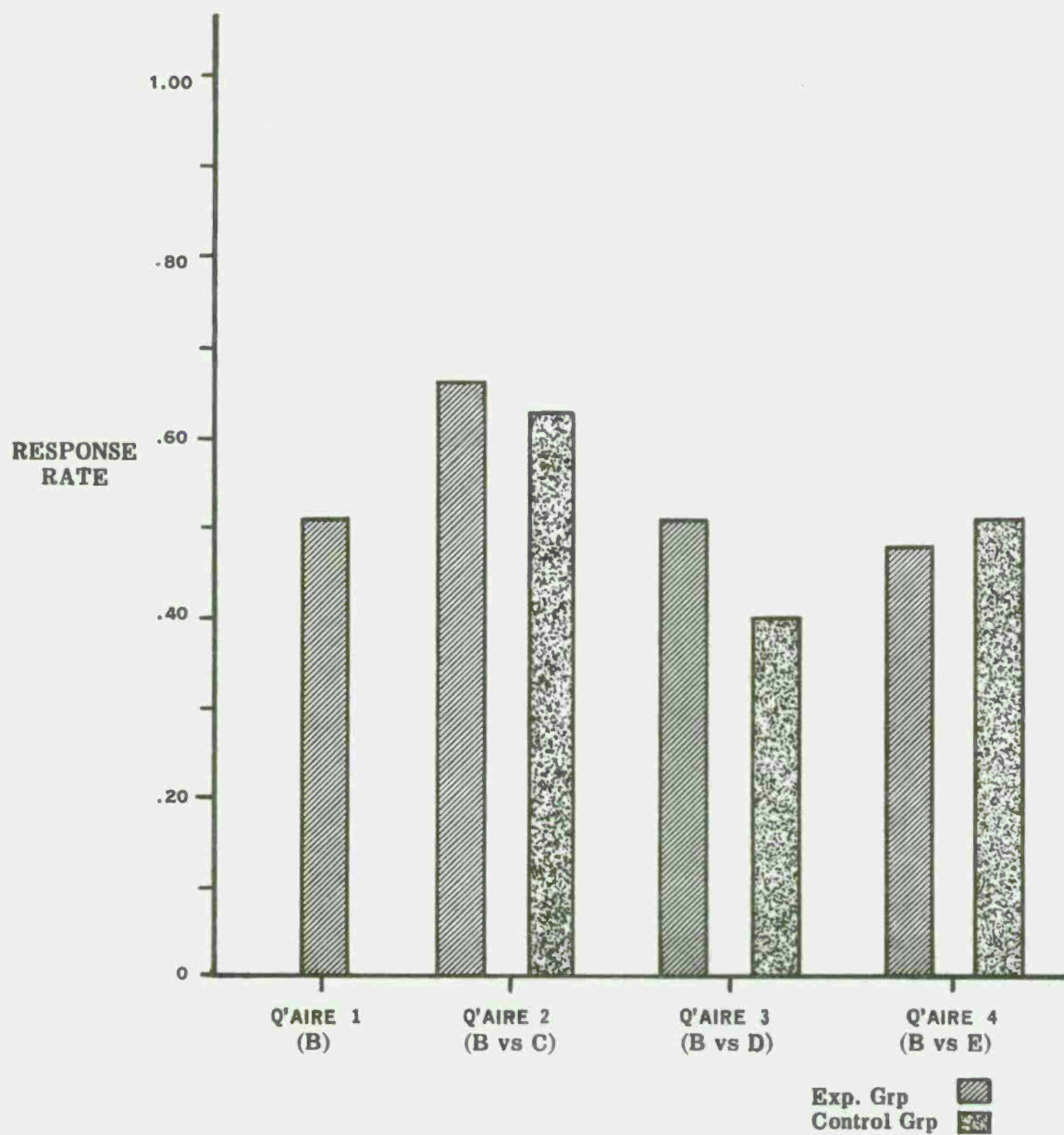
Figure 4.   Response rate over repeated surveying
of Group B compared to response rates
for control groups.

The strategy was to compute the results of each survey as if it had been a single survey. In other words, in each survey the respondents and non-respondents were compared in terms of their demographic characteristics. The size of these differences was then compared to the differences found using the four-survey method. The bulk of these analyses was done using demographic variables since no attitudinal information would ordinarily be available on the nonrespondents in a single-survey situation.

For Groups A and B, the mean of each demographic variable for the re-spondents and nonrespondents is presented in Table 13. The focus for Groups A and B was on response category in relation to Questionnaire 1 because that was the first questionnaire in the series, and those subjects had not been exposed to the effects of repeated surveying at that point. Moreover, the results of the previous section indicated that repeated surveying did indeed have an effect. Comparing Table 13 to Tables 6 and 7 shows that, as expected, the magnitude of the difference between response/non-response is something less than the magnitude of the difference between the two extremes in the five category case (between those who responded to none out of four and those who responded to all four). However, there still are fairly sizeable differences in Table 13, and the differences are generally in the same direction as those in Tables 6 and 7.

For Groups C, D, and E, the mean of each demographic variable for the respondents and nonrespondents to Questionnaires 2, 3, and 4 respectively is in Table 14. The magnitude of the differences between the respondents and nonrespondents is very similar on all variables for Groups C, D, and E. Moreover, these differences are very similar to those of Groups A and B, as shown in Table 13.

Frequency distributions were also computed to study the relationship between response/nonresponse and level of each demographic variable for Groups A and B on Questionnaire 1 and for Groups C, D and E for Question-naires 2, 3, and 4 respectively. Chi square tests were done to test the significance of the relationship between each demographic characteristic and response/nonresponse. (Any variables not mentioned below did not reach statistical significance at $p < .05$.) For Group A, pay grade, enlistments, primary dependents, date of birth, time-in-rate, sea/shore duty, and active duty base were significant at $p < .001$; MECH score at $p < .05$. For Group B, none of the relationships were significant at $p < .05$. A comparison of the chi square tests for Groups A and B given here to those given for Groups A and B when response behavior was treated as five categories (.00, .25, .50, .75, or 1.00) showed that for Group A a few more of the former tests achieved statistical significance, while less of Group B did so. For Group C, pay grade, enlistments, date of birth and active duty base date were significant at $p < .001$; primary dependents at $p < .01$. For Group D, pay grade, enlist-ments and active duty base date were significant at $p < .01$; date of birth at $p < .05$. For Group E, primary dependents was significant at $p < .001$; en-listments, date of birth, active duty base date and race at $p < .01$; GCT score at $p < .02$.

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TABLE 13

MEANS OF DEMOGRAPHIC CHARACTERISTICS FOR GROUPS A AND B
ACCORDING TO RESPONSE CATEGORY FOR
QUESTIONNAIRE 1

Demographic Characteristics	Group A			Group B		
	Responded	Did not respond	n	Responded	Did not respond	n
Pay grade/1[a]	E5.5	E4.4	366	E5.1	E4.8	153
Pay grade/2[b]	E5.7	E4.8	361	E5.4	E5.3	153
Time in rate	Oct '68	Nov '69	346	Oct '68	Nov '69	150
Number of enlistments/1	2.9	1.96	362	2.7	2.5	153
Number of enlistments/2	2.87	1.98	361	2.7	2.5	153
Primary dependents/1	2.4	1.1	361	1.9	1.4	153
Primary dependents/2	2.6	1.3	360	2.0	1.6	153
Years of education	12.0	12.1	362	11.8	12.0	153
Date of birth	Feb '42	May '46	362	Mar '42	Jun '43	153
Active duty base date	Nov '61	Jan '66	361	62.2	63.6	153
GCT score	55.4	55.9	317	52.0	53.0	129
ARI score	54.3	54.0	315	51.0	52.4	126
MECH score	53.0	50.9	315	48.4	47.4	126
CLER score	51.3	53.2	315	49.2	50.0	126
EAOS date/1	Apr '76	Apr '75	362	May '75	Apr '75	153
EAOS date/2	May '75	May '75	361	May '75	May '75	153
Tour completion date/1	Nov '74	Sep '74	362	Oct '74	Nov '74	153
Tour completion date/2	Feb '75	Feb '75	357	Mar '75	Mar '75	153

[a]/1 - Data extracted in 1972.

[b]/1 - Data extracted in 1973.

TABLE 14

MEANS OF DEMOGRAPHIC CHARACTERISTICS BY
RESPONSE CATEGORY FOR GROUPS C, D, AND E

Demographic Character-istics	Group C			Group D			Group E		
	Responded	Did not respond	n	Responded	Did not respond	n	Responded	Did not respond	n
Pay grade/2[a]	E5.3	E4.1	202	E5.2	E4.2	200	E5.0	E4.2	200
No. of en-listments/2	2.5	1.8	202	2.7	1.9	200	2.4	1.8	200
Primary de-pendents/2	1.8	1.1	202	1.8	1.1	200	1.8	0.9	200
Years of education	12.0	11.9	202	12.2	11.9	200	12.1	11.8	200
Date of birth	Jun '43	Oct '47	202	Aug '42	May'46	200	May '44	Jun'47	200
Active duty base date	May '63	Apr '67	202	Nov '62	Jun'66	200	Mar '64	Mar'67	200
GCT score	52.0	51.3	179	53.6	51.4	179	54.5	49.8	187
ARI score	50.7	50.1	178	51.2	50.2	178	52.8	50.6	187
MECH score	48.6	48.5	178	48.1	45.8	176	49.0	47.8	187
CLER score	50.5	48.1	178	53.6	50.9	176	52.3	52.0	187
EAOS date/2	Mar '75	Jun '75	202	Aug '75	Jul'75	200	Sep '75	Jun'75	200
Tour comple-tion date/2	Feb '75	Mar '75	201	Feb '75	Feb'75	200	Mar '75	Feb'75	200

[a]/2 – Data extracted in 1973.

Stepwise multiple regression was used to determine which combinations of demographic variables could best predict response/non-response for each questionnaire. (As stated in the Approach chapter, multiple regression produces the same solution as discriminant function when the criterion is dichotomous.) A regression equation was produced for Groups A and B in relation to their response behavior to each of the four questionnaires individually. The final equations included only those variables which were taken from the September 1972 master file. The final multiple correlations for Groups A and B respectively were as follows: Questionnaire 1, .38 and .26; Questionnaire 2, .40 and .36; Questionnaire 3, .31 and .40; Questionnaire 4, .33 and .43. There was no overall pattern to the order of entry of the predictor variables, except that in five out of the eight equations, pay grade was the first variable to enter.

A comparison of these regression analyses to those using the five-category criterion (.00, .25, .50, .75, or 1.00) indicated that prediction was only slightly less strong for all the dichotomous cases than for the five-category cases. A multiple correlation of .42 was achieved for both Groups A and B for the five-category criterion. For the dichotomous criteria, seven of the eight correlations were lower, but only slightly so (ranging from .26 to .40), and one was actually higher (.43). A comparison of the Pearson correlations for response behavior and each demographic variable between the five-category and dichotomous cases shows the former correlations to be usually higher, but not much higher generally (see Table 11).

A stepwise multiple regression was done to predict Group D subjects' response behavior to Questionnaire 3, and another was done to predict Group E subjects' response behavior to Questionnaire 4. For these analyses, the criterion was 1 or 0, indicating response or nonresponse to the questionnaire, and the predictor variables were the demographic variables. A similar analysis was not done to predict Group C subjects' response behavior to Questionnaire 2 because not enough demographic data was available on the master file for these subjects. The final regression equation for Group D produced a multiple correlation of .38 and contained the following predictor variables in their order of entry into the equation: enlistments, CLER score, years of education, tour completion date, GCT score, active duty base date, pay grade. The equation for Group E had a final multiple correlation of .41 and contained the following predictors in order of entry: primary dependents, GCT score, EAOS date, MECH score, enlistments, tour completion date, and pay grade.

DISCUSSION

One interesting piece of information obtained from this study was the distribution of the numbers of subjects who returned various proportions of the questionnaires. More subjects were at the high end of the continuum than the low end, that is, more people tended to return three or four questionnaires than one or none. In the other study identified which employed a similar methodology (Wallace, 1954) 50% of the subjects answered most or all of four questionnaires, and the results of this study are quite similar. As a matter of fact, the smallest category in this study by far was those not responding to any questionnaire. This means that there are a relatively small proportion of enlisted men who show no tendency whatsoever to respond to mail surveys. This fact suggests that response rates can be increased among those types who responded to at least one but less than four questionnaires by employing survey methods and formats with differential appeal to differential subpopulations.

In this study, for those who returned no questionnaires, telephone interviews were conducted with their immediate supervisors. There are at least two problems with employing this approach. First, there is the fact that the supervisor may not convey the subject's attitudes, and therefore these responses may not be directly comparable to those of the other respondents. Second, there is the question of whether it is ethical to contact an individual's supervisor for these purposes without the subject's permission, even though the information is confidential and used only for research purposes. However, if information is really needed about their attitudes, one has the alternative of contacting them rather than their supervisors. In view of their lack of response, there was the possibility that they might view a telephone survey with hostility. This problem represents what is called a "refusal" among public opinion pollsters, that is, someone who absolutely will not respond to a survey. This problem has not previously been faced by the Navy because few efforts have been made to pursue those who do not respond to any given survey. On the other hand, there is no direct evidence from this study to demonstrate that the nonrespondents were negative toward surveys. Situational factors, for instance, might account for their nonresponse.

Some useful information was gained in the telephone interview phase. Since the approach has not been employed before, it was learned that it is a viable alternative to the mail method, at least for small samples. It was learned that it is indeed possible to locate and contact many of the designated people, starting with only the general duty station mailing address off the address master file. An extremely high proportion of response was obtained of those contacted. In most cases, autovon lines could be used. On the detracting side, a fair number of phone calls were required to locate most individuals (an average of four or five), and therefore the process was quite time-consuming. The telephone interview method should at least be considered for use when samples are very small and a short time frame for data collection exists.

Since this study represented a sizeable administrative undertaking, an effort was made to reduce the total investment whenever possible by administering questionnaires that had to be administered anyway. In other words, the

questionnaires used in this study were generally "real" surveys. By accomplishing these surveys as part of this methodological study, needless duplication of effort was avoided. On the other hand, the questions in the questionnaire could not be selected to meet the purposes of this study. Consequently, quite a few items in the questionnaires were not suited to the purposes of this study, e.g., it is not particularly important if more respondents than nonrespondents hold certain opinions toward the CHAMPUS medical care program.

In the Data Analysis section, it was pointed out that the analyses of response behavior according to answers to the attitudinal items contained different sets of subjects across different questionnaires. This fact means that these results must be interpreted with caution. A bias is present due to the fact that a significant relationship was found between response rate and which particular questionnaires were returned. In other words, the response rate distribution for each attitudinal item was affected by an additional factor--the particular questionnaire to which the item belonged. To further complicate matters, which particular questionnaires were returned was also related to the total proportion of questionnaires returned.

The overall pattern of the results was such that there were some indications of nonresponse bias from the attitudinal data, and there were stronger indications from the demographic data. Because of the problems already described regarding the attitudinal data, more emphasis is placed on the evidence from the demographic data. These data show definite trends in differences in response rates. In general, these results could be summarized by saying that those men who are of higher pay grades, more enlistments and older have a higher tendency to respond to mail surveys than those who are of lower pay grades, less time in the Navy and younger. Moreover, almost all previous naval personnel surveys indicate that many attitudes toward naval personnel issues are strongly related to age and pay grade. It should be pointed out that this study only concerned tendency to respond to naval mail surveys, not to mail surveys in general. It might be concluded that more high pay grade men respond to naval mail surveys because they have made more of a behavioral commitment to the organization sponsoring these surveys.

The analysis of the response rates of those still in the Navy versus those out showed that, for Group A, those who had left the Navy had a lower response rate than those who were still in. There was a great deal of slippage in this particular analysis. The "in" group probably contained a certain number of true "outs;" in other words, a certain number of people would be getting out once their EAOS date arrived. Since this analysis showed a significant difference in spite of this slippage, there is a strong indication that people who remain in the Navy after their EAOS date are more likely to return surveys than those who do not remain. Since the opinions of people who stay in the Navy differ from those who leave, these results suggest this factor produces nonresponse bias.

The results of this study generally substantiate Gale's findings (1971) in that age, number of enlistments, shore duty, and number of dependents were found to be positively related to response behavior. Unlike Gale's finding that GCT score was positively related to response rate, only a slight such relationship was obtained in this study. Also, Gale found Blacks less likely to respond than Caucasians, a finding not made here.

The multivariate analyses using demographic items indicated that it is possible to predict to some extent whether a person will respond to a survey from a combination of his personal characteristics available from the master file. The magnitude of the multiple correlations was about .40, meaning that about 16% of the variance in response behavior was accounted for in this manner. Because of the constraints put on the multiple regression analyses, generally quite a few variables entered each equation. However, in most of these analyses, a multiple correlation in the high .30's was achieved with only a handful of variables. One problem with these analyses was that many of the variables available off the master file to use in these analyses were highly intercorrelated, e.g., pay grade, number of enlistments, number of primary dependents, date of birth, active duty base date. These happened to be the variables which were individually the most highly correlated with response behavior. The single variable most consistently and most strongly related to response behavior was pay grade. In the regression equations, often some of the variables with relatively low correlations with the criterion entered before those with much higher correlations with the criterion. This event occurred because of the intercorrelation mentioned above. The regression calculation selects for entry into the equation on each iteration that variable which is the best combination of being highly correlated with the criterion yet least correlated with the other predictors, in other words, accounts for the most unique variance in the criterion.

It should be noted that cross-validation was not performed in any of the multivariate analyses. Therefore some shrinkage in the size of the relationships discovered could be expected if computed on an independent sample.

There were no specific hypotheses generated to predict the effects of using different questionnaire forms on response rate since so little was known about the behavior of naval personnel in this regard. There was a general expectation, however, that Questionnaire 2 would elicit the highest response rate, and this expectation was confirmed. This expectation existed despite Berdie's findings that response rate was unaffected by questionnaire length (1973). Questionnaire 2 was much shorter than any of Berdie's questionnaires, had a postcard format, which made it much easier for the respondent to complete and return than Questionnaires 1, 3, and 4. That Questionnaire 3 had such a low response rate came as something of a surprise, particularly since Questionnaire 3 was so similar in form to Questionnaire 4. Moreover, Questionnaire 4 was mailed near Christmas so that, everything else being equal, one would expect response to Questionnaire 4 to be lower than Questionnaire 3, rather than the reverse. Since the length and format of Questionnaires 3 and 4 were virtually identical, it appears that the difference in response rate is attributable to item content. Questionnaire 3 primarily contained items on a medical care program for dependents (CHAMPUS) plus a few items on recruitment. Questionnaire 4 contained items on women's role in the Navy, and on role conflict and ambiguity in one's job. CHAMPUS is not relevant to single people and may not be relevant to some married people, while the items in Questionnaire 4 were germane to all naval personnel.

The analysis of the response patterns of those subjects who responded to between one and three questionnaires showed that some questionnaires or combinations of questionnaires were definitely responded to more frequently than others.

A review of these results points to an order effect, that is, the subjects more often responded to the first questionnaires than to the later questionnaires. Of those who answered only one questionnaire, more people returned Q2, a result which is not surprising in view of the short postcard form of Q2; the other large category of response was to Q1. For those who returned two questionnaires, the majority returned the first two. For those who returned three questionnaires, the results differed substantially between Groups A and B. In Group A, the order effect was again prominent, with the majority returning Q1, 2 and 3, and the only other sizeable percentage returning Q1, 2 and 4. In Group B, however, the largest number of people responded to Q2, 3 and 4, with the second largest number responding to Q1, 2 and 3. Since Group B differed from Group A in having more non-Caucasians and more people with a fewer number of enlistments, this difference in results might be attributable to either one or both of the differences in sample composition between the two groups. Generally, however, the results did indicate that the subjects who responded to at least one but not all the questionnaires more often returned the first questionnaire or combinations of the first questionnaires. In other words, if a subject did not return Questionnaire 1 or 2, he was unlikely to return Questionnaire 3 or 4.

No specific hypotheses were generated regarding the effects of repeated surveying on response behavior. The reason was that at least two possible competing phenomena might affect response rate. First, the experimental subjects might get annoyed with receiving questionnaires, a factor which would depress response rate. Second, the experimental subjects might have suspected that they were part of a special study (although no mention of this fact was made), and a Hawthorne effect may have resulted in increased response. In the Hawthorne effect, people who realize they are the objects of some special attention will behave differently than they would under ordinary circumstances. The results on the effects of repeated surveying indicated that the response rate of the experimental group did not fall off. Moreover, in the case of Questionnaire 3, it was actually higher than its control. A plausible explanation might be that the subjects in the experimental group realized that they were part of some group which had been singled out and that they were responding to the demand characteristics of the experimental situation. These results should be interpreted with some caution, however, due to the slightly different nature of the sample composition between Group B and the control groups, the control groups having more people of higher enlistments than Group B.

One of the advantages of using the four-survey method was that some attitudinal information could be had on all subjects who responded to at least one of the four questionnaires. In a one-survey situation, attitudinal information is only available on the respondents unless a follow-up is done. Of course, as discussed above in the four-survey method, different sets of attitudinal information were available on different subjects. The use of the multivariate CHAROSEL analyses partially obviates this problem by utilizing the a priori probabilities of group membership. This analysis was reasonably successful in predicting response behavior. One of the disadvantages of using the four-survey method was that the relationships were attenuated in that the subjects were divided among five categories (.00, .25, .50, .75, 1.00) instead of two (.00, 1.00). Use of this method really requires more subjects than use of a

single survey method, and in a group such as Group B, there were scarcely enough people to allow for meaningful comparisons among categories.

These results indicate that if a direct mail method is to be used in conducting a naval personnel survey, it would be best to control for the possibility of nonresponse bias by employing a follow-up procedure. There are many ways in which a follow-up can be conducted. This study indicates that response behavior varies to quite an extent across different types of people. Therefore, varying types of follow-up procedures should be used in different types of survey situations. If this study is to have a sequel, it should be directed at determining which follow-up procedures are most accurate and cost-effective in which situations. For instance, Panos and Rice (1967) studied the response rate per unit cost of six different follow-up methods for student nonrespondents. The methods consisted of either personal or impersonal cover letters sent by either certified mail, special delivery or first class. The different methods showed large differences in the cost per respondent, with the personal letter via special delivery proving the most cost-effective ($1.60 per respondent). A controlled comparison of potential methods in a Navy setting (including the telephone interview) would give needed information on the cost-effectiveness of different follow-up approaches.
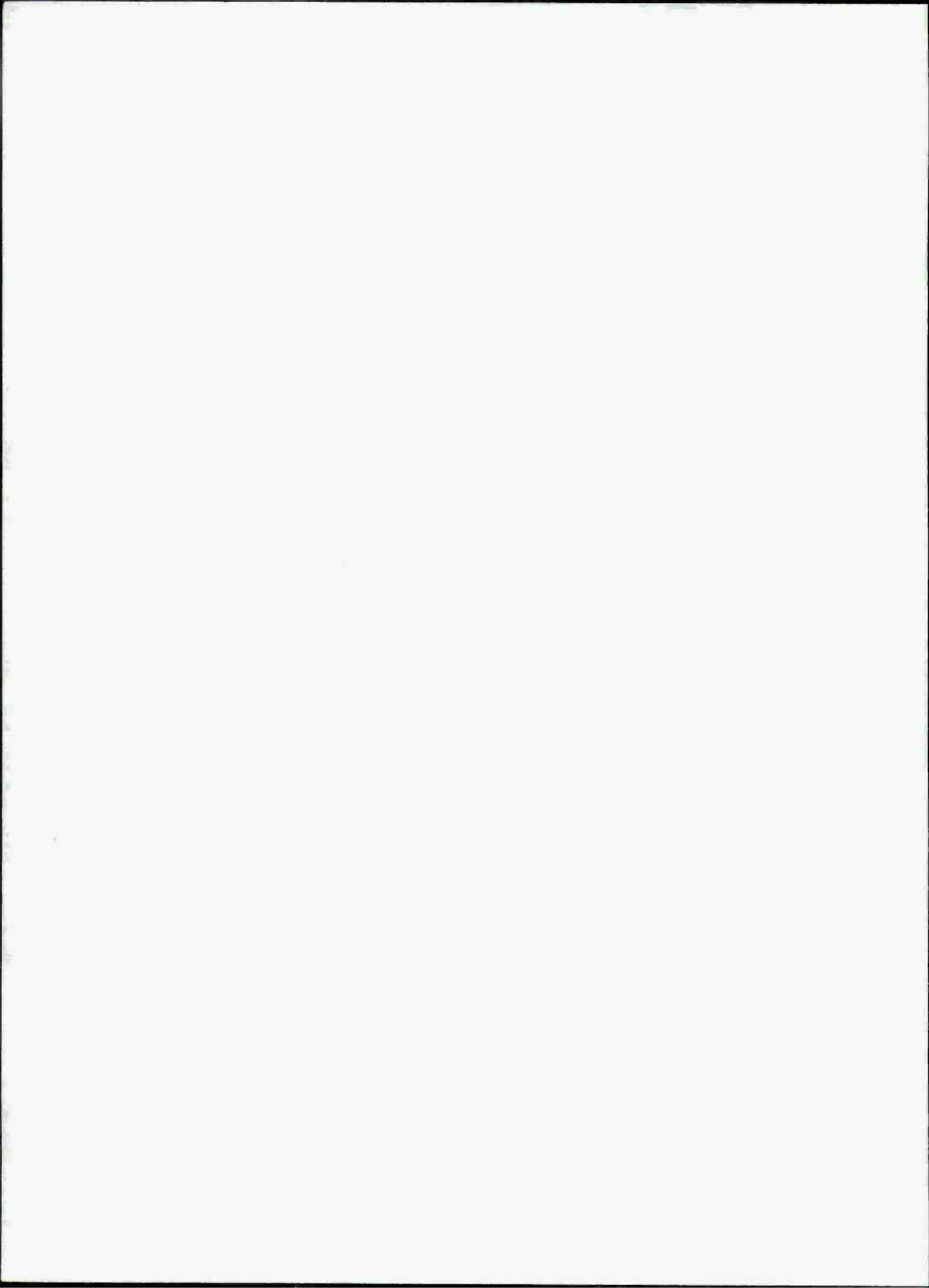
CONCLUSIONS AND RECOMMENDATIONS

A certain amount of nonresponse bias exists for direct mail surveys of naval personnel. This bias is dependent upon a complex set of factors, and it varies from being negligible in certain instances to fairly sizeable in other cases.

The form of the survey does have an effect on response rate. A very short, self-contained form secures high response. Relevance of the questionnaire items to the individuals in the sample also has an important effect on response rate.

Not that much more is learned about nonresponse bias from employing the four-survey method than from using a single survey. While there are some advantages to the four-survey method, the size of these advantages is not such that the increased effort required for the four-survey method is justified.

Because of the complexity of the factors involved in producing nonresponse bias, it is difficult to determine for a given survey if such bias will be present. It is therefore recommended that in naval personnel surveys employing direct mailing, some form of follow-up technique be instituted. The specific form of follow-up should be carefully selected based on additional information, including the knowledge available from this study on the differential characteristics of those likely to respond and those not. The methods by which follow-ups can be conducted in a Navy setting should be compared to identify those which are most cost-effective.

The information from this study on effects of form on response rate should be used in the design of future naval personnel surveys. To enhance response rates, questionnaires should be administered only to those individuals for whom the content is relevant. Omnibus surveys (surveys which contain items on many disparate topics) are bound to contain some irrelevant items for everyone. Specific surveys administered to a broad cross-section of the population are bound to be irrelevant to some subsections of the sample.

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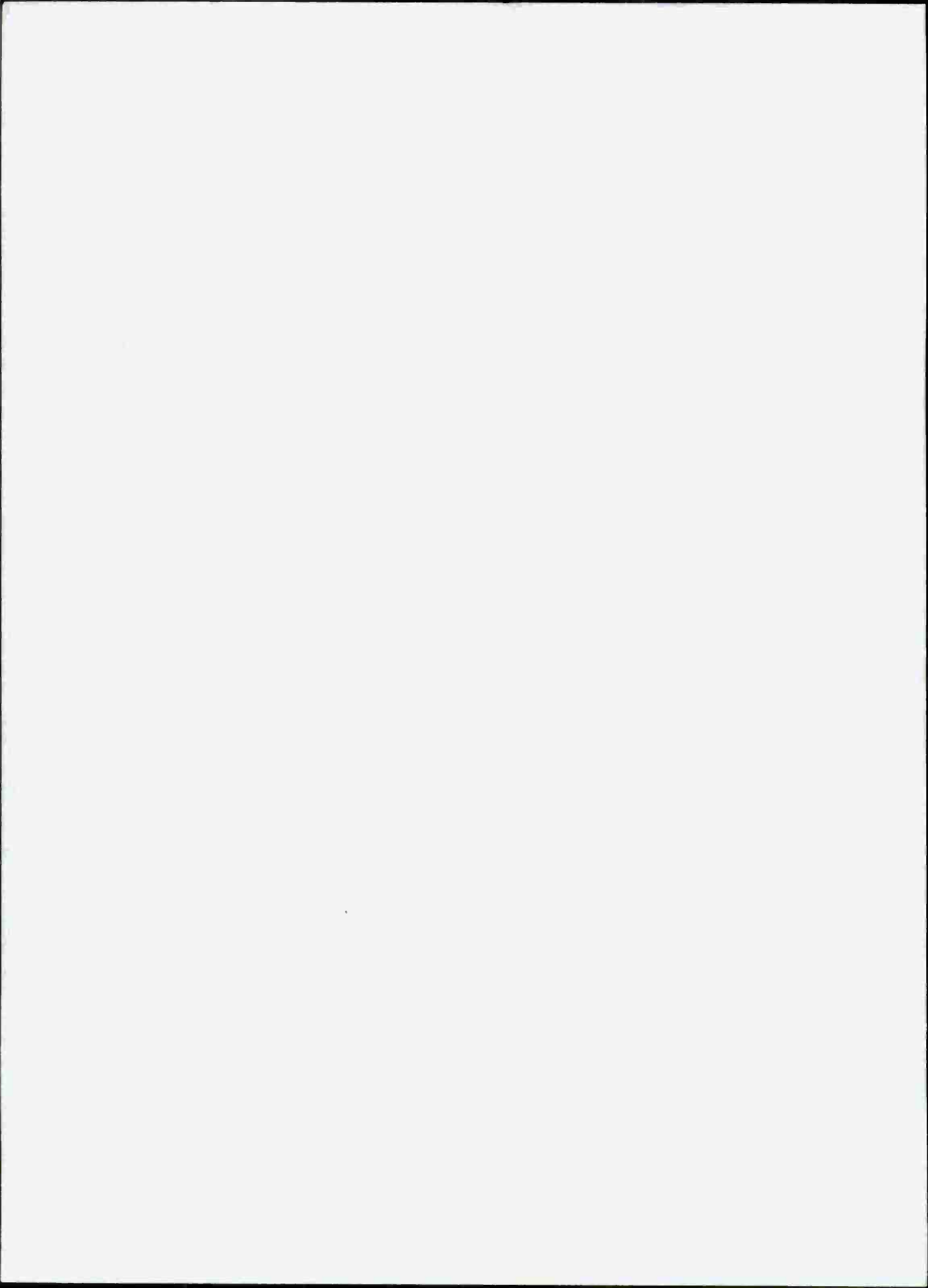
REFERENCES

Bell, C. R. Psychological versus sociological variables in studies of volunteer bias in surveys. Journal of Applied Psychology, 1961, 45, 80-85.

Berdie, D. R. Questionnaire length and response rate. Journal of Applied Psychology, 1973, 58, 278-280.

Blake, R. R., Berkowitz, H., Bellamy, R. Q., & Mouton, J. S. Volunteering as an avoidance act. Journal of Abnormal and Social Psychology, 1956, 53, 154-156.

Blake, R. R., & Rosenbaum, M. Volunteering as a function of field structure. Journal of Abnormal and Social Psychology, 1955, 50, 193-196.

Donald, M. M. Implications of nonresponse for the interpretation of mail-questionnaire data. Public Opinion Quarterly, 1960, 24, 99-114.

El-Badry, M. A. A sampling procedure for mailed questionnaires. Journal of the American Statistical Association, 1956, 51, 209-227.

Ellis, R., Endo, C., & Armer, J. The use of potential nonrespondents for studying nonresponse bias. Pacific Sociological Review, 1970, 13, 103-110.

Ferber, R. The problem of bias in mail returns: A solution. Public Opinion Quarterly, 1948, 12, 669-672.

Gale, E. F., Jr. Nonresponse in a mail survey of naval personnel. Unpublished thesis, Naval Postgraduate School, 1971.

Gannon, M. J., Nothern, J. C. & Carroll, S. J., Jr. Characteristics of nonrespondents among workers. Journal of Applied Psychology, 1971, 55, 586-588.

Hansen, M. H., & Hurwitz, W. H. The problem of non-response in sampling surveys. Journal of the American Statistical Association, 1946, 41, 517-529.

Hochstim, J. R., & Athanasopoulos, D. A. Personal follow-up in a mail survey: Its contribution and its cost. Public Opinion Quarterly, 1970, 34, 69-81.

Hood, T. C., & Back, K. W. Self-disclosure and the volunteer: A source of bias in laboratory experiments. Journal of Personality and Social Psychology, 1971, 17, 130-136.

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Kirk, B. A., & Sereda, L. Accuracy of self-reported college grade averages and characteristics of non and discrepant reporters. Educational and Psychological Measurement, 1969, 29, 147-155.

Kish, G. B. Variables affecting return-rate of mailed questionnaires. Paper presented at the Eastern Psychological Association Meeting, Boston, 1972.

Kivlin, J. E. Contributions to the study of mail-back bias. Rural Sociology, 1965, 30, 322-326.

Larson, R. F., & Catton, W. R. Can mail-back bias contribute to a study's validity? American Sociological Review, 1959, 24, 243-245.

Lundberg, G. A. Social research. New York: Longmans, Green, & Co., 1942.

Martin, R. M., & Marcuse, F. L. Characteristics of volunteers and nonvolunteers in psychological experimentation. Journal of Consulting Psychology, 1958, 22, 475-479.

Mayer, C. S., & Pratt, R. W., Jr. A note on non-response in a mailed survey. Public Opinion Quarterly, 1966, 30, 637-646.

Moonan, W. J. Vistas of analysis: Qualitative prediction and decision analysis. Paper presented at the Occupational Research Conference, San Diego, CA., 1973.

Ognibene, P. Correcting nonresponse bias in mail questionnaires. Journal of Marketing Research, 1971, 8, 233-235.

Pace, R. C. Factors influencing questionnaire returns from former university students. Journal of Applied Psychology, 1939, 23, 388-397.

Panos, R. J., & Rice, J. E. Experimental analysis of different mail follow-up techniques within a national sample of hard-core nonrespondents. Proceedings of the 75th Annual Convention of the American Psychological Association, 1967.

Rizzo, J. R., House, R. J., & Lirtzman, S. I. Role conflict and ambiguity in complex organizations. Administrative Science Quarterly, 1970, 15, 150-163.

Rosnow, R. L., Rosenthal, R., McConochie, R. M., & Arms, R. L. Volunteer effects on experimental outcomes. Educational and Psychological Measurement, 1969, 29, 825-846.

Scheverian, K. P., & Blaine, H. R. Questionnaire return bias in the study of blue collar workers. Public Opinion Quarterly, 1966, 30, 656-663.

Tsai, R. A Method for Correcting the Bias due to Nonresponse in a Mail Survey, WTR 73-44. Washington, D. C.: Naval Personnel Research and Development Laboratory, 1973.

Wallace, D. A case for and against mail questionnaires. Public Opinion
Quarterly, 1954, 18, 40-52.

APPENDIX A

FREQUENCY DISTRIBUTIONS OF THE
NUMBER OF TIMES REACHED
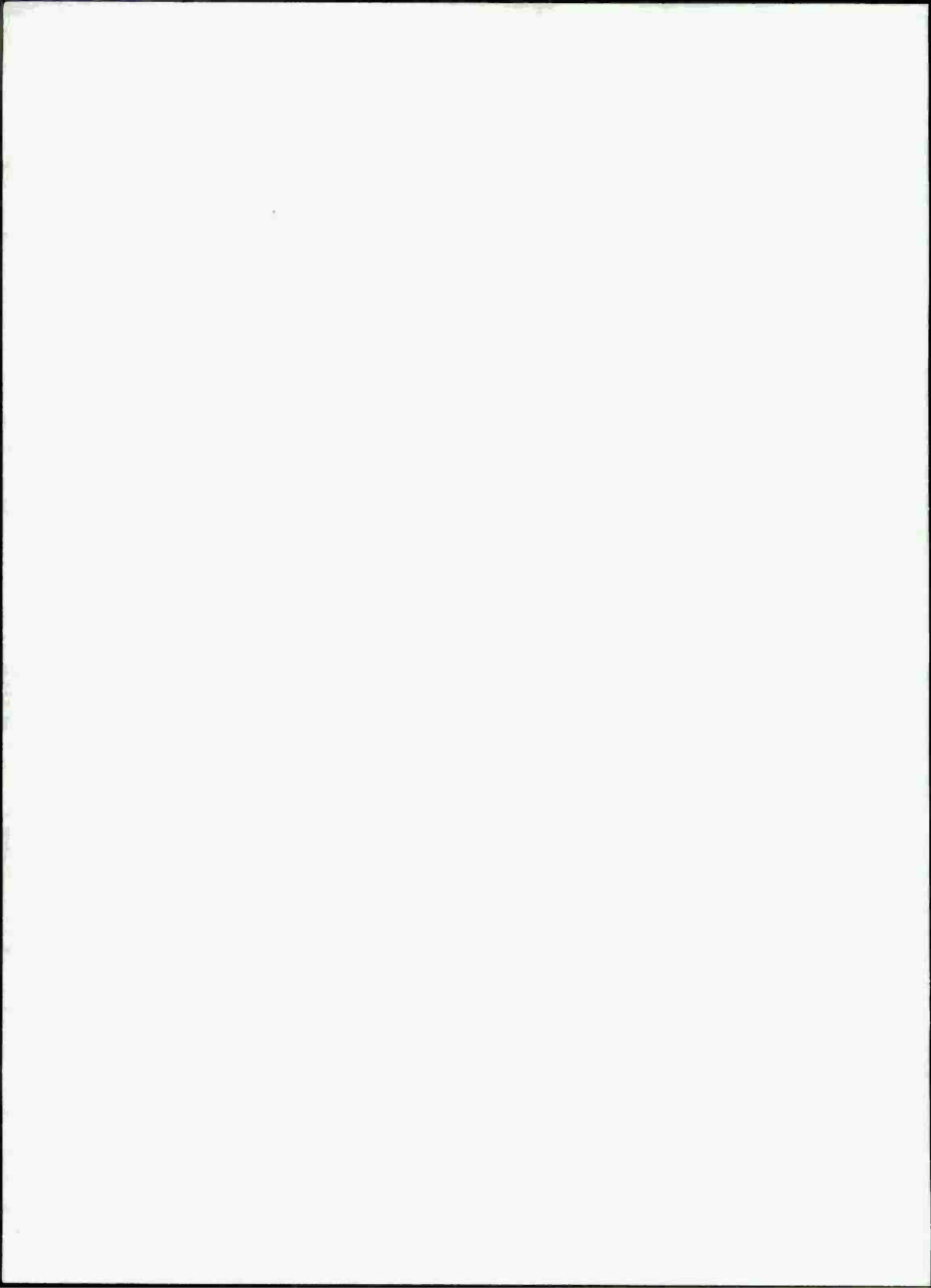
FREQUENCY DISTRIBUTION OF THE NUMBER OF TIMES
REACHED BY THE NUMBER OF TIMES RESPONDED -- GROUP A

Number of times reached	Number of times responded									
	0		1		2		3		4	
	n	%	n	%	n	%	n	%	n	%
None	5	8.3	0	0.0	0	0.0	0	0.0	0	0.0
Once	6	10.0	1	1.2	0	0.0	0.	0.0	0	0.0
Twice	10	16.7	12	14.1	16	14.5	0	0.0	0	0.0
Three times	4	6.7	13	15.3	13	11.8	18	19.6	0	0.0
Four times	35	58.3	59	69.4	81	73.6	74	80.4	113	100.0
Total	60	13.0	85	18.5	110	23.9	92	20.0	113	24.6

FREQUENCY DISTRIBUTION OF THE NUMBER OF TIMES
REACHED BY THE NUMBER OF TIMES RESPONDED -- GROUP B

Number of times reached	Number of times responded									
	0		1		2		3		4	
	n	%	n	%	n	%	n	%	n	%
None	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Once	6	17.6	0	0.0	0	0.0	0	0.0	0	0.0
Twice	11	32.4	9	18.8	11	23.4	0	0.0	0	0.0
Three times	3	8.8	1	2.1	5	10.6	1	2.5	0	0.0
Four times	14	41.2	38	79.2	31	66.0	39	97.5	31	100.0
Total	34	17.0	48	24.0	47	23.5	40	20.0	31	15.5

FREQUENCY DISTRIBUTION OF THE NUMBER OF TIMES
REACHED BY THE PROPORTION OF TIMES RESPONDED -- GROUP A

Number of times reached	Proportion of times responded												
	.00		.25		.33		.50		.67		.75		1.00	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
None	5	8.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Once	6	10.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.7
Twice	10	16.7	0	0.0	0	0.0	12	12.9	0	0.0	0	0.0	16	10.8
Three times	4	6.7	0	0.0	13	100.0	0	0.0	13	100.0	0	0.0	18	12.2
Four times	35	58.3	60	100.0	0	0.0	81	87.1	0	0.0	73	100.0	113	76.4
Total	60	13.0	60	13.0	13	2.8	93	20.2	13	2.8	73	15.9	148	32.2

FREQUENCY DISTRIBUTION OF THE NUMBER OF TIMES
REACHED BY THE PROPORTION OF TIMES RESPONDED -- GROUP B

Number of times reached	Proportion of times responded												
	.00		.25		.33		.50		.67		.75		1.00	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
None	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Once	6	17.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Twice	11	32.4	0	0.0	0	0.0	9	22.5	0	0.0	0	0.0	11	25.6
Three times	3	8.8	0	0.0	1	100.0	0	0.0	5	100.0	0	0.0	1	2.3
Four times	14	41.2	38	100.0	0	0.0	31	77.5	0	0.0	39	100.0	31	72.1
Total	34	17.0	38	19.0	1	.5	40	20.0	5	2.5	39	19.5	43	21.5

APPENDIX B

FREQUENCY DISTRIBUTIONS OF RESPONSES
TO THE ATTITUDINAL ITEMS BY RESPONSE CATEGORY
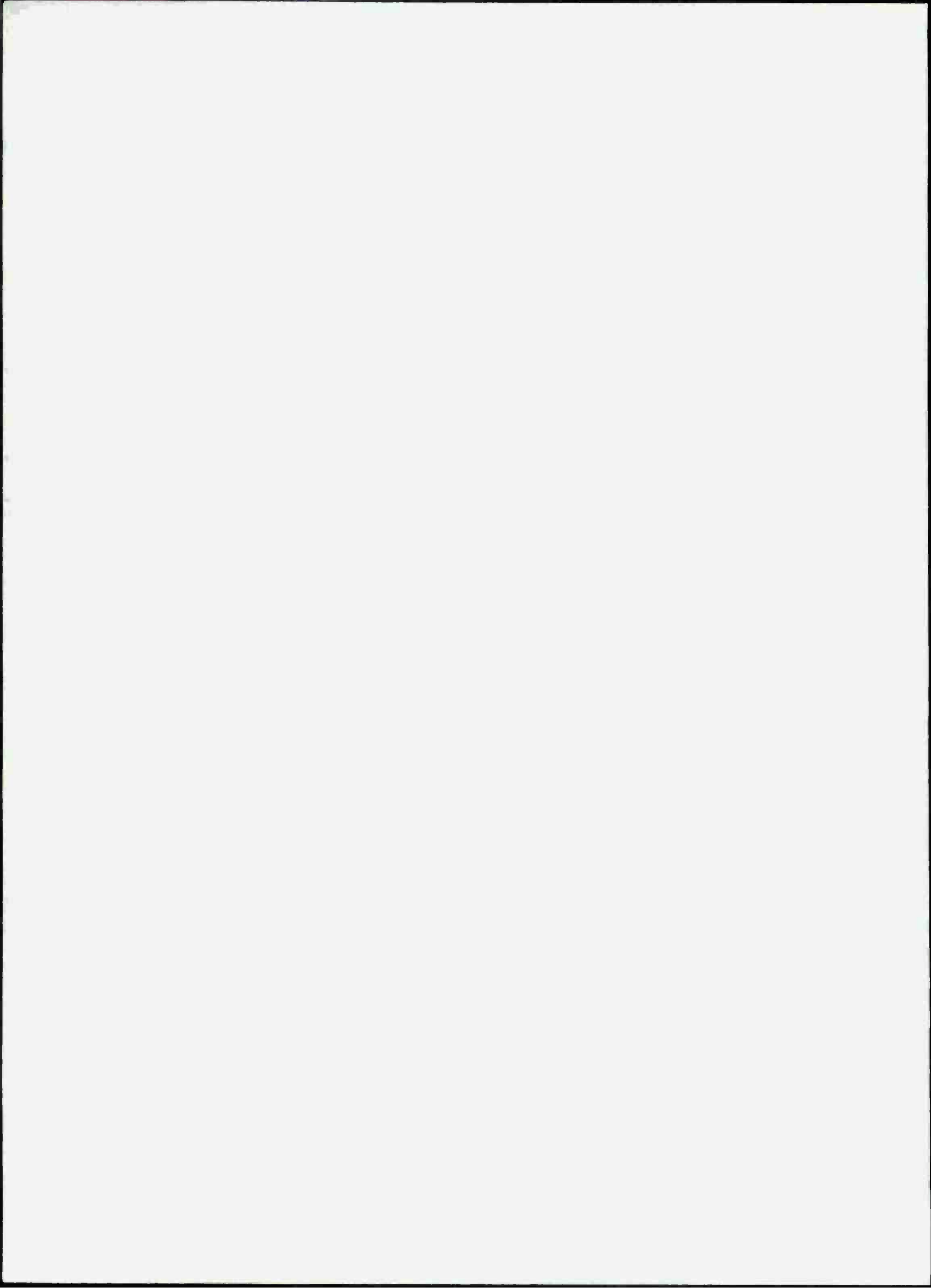
FREQUENCY DISTRIBUTIONS OF RESPONSES TO THE
ATTITUDINAL ITEMS BY RESPONSE CATEGORY FOR GROUPS A AND B

Item		Group B				
Advancement Multiple(1-8)		.25	.50	.75	1.00	Row n and Mean Row %
Fair	n %	10	14	12	25	61
	Row %	16.4	23.0	19.7	41.0	
	Column %	71.4	70.0	60.0	80.6	71.8
Unfair	n %	2	3	4	5	14
	Row %	14.3	21.4	28.6	35.7	
	Column %	14.3	15.0	20.0	16.1	16.5
No Opinion	n %	2	3	4	1	10
	Row %	20.0	30.0	40.0	10.0	
	Column %	14.3	15.0	20.0	3.2	11.8
	Column n and Mean	14	20	20	31	85
	Column %	16.5	23.5	23.5	36.5	

Chi square = 4.283,
df = 6,
Not significant at p < .05.

- -

Advancement-in-rate(1-10)						
Not applicable	n %	2	3	3	1	9
	Row %	22.2	33.3	33.3	11.1	
	Column %	14.3	15.0	15.8	3.2	10.7
Yes	n %	5	4	7	13	29
	Row %	17.2	13.8	24.1	44.8	
	Column %	35.7	20.0	36.8	41.9	34.5
No	n %	7	13	9	17	46
	Row %	15.2	28.3	19.6	37.0	
	Column %	50.0	65.0	47.4	54.8	54.8
	Column n and Mean	14	20	19	31	
	Column %	16.7	23.8	22.6	36.9	84

Chi square = 4.970,
df = 6,
Not significant at p < .05.

Item			Group B				
Information on rate (1-12)			.25	.50	.75	1.00	Row n and Mean Row %
Almost always	n %		4	4	9	16	33
	Row %		12.1	12.1	27.3	48.5	
	Column %		30.8	20.0	45.0	51.6	39.3
Occasionally	n %		8	11	11	12	42
	Row %		19.0	26.2	26.2	28.6	
	Column %		61.5	55.0	55.0	38.7	50.0
Never	n %		1	5	0	3	9
	Row %		11.1	55.6	0.0	33.3	
	Column %		7.7	25.0	0.0	9.7	10.7
	Column n and Mean		13	20	20	31	
	Column %		15.5	23.8	23.8	36.9	84

Chi square = 10.930,
df = 6,
Not significant at p < .05.

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Captain's Call (1-15)							
Yes	n %		8	8	10	15	41
	Row %		19.5	19.5	24.4	36.6	
	Column %		57.1	40.0	50.0	48.4	48.2
No	n %		6	12	10	16	44
	Row %		13.6	27.3	22.7	36.4	
	Column %		42.9	60.0	50.0	51.6	51.8
	Column n and Mean		14	20	20	31	
	Column %		16.5	23.5	23.5	36.5	85

Chi square = 1.013,
df = 3,
Not significant at p < .05.

Item		Group B				Row n and
Field advancement Program (1-24)		.25	.50	.75	1.00	Mean Row %
Yes	n %	10	14	12	16	52
	Row %	19.2	26.9	23.1	30.8	
	Column %	71.4	70.0	60.0	55.2	62.7
No	n %	4	6	8	13	31
	Row %	12.9	19.4	25.8	41.9	
	Column %	28.6	30.0	40.0	44.8	37.3
	Column n and Mean	14	20	20	29	
	Column %	16.9	24.1	24.1	34.9	83

Chi square = 1.676,
df = 3,
Not significant at $p < .05$.

- -

Item						
Rewards of rate (1-30)						
Yes	n %	11	19	19	29	78
	Row %	14.1	24.4	24.4	37.2	
	Column %	78.6	95.0	95.0	93.5	91.8
No	n %	3	1	1	2	7
	Row %	42.9	14.3	14.3	28.6	
	Column %	21.4	5.0	5.0	6.5	8.2
	Column n and Mean	14	20	20	31	
	Column %	16.5	23.5	23.5	36.5	85

Chi square = 3.909,
df = 3,
Not significant at $p < .05$.

Item		Group B				
Commanding Officer's Interest (1-31)		.25	.50	.75	1.00	Row n and Mean Row %
Not applicable	n %	4	11	10	13	38
	Row %	10.5	28.9	26.3	34.2	
	Column %	28.6	57.9	50.0	43.3	45.8
Never Attend	n %	2	3	1	2	8
	Row %	25.0	37.5	12.5	25.0	
	Column %	14.3	15.8	5.0	6.7	9.6
Yes	n %	6	5	8	11	30
	Row %	20.0	16.7	26.7	36.7	
	Column %	42.9	26.3	40.0	36.7	36.1
No	n %	2	0	1	4	7
	Row %	28.6	0.0	14.3	57.1	
	Column %	14.3	0.0	5.0	13.3	8.4
	Column n and Mean	14	19	20	30	
	Column %	16.9	22.9	24.1	36.1	83

Chi square = 7.484,
df = 9,
Not significant at $p < .05$.

- -

Recreation affect duty (1-33)						
Favorably	n %	8	14	11	21	54
	Row %	14.8	25.9	20.4	38.9	
	Column %	57.1	70.0	55.0	67.7	63.5
No influence	n %	4	6	9	9	28
	Row %	14.3	21.6	32.1	32.1	
	Column %	28.6	30.0	45.0	29.0	32.9
Unfavorably	n %	2	0	0	1	3
	Row %	66.7	0.0	0.0	33.3	
	Column %	14.3	0.0	0.0	3.2	3.5
	Column n and Mean	14	20	20	31	
	Column %	16.5	23.5	23.5	36.5	85

Chi square = 7.707,
df = 6,
Not significant at $p < .05$.

Item		Group B				Row n and
Reason for enlisting (1-55)		.25	.50	.75	1.00	Mean Row %
Job opportunities	n %	0	2	0	1	3
	Row %	0.0	66.7	0.0	33.3	
	Column %	0.0	10.0	0.0	3.2	3.5
Travel	n %	2	5	4	11	22
	Row %	9.1	22.7	18.2	50.0	
	Column %	14.3	25.0	20.0	35.5	25.9
Education	n %	1	1	3	5	10
	Row %	10.0	10.0	30.0	50.0	
	Column %	7.1	5.0	15.0	16.1	11.8
Fulfill military obligation	n %	3	5	6	5	19
	Row %	15.8	26.3	31.6	26.3	
	Column %	21.4	25.0	30.0	16.1	22.4
Save country	n %	2	2	2	3	9
	Row %	22.2	22.2	22.2	33.3	
	Column %	14.3	10.0	10.0	9.7	10.6
Interests in flying	n %	0	1	0	1	2
	Row %	0.0	50.0	0.0	50.0	
	Column %	0.0	5.0	0.0	3.2	2.4
Security	n %	3	3	1	2	9
	Row %	33.3	33.3	11.1	22.2	
	Column %	21.4	15.0	5.0	6.5	10.6
Other reason	n %	3	1	4	3	11
	Row %	27.3	9.1	36.4	27.3	
	Column %	21.4	5.0	20.0	9.7	12.9
	Column n and Mean	14	20	20	31	
	Column %	16.5	23.5	23.5	36.5	85

Chi square = 16.032,
df = 21,
Not significant at $p < .05$.

Item		Group B				Row n and
Effect of draft (1-56)		.25	.50	.75	1.00	Mean Row %
Would not	n %	9	16	14	26	65
have entered	Row %	13.8	24.6	21.5	40.0	
	Column %	64.3	80.0	70.0	83.9	76.5
Don't know	n %	5	2	5	5	17
	Row %	29.4	11.8	29.4	29.4	
	Column %	35.7	10.0	25.0	16.1	20.0
Would have	n %	0	2	1	0	3
entered	Row %	0.0	66.7	33.3	0.0	
	Column %	0.0	10.0	5.0	0.0	3.5
	Column n and Mean	14	20	20	31	
	Column %	16.5	23.5	23.5	36.5	85

Chi square = 7.930,
df = 6,
Not significant at p <.05.

- -

Service plans (1-57)						
Remain	n %	6	13	9	22	50
until	Row %	12.0	26.0	18.0	44.0	
retirement	Column %	42.9	65.0	45.0	71.0	58.8
Undecided	n %	4	5	6	5	20
	Row %	20.0	25.0	30.0	25.0	
	Column %	28.6	25.0	30.0	16.1	23.5
Get out	n %	4	2	5	4	15
	Row %	26.7	13.3	33.3	26.7	
	Column %	28.6	10.0	25.0	12.9	17.6
	Column n and Mean	14	20	20	31	
	Column %	16.5	23.5	23.5	36.5	85

Chi square = 6.028
df = 6,
Not significant at p .05.

Item		Group A					Group B				
Request Sea Duty (2-2)		.25	.50	.75	1.00	Row n and Mean Row %	.25	.50	.75	1.00	Row n and Mean Row %
Highly Probable	n	8	19	14	25	66	4	3	5	6	18
	Row %	12.1	28.8	21.2	37.9		22.2	16.7	27.8	33.3	
	Column %	33.3	38.0	24.1	26.0	28.9	28.6	13.6	16.7	20.7	18.9
Probable	n	6	10	16	35	67	5	10	16	13	44
	Row %	9.0	14.9	23.9	52.2		11.4	22.7	36.4	29.5	
	Column %	25.0	20.0	27.6	36.5	29.4	35.7	45.5	53.3	44.8	46.3
Improbable	n	3	12	10	15	40	1	3	3	5	12
	Row %	7.5	30.0	25.0	37.5		8.3	25.0	25.0	41.7	
	Column %	12.5	24.0	17.2	15.6	17.5	7.1	13.6	10.0	17.2	12.6
Not at all likely	n	7	9	18	21	55	4	6	6	5	21
	Row %	12.7	16.4	32.7	38.2		19.0	28.6	28.6	23.8	
	Column %	29.2	18.0	31.0	21.9	24.1	28.6	27.3	20.0	5.3	22.1
	Column n and Mean	24	50	58	96	228	14	22	30	29	95
	Column %	10.5	21.9	25.4	42.1		14.7	23.2	31.6	30.5	

Chi square = 9.793,
df = 9,
Not significant at $p < .05$.

Chi square = 3.722,
df = 9,
Not significant at $p < .05$.

Race of recruiter (3-20)		.25	.50	.75	1.00	Row n and Mean Row %	.25	.50	.75	1.00	Row n and Mean Row %
Black	n	0	0	0	2	2	0	1	5	1	7
	Row %	0.0	0.0	0.0	100.8		0.0	14.3	71.4	14.3	
	Column %	0.0	0.0	0.0	1.8	1.1	0.0	7.7	16.1	3.2	9.0
White	n	0	4	6	15	25	0	2	6	2	10
	Row %	0.0	16.0	24.0	60.0		0.0	20.0	60.0	20.0	
	Column %	0.0	30.8	10.9	13.4	13.4	0.0	15.4	19.4	6.5	12.8
Other	n	0	0	0	2	2	0	0	0	1	1
	Row %	0.0	0.0	0.0	100.8		0.0	0.0	0.0	100.0	
	Column %	0.0	0.0	0.0	1.8	1.1	0.0	0.0	0.0	3.2	1.3
No preference	n	7	9	49	93	158	3	10	20	27	60
	Row %	4.4	5.7	31.0	58.9		5.0	16.7	33.3	45.0	
	Column %	100.0	69.2	89.1	83.0	84.5	100.0	76.9	64.5	87.1	76.9
	Column n and Mean	7	13	55	112	187	3	13	31	31	78
	Column %	3.7	7.0	29.4	59.9		3.8	16.7	39.7	39.7	

Chi square = 7.531,
df = 9,
Not significant at $p < .05$.

Chi square = 8.429,
df = 9,
Not significant at $p < .05$.
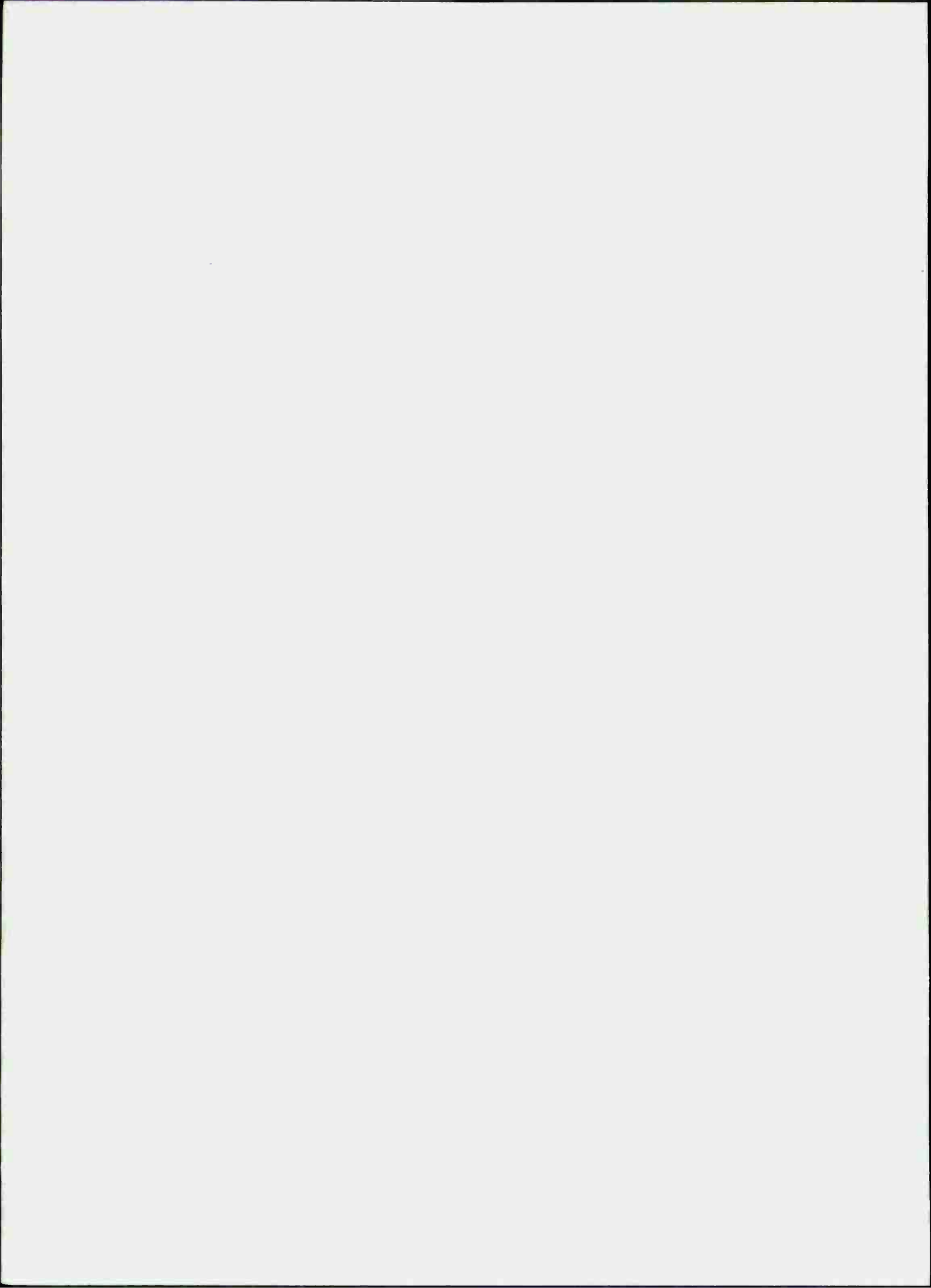
Item		Group A					Group B				
Human Goals Work (4-1)		.25	.50	.75	1.00	Row n and Mean Row %	.25	.50	.75	1.00	Row n and Row %
Yes	n	4	13	17	56	90	2	6	23	20	51
	Row %	4.4	14.4	18.9	62.2		3.9	11.8	45.1	39.2	
	Column %	80.0	48.1	51.5	51.9	52.0	66.7	85.7	76.7	66.7	72.9
No	n	1	13	16	45	75	1	1	5	10	17
	Row %	1.3	17.3	21.3	60.0		5.9	5.9	29.4	58.5	
	Column %	20.0	48.1	48.5	41.7	43.4	33.3	14.3	16.7	33.3	24.3
Don't know	n	0	1	0	7	8	0	0	2	0	2
	Row %	0.0	12.5	0.0	87.5		0.0	0.0	100.2	0.0	
	Column %	0.0	3.7	0.0	6.5	4.6	0.0	0.0	6.7	0.0	2.9
	Column n and Mean Column %	5	27	33	108	173	3	7	30	30	70
		2.9	15.6	19.1	62.4		4.3	10.0	42.9	42.9	

Chi square = 4.488,
df = 6,
Not significant at p < .05.

Chi square = 5.176,
df = 6,
Not significant at p < .05.

Women on ship (4-2)		.25	.50	.75	1.00		.25	.50	.75	1.00	
Dislike	n	1	7	8	29	45	0	1	8	7	16
	Row %	2.2	15.6	17.8	64.4		0.0	6.3	50.0	43.8	
	Column %	20.0	25.0	24.2	26.9	25.9	0.0	14.3	26.7	23.8	22.9
Neutral	n	2	11	11	41	65	1	3	7	11	22
	Row %	3.1	16.9	16.9	63.1		4.5	13.6	31.8	50.0	
	Column %	40.0	39.3	33.3	38.0	37.4	33.3	42.9	23.3	36.7	31.4
Like	n	2	10	14	38	64	2	3	15	12	32
	Row %	3.1	15.6	21.9	59.4		6.3	9.4	46.9	37.5	
	Column %	40.0	35.7	42.4	35.2	36.8	66.7	42.9	50.0	40.0	45.7
	Column n and Mean Column %	5	28	33	108	174	3	7	30	30	70
		2.9	16.1	19.0	62.1		4.3	10.0	42.9	42.9	

Chi square = .723,
df = 6,
Not significant at p < .05.

Chi square = 2.921,
df = 6,
Not significant at p < .05.

Women in combat (4-4)		.25	.50	.75	1.00		.25	.50	.75	1.00	
Unfavorable	n	2	4	7	24	37	0	2	10	9	21
	Row %	5.4	10.8	18.9	64.9		0.0	9.5	47.6	42.9	
	Column %	40.0	15.4	21.9	22.2	21.6	0.0	28.6	34.5	30.0	30.4
Partial	n	0	3	5	18	26	0	1	4	3	8
	Row %	0.0	11.5	19.2	69.2		0.0	12.5	50.0	37.5	
	Column %	0.0	11.5	15.6	16.7	15.2	0.0	14.3	13.8	10.0	11.6
Favorable	n	3	19	20	66	108	3	4	15	18	40
	Row %	2.8	17.6	18.5	61.1		7.5	10.0	37.5	45.0	
	Column %	60.0	73.1	62.5	61.1	63.2	100.0	57.1	51.7	160.0	58.0
	Column n and Mean Column %	5	26	32	108	171	3	7	29	30	70
		2.9	15.2	18.7	63.2		4.3	10.1	42.0	43.5	

Chi square = 2.899,
df = 6,
Not significant at p < .05.

Chi square = 2.789,
df = 6,
Not significant at p < .05.

Item		Group A					Group B				
Advancement of men and women (4-6)		.25	.50	.75	1.00	Row n and Mean Row%	.25	.50	.75	1.00	Row n and Mean Row %
Different	n	0	3	0	5	8	0	1	2	1	4
	Row %	0.0	37.5	0.0	62.5		0.0	25.0	50.0	25.0	
	Column %	0.0	10.7	0.0	4.6	4.6	0.0	14.3	6.7	3.3	5.7
Separate but equal	n	1	3	7	20	31	1	0	5	8	14
	Row %	3.2	9.7	22.6	64.5		7.1	0.0	35.7	57.1	
	Column %	20.0	10.7	20.6	18.5	17.7	33.3	0.0	16.7	26.7	20.0
Absolutely equal	n	4	22	27	83	136	2	6	23	21	52
	Row %	2.9	16.2	19.9	61.0		3.8	11.5	44.2	40.4	
	Column %	80.0	78.6	79.4	76.9	77.7	66.7	85.7	76.7	70.0	74.3
	Column n and Mean	5	28	34	108	175	3	7	30	30	70
	Column %	2.9	16.0	19.4	61.7		4.3	10.0	42.9	42.9	

Chi square = 5.111, df = 6, Not significant at p < .05.

Chi square = 4.160, df = 6, Not significant at p < .05.

Women as supervisors (4-7)											
Acceptable	n	5	20	23	78	126	3	7	23	23	56
	Row %	4.0	15.9	18.3	61.9		5.4	12.5	41.1	41.1	
	Column %	100.0	71.4	67.6	72.2	72.0	100.0	100.0	76.7	76.7	80.0
Barely acceptable	n	0	8	8	21	37	0	0	5	6	11
	Row %	0.0	21.6	21.6	56.8		0.0	0.0	45.5	54.5	
	Column %	0.0	28.6	23.5	19.4	21.0	0.0	0.0	16.7	20.0	15.7
Unacceptable	n	0	0	3	9	12	0	0	2	1	3
	Row %	0.0	0.0	25.0	75.0		0.0	0.0	66.7	33.3	
	Column %	0.0	0.0	8.8	8.3	6.9	0.0	0.0	6.7	3.3	4.3
	Column n and Mean	5	28	34	108	175	3	7	30	30	70
	Column %	2.9	16.0	19.4	61.7		4.3	10.0	42.9	42.9	

Chi square = 5.461, df = 6, Not significant at p < .05.

Chi square = 3.412, df = 6, Not significant at p < .05.

Item		Group A					Group B				
Mean role conflict scale		.25	.50	.75	1.00	Row n and Mean Row %	.25	.50	.75	1.00	Row n and Mean Row %
Very true	n	1	5	6	21	33	0	0	9	4	13
	Row %	3.0	15.2	18.2	63.6		0.0	0.0	69.2	30.8	
	Column %	20.0	17.9	17.6	19.3	18.8	0.0	0.0	30.0	13.3	18.6
Somewhat true	n	3	6	6	22	37	0	2	4	6	12
	Row %	8.1	16.2	16.2	59.5		0.0	16.7	33.3	50.0	
	Column %	60.0	21.4	17.6	20.2	21.0	0.0	28.6	28.6	20.0	17.1
Somewhat untrue	n	1	10	14	31	56	1	3	6	8	18
	Row %	1.8	17.9	25.0	55.4		5.6	16.7	33.3	44.4	
	Column %	20.0	35.7	41.2	28.4	31.8	33.3	42.9	20.0	26.7	25.7
Very untrue	n	0	7	8	35	50	2	2	11	12	27
	Row %	0.0	14.0	16.0	70.0		7.4	7.4	40.7	44.4	
	Column %	0.0	25.0	23.5	32.1	28.4	66.7	28.6	36.7	40.0	38.6
Column n and Mean		5	28	34	109	176	3	7	30	30	70
Column %		2.8	15.9	19.3	61.9		4.3	10.0	42.9	42.9	

Chi square = 7.915,
df = 9,
Not significant at p <.05.

Chi square = 7.953,
df = 9,
Not significant at p <.05.

Mean role ambiguity score		.25	.50	.75	1.00	Row n and Mean Row %	.25	.50	.75	1.00	Row n and Mean Row %
Very untrue	n	0	5	5	30	40	1	0	11	7	19
	Row %	0.0	12.5	12.5	75.0		5.3	0.0	57.9	36.8	
	Column %	0.0	17.9	14.7	27.5	22.7	33.3	0.0	36.7	23.3	27.1
Somewhat untrue	n	0	7	4	22	33	0	3	2	6	11
	Row %	0.0	21.2	12.1	66.7		0.0	27.3	18.2	54.5	
	Column %	0.0	25.0	11.8	20.2	18.8	0.0	42.9	6.7	20.0	15.7
Somewhat true	n	3	10	15	36	64	2	1	9	13	25
	Row %	4.7	15.6	23.4	56.3		8.0	4.0	36.0	52.0	
	Column %	60.0	35.7	44.1	33.0	36.4	66.7	14.3	30.0	43.0	35.7
Very true	n	2	6	10	21	39	0	3	8	4	15
	Row %	5.1	15.4	25.6	53.8		0.0	20.0	53.3	26.7	
	Column %	40.0	21.4	29.4	19.3	22.2	0.0	42.9	26.7	13.3	21.4
Column n and Mean		5	28	34	109	176	3	7	30	30	70
Column %		2.8	15.9	19.3	61.9		4.3	10.0	42.9	42.9	

Chi square = 9.630,
df = 9,
Not significant at p <.05.

Chi square = 14.683,
df = 9,
Not significant at p <.05.
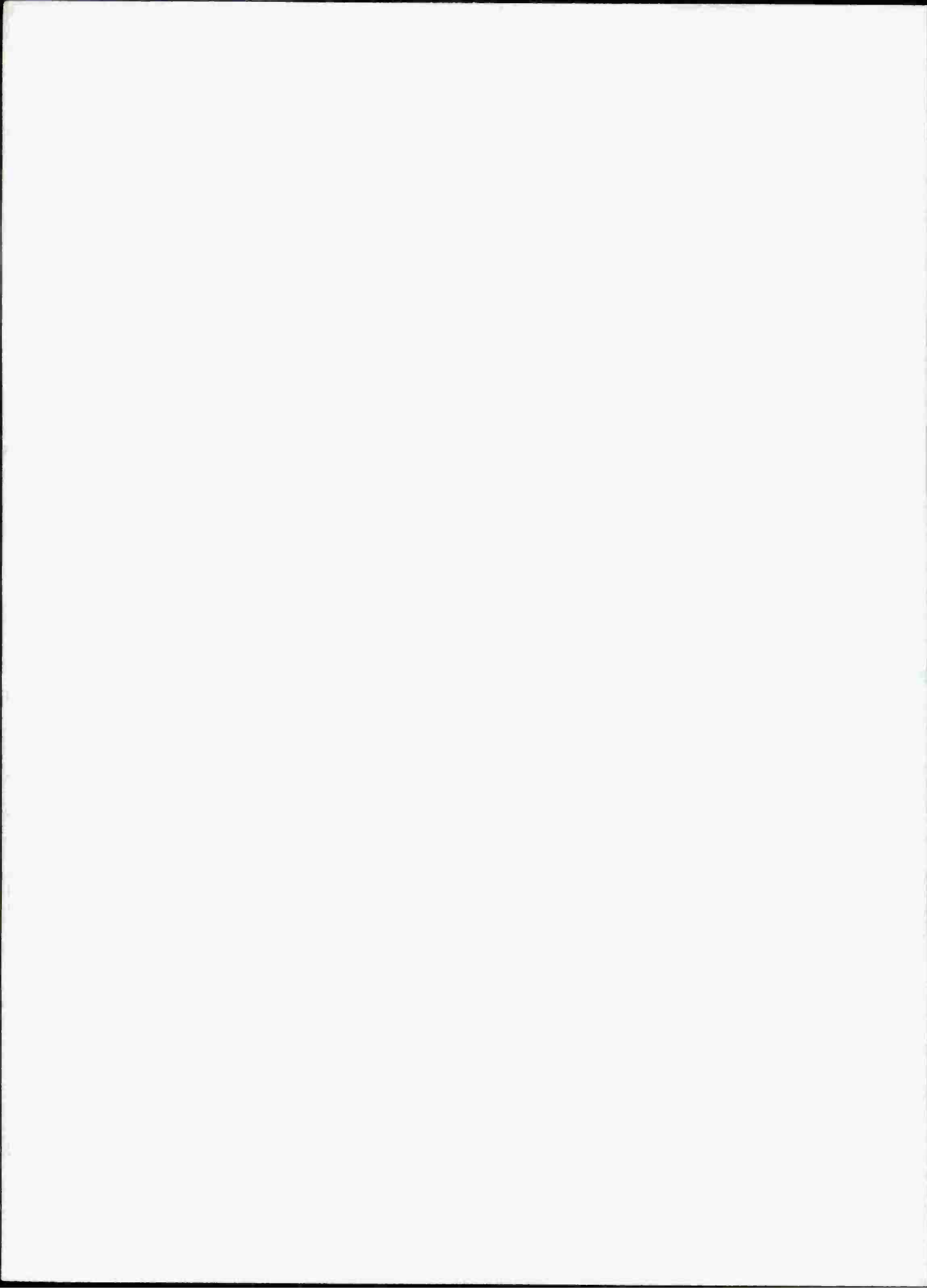
APPENDIX C

FREQUENCY DISTRIBUTIONS OF LEVELS OF
DEMOGRAPHIC VARIABLES

Pay grade/1		Group A					Row n and Mean Row %	Group B					Row n and Mean Row %
		.00	.25	.50	.75	1.00		.00	.25	.50	.75	1.00	
E2-3	n	15	19	14	2	12	62	6	15	4	9	3	37
	Row %	24.2	30.6	22.6	3.2	19.4		16.2	40.5	10.8	24.3	8.1	
	Column %	42.9	31.7	17.3	2.7	10.6	17.1	42.9	39.5	12.9	23.1	9.7	24.2
E4-6	n	19	31	55	60	71	236	6	17	21	24	16	84
	Row %	8.1	13.1	23.3	25.4	30.1		7.1	20.2	25.0	28.6	19.0	
	Column %	54.3	51.7	67.9	82.2	62.8	65.2	42.9	44.7	67.7	61.5	51.6	54.9
E7-9	n	1	10	12	11	30	64	2	6	6	6	12	32
	Row %	1.6	15.6	18.8	17.2	46.9		6.3	18.8	18.8	18.8	37.5	
	Column %	2.9	16.7	14.8	15.1	26.5	17.7	14.3	15.8	19.4	15.4	38.7	20.9
	Column n and Mean	35	60	81	73	113	362	14	38	31	39	31	153
	Column %	9.7	16.6	22.4	20.2	31.2		9.2	24.8	20.3	25.5	20.3	

Chi square = 48.368, df = 8, (P < .001).

Chi square = 18.502, df = 8, (p < .05).

No. of enlistments/1		Group A					Row n and Mean Row %	Group B					Row n and Mean Row %
		.00	.25	.50	.75	1.00		.00	.25	.50	.75	1.00	
1	n	23	23	22	11	14	93	8	20	7	12	5	52
	Row %	24.7	24.7	23.7	11.8	15.1		15.4	38.5	13.5	23.1	9.6	
	Column %	65.7	38.3	27.2	15.1	12.4	25.7	57.1	52.6	22.6	30.8	16.1	34.0
2	n	2	19	21	27	25	94	0	5	5	8	5	23
	Row %	2.1	20.2	22.3	28.7	26.6		0.0	21.7	21.7	34.8	21.7	
	Column %	5.7	31.7	25.9	37.0	22.1	26.0	0.0	13.2	16.1	20.5	16.1	15.0
3	n	4	4	11	13	31	63	4	7	10	12	5	38
	Row %	6.3	6.3	17.5	20.6	49.2		10.5	18.4	26.3	31.6	13.2	
	Column %	11.4	6.7	13.6	17.8	27.4	17.4	28.6	18.4	32.3	30.8	16.1	24.8
4 or more	n	6	14	27	22	43	112	2	6	9	7	16	40
	Row %	5.4	12.5	24.1	19.6	38.4		5.0	15.0	22.5	17.5	40.0	
	Column %	17.1	23.3	33.3	30.1	38.1	30.9	14.3	15.8	29.0	17.9	51.6	26.1
	Column n and Mean	35	60	81	73	113	362	14	38	31	39	31	153
	Column %	9.7	16.6	22.4	20.2	31.2		9.2	24.8	20.3	25.5	20.3	

Chi square = 64.149, df = 12, (p < .001).

Chi square = 27.330, df = 12, (p < .01).

Variable		Group A						Group B					
Primary dependents/1		.00	.25	.50	.75	1.00	Row n and Mean Row %	.00	.25	.50	.75	1.00	Row n and Mean Row %
0	n	21	28	26	17	21	113	8	18	9	14	6	55
	Row %	18.6	24.8	23.0	15.0	18.6		14.5	32.7	16.4	25.5	10.9	
	Column %	60.0	46.7	32.5	23.3	18.6	31.3	57.1	47.4	29.0	35.9	19.4	35.9
1	n	3	10	11	9	14	47	1	4	10	7	2	24
	Row %	6.4	21.3	23.4	19.1	29.8		4.2	16.7	41.7	29.2	8.3	
	Column %	8.6	16.7	13.8	12.3	12.4	13.0	7.1	10.5	32.3	17.9	6.5	15.7
2	n	4	11	13	15	14	57	2	5	4	6	10	27
	Row %	7.0	19.3	22.8	26.3	24.6		7.4	18.5	14.8	22.2	37.0	
	Column %	11.4	18.3	16.3	20.5	12.4	15.8	14.3	13.2	12.9	15.4	32.3	17.6
3 or more	n	7	11	30	32	64	144	3	11	8	12	13	47
	Row %	4.9	7.6	20.8	22.2	44.4		6.4	23.4	17.0	25.5	27.7	
	Column %	20.0	18.3	37.5	43.8	56.6	39.9	21.4	28.9	25.8	30.8	41.9	30.7
	Column n and Mean Column %	35	60	80	73	113	361	14	38	31	39	31	153
		9.7	16.6	22.2	20.2	31.3		9.2	24.8	20.3	25.5	20.3	

Chi square = 43.704,
df = 12,
(p < .001).

Chi square = 21.179,
df = 12,
(p < .05).

EAOS date/1		.00	.25	.50	.75	1.00	Row n and Mean Row %	.00	.25	.50	.75	1.00	Row n and Mean Row %
1974	n	20	24	42	33	51	170	9	19	12	16	16	72
	Row %	11.8	14.1	24.7	19.4	30.0		12.5	26.4	16.7	22.2	22.2	
	Column %	57.1	40.0	51.9	45.2	45.1	47.0	64.3	50.0	38.7	41.0	51.6	47.1
1975	n	13	17	22	22	37	111	3	13	6	15	6	43
	Row %	11.7	15.3	19.8	19.8	33.3		7.0	30.2	14.0	34.9	14.0	
	Column %	37.1	28.3	27.2	30.1	32.7	30.7	21.4	34.2	19.4	38.5	19.4	28.1
1976	n	1	10	9	8	12	40	1	5	9	4	7	26
	Row %	2.5	25.0	22.5	20.0	30.0		3.8	19.2	34.6	15.4	26.9	
	Column %	2.9	16.7	11.1	11.0	10.6	11.0	7.1	13.2	29.0	10.3	22.6	17.0
1977 or later	n	1	9	8	10	13	41	1	1	4	4	2	12
	Row %	2.4	22.0	19.5	24.4	31.7		8.3	8.3	33.3	33.3	16.7	
	Column %	2.9	15.0	9.9	13.7	11.5	11.3	7.1	2.6	12.9	10.3	6.5	7.8
	Column n and Mean Column %	35	60	81	73	113	362	14	38	31	39	31	153
		9.7	16.6	22.4	20.2	31.2		9.2	24.8	20.3	25.5	20.3	

Chi square = 10.315,
df = 12,
Not significant at p < .05.

Chi square = 13.840,
df = 12,
Not significant at p < .05.

Variable		Group A						Group B					
GCT score		.00	.25	.50	.75	1.00	Row n and Mean Row %	.00	.25	.50	.75	1.00	Row n and Mean Row %
40 or less	n	2	5	10	4	4	25	3	5	4	5	2	19
	Row %	8.0	20.0	40.0	16.0	16.0		15.8	26.3	21.1	26.3	10.5	
	Column %	6.7	9.4	13.5	6.0	4.3	7.9	23.1	15.2	17.4	14.7	7.7	14.7
41-50	n	8	8	15	13	18	62	3	7	7	9	7	33
	Row %	12.9	12.9	24.2	21.0	29.0		9.1	21.2	21.2	27.3	21.2	
	Column %	26.7	15.1	20.3	19.4	19.4	19.6	23.1	21.2	30.4	26.5	26.9	25.6
51-60	n	12	23	28	26	37	126	3	14	8	9	14	48
	Row %	9.5	18.3	22.2	20.6	29.4		6.3	29.2	16.7	18.8	29.2	
	Column %	40.0	43.4	37.8	38.8	39.8	39.7	23.1	42.4	34.8	26.5	53.8	37.2
61 or more	n	8	17	21	24	34	104	4	7	4	11	3	29
	Row %	7.7	16.3	20.2	23.1	32.7		13.8	24.1	13.8	37.9	10.3	
	Column %	26.7	32.1	28.4	35.8	36.6	32.8	30.8	21.2	17.4	32.4	11.5	22.5
	Column n and Mean	30	53	74	67	93	317	13	33	23	34	26	129
	Column %	9.5	16.7	23.3	21.1	29.3	10.1	25.6	17.8	26.4	20.2		

Chi square = 7.995,
df = 12,
Not significant at p < .05.

Chi square = 9.630,
df = 12,
Not significant at p < .05.

ARI score		.00	.25	.50	.75	1.00	Row n and Mean Row %	.00	.25	.50	.75	1.00	Row n and Mean Row %
40 or less	n	3	4	11	2	1	21	1	3	5	4	1	14
	Row %	14.3	19.0	52.4	9.5	4.8		7.1	21.4	35.7	28.6	7.1	
	Column %	10.0	7.7	15.1	3.0	1.1	6.7	7.7	9.4	22.7	11.8	4.0	11.1
41-50	n	12	10	17	18	24	81	4	12	5	9	15	45
	Row %	14.8	12.3	21.0	22.2	29.6		8.9	26.7	11.1	20.0	33.3	
	Column %	40.0	19.2	23.3	26.9	25.8	25.7	30.8	37.5	22.7	26.5	60.0	35.7
51-60	n	9	28	25	34	45	141	4	12	12	16	5	49
	Row %	6.4	19.9	17.7	24.1	31.9		8.2	24.5	24.5	32.7	10.2	
	Column %	30.0	53.8	34.2	50.7	48.4	44.8	30.8	37.5	54.5	47.1	20.0	38.9
61 or more	n	6	10	20	13	23	72	4	5	0	5	4	18
	Row %	8.3	13.9	27.8	18.1	31.9		22.2	27.8	0.0	27.8	22.2	
	Column %	20.0	19.2	27.4	19.4	24.7	22.9	30.8	15.6	0.0	14.7	16.0	14.3
	Column n and Mean	30	52	73	67	93	315	13	32	22	34	25	126
	Column %	9.5	16.5	23.2	21.3	29.5		10.3	25.4	17.5	27.0	19.8	

Chi square = 24.057,
df = 12,
Not significant at p < .05.

Chi square = 20.356,
df = 12,
Not significant at p < .05.

MECH score

Variable		Group A .00	.25	.50	.75	1.00	Row n and Mean Row %	Group B .00	.25	.50	.75	1.00	Row n and Mean Row %
40 or less	n	2	5	8	5	5	25	3	5	4	7	5	24
	Row %	8.0	20.0	32.0	20.0	20.0		12.5	20.8	16.7	29.2	20.8	
	Column %	6.7	9.6	11.0	7.5	5.4	7.9	23.1	15.6	18.2	20.6	20.0	19.0
41-50	n	11	19	28	22	26	106	8	15	8	13	13	57
	Row %	10.4	17.9	26.4	20.8	24.5		14.0	26.3	14.0	22.8	22.8	
	Column %	36.7	36.5	38.4	32.8	28.0	33.7	61.5	46.9	36.4	38.2	52.0	45.2
51-60	n	17	21	24	28	42	132	2	8	7	11	4	32
	Row %	12.9	15.9	18.2	21.2	31.8		6.3	25.0	21.9	34.4	12.5	
	Column %	56.7	40.4	32.9	41.8	45.2	41.9	15.4	25.0	31.8	32.4	16.0	25.4
61 or more	n	0	7	13	12	20	52	0	4	3	3	3	13
	Row %	0.0	13.5	25.0	23.1	38.5		0.0	30.8	23.1	23.1	23.1	
	Column %	0.0	13.5	17.8	17.9	21.5	16.5	0.0	12.5	13.6	8.8	12.0	10.3
Column n and Mean		30	52	73	67	93	315	13	32	22	34	25	126
Column %		9.5	16.5	23.2	21.3	29.5		10.3	25.4	17.5	27.0	19.8	

Chi square = 13.523, $df = 12$, Not significant at $p < .05$.

Chi square = 6.413, $df = 12$, Not significant at $p < .05$.

CLER score

Variable		Group A .00	.25	.50	.75	1.00	Row n and Mean Row %	Group B .00	.25	.50	.75	1.00	Row n and Mean Row %
40 or less	n	4	7	10	7	5	33	4	4	4	8	6	26
	Row %	12.1	21.2	30.3	21.2	15.2		15.4	15.4	15.4	30.8	23.1	
	Column %	13.3	13.5	13.7	10.4	5.4	10.5	30.8	12.5	18.2	24.2	24.0	20.8
41-50	n	10	19	27	19	28	103	3	11	7	12	9	42
	Row %	9.7	18.4	26.2	18.4	27.2		7.1	26.2	16.7	28.6	21.4	
	Column %	33.3	36.5	37.0	28.4	30.1	32.7	23.1	34.4	31.8	36.4	36.0	33.6
51-60	n	9	14	30	32	36	121	4	12	10	9	8	43
	Row %	7.4	11.6	24.8	26.4	29.8		9.3	27.9	23.3	20.9	18.6	
	Column %	30.0	26.9	41.1	47.8	38.7	38.4	30.8	37.5	45.5	27.3	32.0	34.4
61 or more	n	7	12	6	9	24	58	2	5	1	4	2	14
	Row %	12.1	20.7	10.3	15.5	41.4		14.3	35.7	7.1	28.6	14.3	
	Column %	23.3	23.1	8.2	13.4	25.8	18.4	15.4	15.6	4.5	12.1	8.0	11.2
Column n and Mean		30	52	73	67	93	315	13	32	22	33	25	125
Column %		9.5	16.5	23.2	21.3	29.5		10.4	25.6	17.6	26.4	20.0	

Chi square = 17.729, $df = 12$, Not significant at $p < .05$.

Chi square = 5.973, $df = 12$, Not significant at $p < .05$.

Variable		Group A					Row n and	Group B					Row n and
EAOS date/2		.00	.25	.50	.75	1.00	Mean Row %	.00	.25	.50	.75	1.00	Mean Row %
1974	n	19	24	40	33	51	167	8	19	12	16	15	70
	Row %	11.4	14.4	24.0	19.8	30.5		11.4	27.1	17.1	22.9	21.4	
	Column %	55.9	40.0	49.4	45.2	45.1	46.3	57.1	50.0	38.7	41.0	48.4	45.8
1975	n	13	17	22	22	37	111	3	13	6	15	6	43
	Row %	11.7	15.3	19.8	19.8	33.3		7.0	30.2	14.0	34.9	14.0	
	Column %	38.2	28.3	27.2	30.1	32.7	30.7	21.4	34.2	19.4	38.5	19.4	28.1
1976	n	1	9	11	8	12	41	1	5	9	4	7	26
	Row %	2.4	22.0	26.8	19.5	29.3		3.8	19.2	34.6	15.4	26.9	
	Column %	2.9	15.0	13.6	11.0	10.6	11.4	7.1	13.2	29.0	10.3	22.6	17.0
1977 or later	n	1	10	8	10	13	42	2	1	4	4	3	14
	Row %	2.4	23.8	19.0	23.8	31.0		14.3	7.1	28.6	28.6	21.4	
	Column %	2.9	16.7	9.9	13.7	11.5	11.6	14.3	2.6	12.9	10.3	9.7	9.2
	Column n and Mean	34	60	81	73	113	361	14	38	31	39	31	153
	Column %	9.4	16.6	22.4	20.2	31.3		9.2	24.8	20.3	25.5	20.3	

Chi square = 9.873,
df = 12,
Not significant at p < .05.

Chi square = 13.114
df = 12,
Not significant at p < .05.

Tour completion date/1		.00	.25	.50	.75	1.00	Row n and Mean	.00	.25	.50	.75	1.00	Row n and Mean
1974	n	24	45	47	51	71	238	9	26	22	25	20	102
	Row %	10.1	18.9	19.7	21.4	29.8		8.8	25.5	21.6	24.5	19.6	
	Column %	68.6	75.0	58.0	69.9	62.8	65.7	64.3	68.4	71.0	64.1	64.5	66.7
1975	n	9	13	24	19	26	91	2	9	6	13	10	40
	Row %	9.9	14.3	26.4	20.9	28.6		5.0	22.5	15.0	32.5	25.0	
	Column %	25.7	21.7	29.6	26.0	23.0	25.1	14.3	23.7	19.4	33.3	32.3	26.1
1976 or later	n	2	2	10	3	16	33	3	3	3	1	1	11
	Row %	6.1	6.1	30.3	9.1	48.5		27.3	27.3	27.3	9.1	9.1	
	Column %	5.7	3.3	12.3	4.1	14.2	9.1	21.4	7.9	7.9	2.6	3.2	7.2
	Column n and Mean	35	60	81	73	113	362	14	38	31	39	31	153
	Column %	9.7	16.6	22.4	20.2	31.2		9.2	24.8	20.3	25.5	20.3	

Chi square = 11.794,
df = 8,
Not significant at p < .05.

Chi square = 8.856,
df = 8,
Not significant at p < .05.

Variable / Race Code		.00	.25	.50	.75	1.00	Row n and Mean Row %	.00	.25	.50	.75	1.00	Row n and Mean Row %
								5	21	19	20	15	80
								6.2	26.3	23.8	25.0	18.8	
								35.7	55.3	61.3	51.3	48.4	52.3
								9	17	12	19	16	73
								12.3	23.3	16.4	26.0	21.9	
								64.3	44.7	38.7	48.7	51.6	47.7
								14	38	31	39	31	153
								9.1	24.8	20.3	25.5	20.3	

Chi square = 3.00
df = 4
Not significant at p < .05.

- -

Active duty base date

		.00	.25	.50	.75	1.00	Row n and Mean Row %	.00	.25	.50	.75	1.00	Row n and Mean Row %
1954 or before	n	1	7	6	2	13	29	0	5	4	1	7	17
	Row %	3.4	24.1	20.7	6.9	44.8		0.0	29.4	23.5	5.9	41.2	
	Column %	2.9	11.7	7.4	2.7	11.5	8.0	0.0	13.2	12.9	2.6	22.6	11.1
1955–1964	n	9	13	36	35	63	156	5	9	15	21	16	66
	Row %	5.8	8.3	23.1	22.4	40.4		7.6	13.6	22.7	31.8	24.2	
	Column %	26.5	21.7	44.4	47.9	55.8	43.2	35.7	23.7	48.4	53.8	51.6	43.1
1965–1968	n	3	13	18	24	19	77	1	5	3	6	3	18
	Row %	3.9	16.9	23.4	31.2	24.7		5.6	27.8	16.7	33.3	16.7	
	Column %	8.8	21.7	22.2	32.9	16.8	21.3	7.1	13.2	9.7	15.4	9.7	11.8
1969–1972	n	21	27	21	12	18	99	8	19	9	11	5	52
	Row %	21.2	27.3	21.2	12.1	18.2		15.4	36.5	17.3	21.2	9.6	
	Column %	61.8	45.0	25.9	16.4	15.9	27.4	57.1	50.0	29.0	28.2	16.1	34.0
	Column n and Mean	34	60	81	73	113	361	14	38	31	39	31	153
	Column %	9.4	16.6	22.4	20.2	31.3	9.2	24.8	20.3	25.5	20.3		

Chi square = 57.806, df = 12, (p < .001).

Chi square = 22.859, df = 12, (p < .05).

Variable Date of birth		.00	.25	.50	.75	1.00	Row n and Mean Row %	.00	.25	.50	.75	1.00	Row n and Mean Row %
1935 or before	n	2	7	9	5	20	43	0	6	4	4	8	22
	Row %	4.7	16.3	20.9	11.6	46.5		0.0	27.3	18.2	18.2	36.4	
	Column %	5.7	11.7	11.1	6.8	17.7	11.9	0.0	15.8	12.9	10.3	25.8	14.4
1936-1945	n	8	17	35	38	58	156	6	11	16	19	15	67
	Row %	5.1	10.9	22.4	24.4	37.2		9.0	16.4	23.9	28.4	22.4	
	Column %	22.9	28.3	43.2	52.1	51.3	43.1	42.9	28.9	51.6	48.7	48.4	43.8
1946-1949	n	7	12	17	21	21	78	1	5	4	7	4	21
	Row %	9.0	15.4	21.8	26.9	26.9		4.8	23.8	19.0	33.3	19.0	
	Column %	20.0	20.0	21.0	28.8	18.6	21.5	7.1	13.2	12.9	17.9	12.9	13.7
1950 or later	n	18	28	20	9	14	85	7	16	7	9	4	43
	Row %	21.2	28.2	23.5	10.6	16.5		16.3	37.2	16.3	20.9	9.3	
	Column %	51.4	40.0	24.7	12.3	12.4	23.5	50.0	42.1	22.6	23.1	12.9	28.1
	Column n and Mean	35	60	81	73	113	362	14	38	31	39	31	153
	Column %	9.7	16.6	22.4	20.2	31.2		9.2	24.8	20.3	25.5	20.3	

Chi square = 46.234,
df = 12,
(p < .001).

Chi square = 17.365,
df = 12,
Not significant at p < .05.

Years education		.00	.25	.50	.75	1.00	Row n and Mean Row %	.00	.25	.50	.75	1.00	Row n and Mean Row %
6-11	n	5	10	12	6	5	38	1	6	10	3	5	25
	Row %	13.2	26.3	31.6	15.8	13.2		4.0	24.0	40.0	12.0	20.0	
	Column %	14.3	16.7	14.8	8.2	4.4	10.5	7.1	15.8	32.3	7.7	16.1	16.3
12	n	27	39	61	53	89	269	12	26	21	32	22	113
	Row %	10.0	14.5	22.7	19.7	33.1		10.6	23.0	18.6	28.3	19.5	
	Column %	77.1	65.0	75.3	72.6	78.8	74.3	85.7	68.4	67.7	82.1	71.0	73.9
13-17	n	3	11	8	14	19	55	1	6	0	4	4	15
	Row %	5.5	20.0	14.5	25.5	34.5		6.7	40.0	0.0	26.7	26.7	
	Column %	8.6	18.3	9.9	19.2	16.8	15.2	7.1	15.8	0.0	10.3	12.9	9.8
	Column N and Mean	35	60	81	73	113	362	14	38	31	39	31	153
	Column %	9.7	16.6	22.4	20.2	31.2		9.2	24.8	20.3	25.5	20.3	

Chi square = 13.366,
df = 8,
Not significant at p < .05.

Chi square = 13.131,
df = 8,
Not significant at p < .05.

Variable				Group A							Group B		
Time in rate		.00	.25	.50	.75	1.00	Row n and Mean Row %	.00	.25	.50	.75	1.00	Row n and Mean Row %
1965 or before	n	1	3	5	3	6	18	0	2	2	2	2	8
	Row %	5.6	16.7	27.8	16.7	33.3		0.0	25.0	25.0	25.0	25.0	
	Column %	2.9	5.3	6.2	4.3	5.8	5.2	0.0	5.3	6.9	5.3	6.5	5.3
1966-1969	n	8	17	28	27	48	128	2	10	11	14	16	53
	Row %	6.3	13.3	21.9	21.1	37.5		3.8	18.9	20.8	26.4	30.2	
	Column %	22.9	29.8	34.6	39.1	46.6	37.1	14.3	26.3	37.9	36.8	51.6	35.3
1970 or later	n	26	37	48	39	49	199	12	26	16	22	13	89
	Row %	13.1	18.6	24.1	19.6	24.6		13.5	29.2	18.0	24.7	14.6	
	Column %	74.3	64.9	59.3	56.5	47.6	57.7	85.7	68.4	55.2	57.9	41.9	59.3
	Column n and Mean	35	57	81	69	103	345	14	38	29	38	31	150
	Column %	10.1	16.5	23.5	20.0	29.9		9.3	25.3	19.3	25.3	20.7	

Chi square = 10.204, df = 8, Not significant at $p < .05$.

Chi square = 9.838, df = 8, Not significant at $p < .05$.

Sea/shore code		.00	.25	.50	.75	1.00		.00	.25	.50	.75	1.00	
Sea	n	20	32	41	31	41	165	6	13	16	19	17	71
	Row %	12.1	19.3	24.8	18.7	24.8		8.5	18.3	22.5	26.8	23.9	
	Column %	57.1	53.3	50.6	42.4	36.3	45.4	42.9	34.2	51.6	48.7	54.8	46.4
Shore	n	15	28	40	42	72	197	8	25	15	20	14	82
	Row %	7.6	14.2	20.3	21.3	36.5		9.8	30.5	18.3	24.4	17.1	
	Column %	42.9	46.7	49.4	57.5	63.7	54.4	57.1	65.8	48.4	51.3	45.2	53.6
	Column n and Mean	35	60	81	73	113	362	14	38	31	39	31	153
	Column %	9.7	16.6	22.4	20.2	31.2		9.2	24.8	20.3	25.5	20.3	

Chi square = 8.39, df = 4, Not significant at $p < .05$.

Chi square = 3.39, df = 4, Not significant at $p < .05$.

Variable Tour completion date/2		.00	.25	.50	.75	1.00	Row n and Mean Row %	.00	.25	.50	.75	1.00	Row n and Mean Row %
				Group A						Group B			
1974	n	19	30	41	31	60	181	7	23	16	17	14	77
	Row %	10.5	16.6	22.7	17.1	33.1		9.1	29.9	20.8	22.1	18.2	
	Column %	57.6	50.8	51.3	42.5	53.6	50.7	50.0	60.5	51.6	43.6	45.2	50.3
1975	n	10	22	25	30	36	123	3	11	9	16	10	49
	Row %	8.1	17.9	20.3	24.4	29.3		6.1	22.4	18.4	32.7	20.4	
	Column %	30.3	37.3	31.3	41.1	32.1	34.5	21.4	28.9	29.0	41.0	32.3	32.0
1976 or later	n	4	7	14	12	16	53	4	4	6	6	7	27
	Row %	7.5	13.2	26.4	22.6	30.2		14.8	14.8	22.2	22.2	25.9	
	Column %	12.1	11.9	17.5	16.4	14.3	14.8	28.6	10.5	19.4	15.4	22.6	17.6
	Column n and Mean	33	59	80	73	112	357	14	38	31	39	31	153
	Column %	9.2	16.5	22.4	20.4	31.4		9.2	24.8	20.3	25.5	20.3	

Chi square = 4.167,
df = 8,
Not significant at p < .05.

Chi square = 5.620,
df = 8,
Not significant at p < .05.
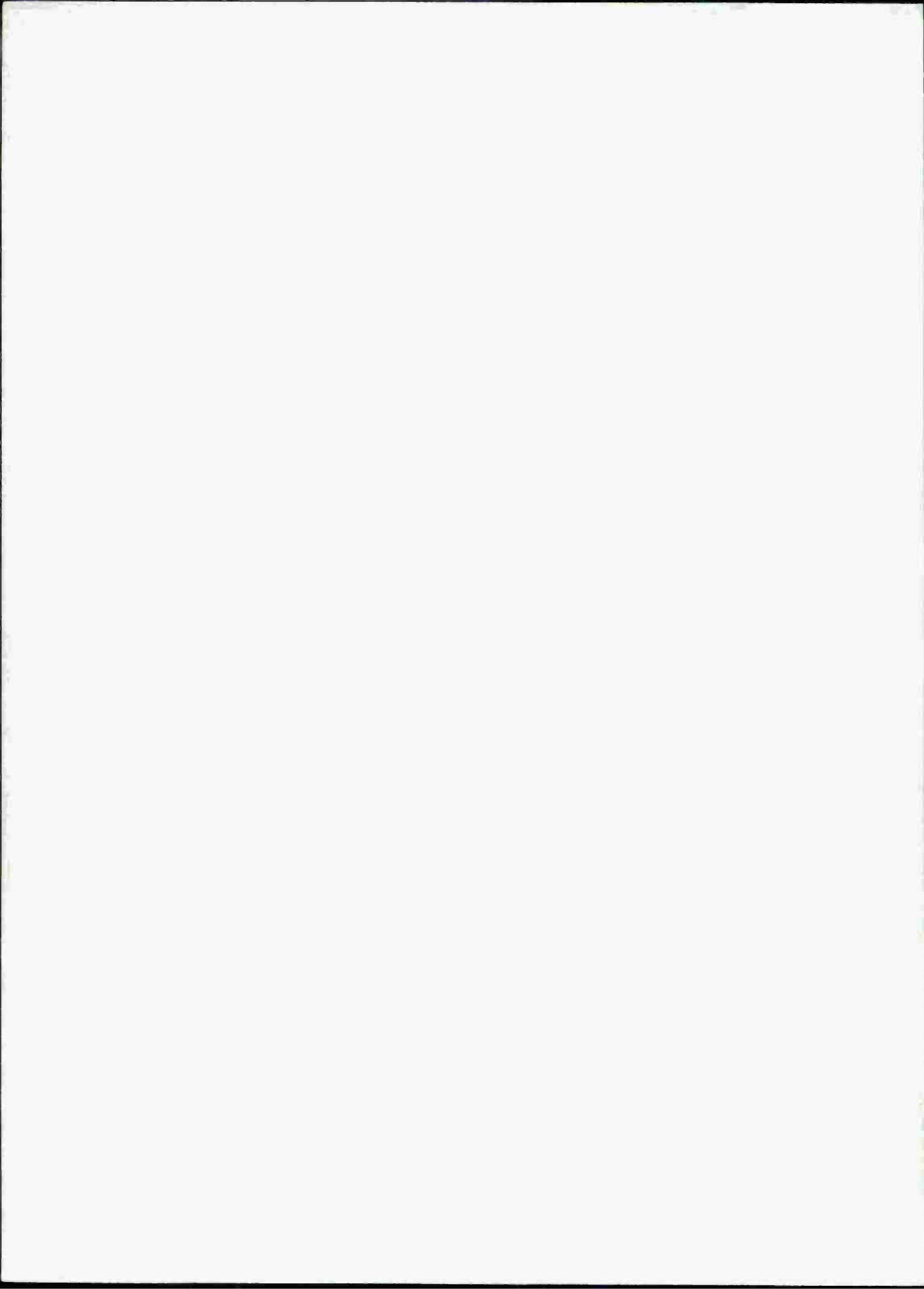
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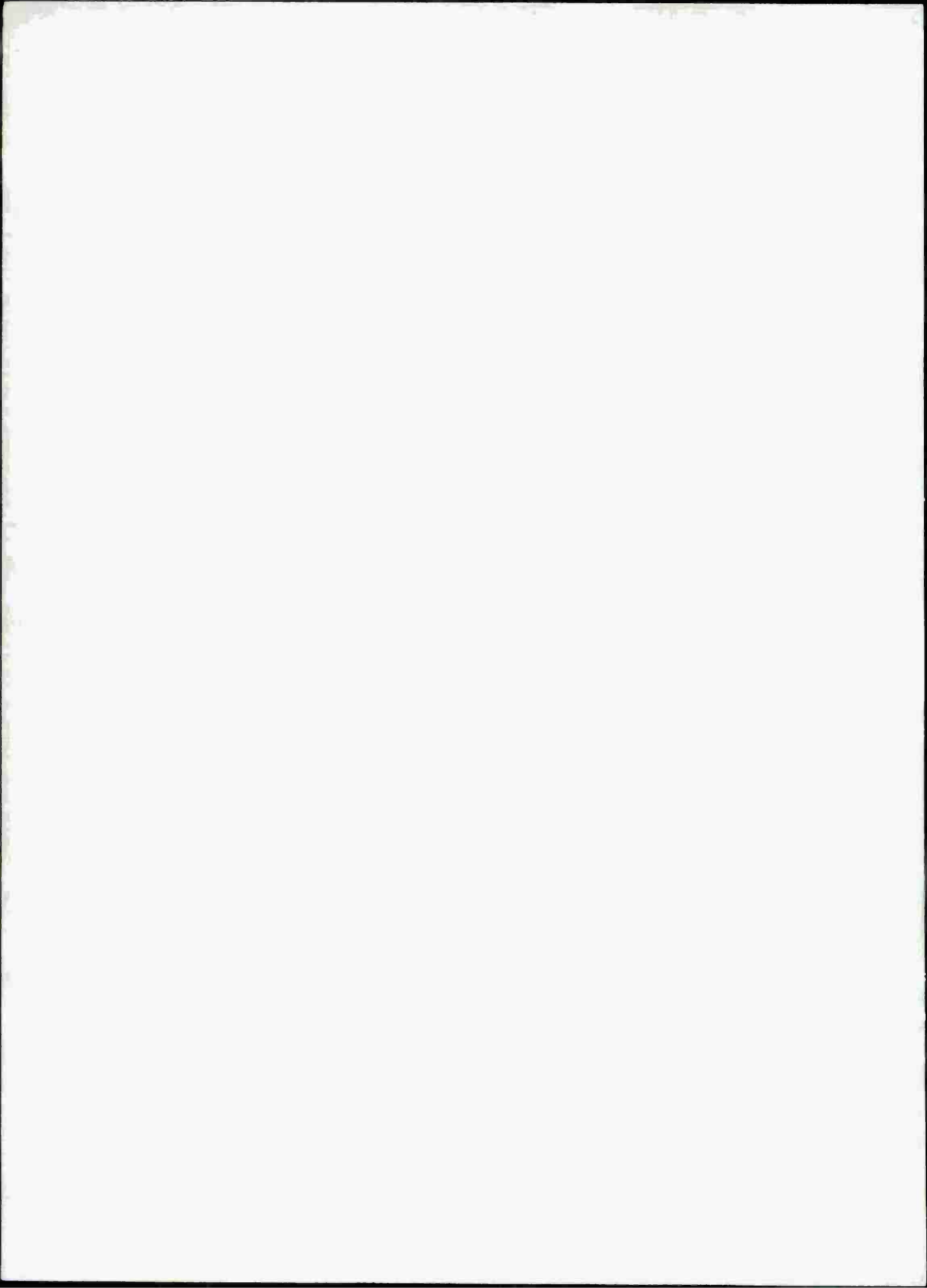
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