DOCUMENT RESUME

ED 112 326 CG 010 100

AUTHOR Brown, George H.
TITLE Randomized Inquiry vs. Conventional Questionnaire Method in Estimating Drug Usage Rates Through Mail Surveys.
INSTITUTION Human Resources Research Organization, Alexandria, Va.
SPONS AGENCY Army Research Inst. for the Behavioral and Social Sciences, Arlington, Va.
REPORT NO HumRRO-TR-75-14
PUB DATE Jun 75
NOTE 35p.

EDRS PRICE MF-$0.76 HC-$1.95 Plus Postage
DESCRIPTORS Armed Forces; *Drug Abuse; Information Seeking; *Measurement Techniques; *Questionnaires; *Research Methodology; Research Projects; Sampling; *Surveys

ABSTRACT

This report is a product of research conducted under a program explcring improved methods of acquiring data on sensitive topics, such as the scope and intensity of current social problems. In this case, the problem studied was drug abuse in the Army. A mail survey dealing with illicit drug use was conducted, comparing the data acquisition effectiveness of the Randomized Inquiry (RI) technique and a conventional-type questionnaire. The respondents were four stratified random samples, of approximately 500 men each, drawn from the U.S. Army, Continental United States. Variables studied were (a) method used in questionnaire (RI vs. conventional), (b) rank of respondent (officers vs. enlisted men), and (c) effect of advance notice on return rate. Five sensitive questions were developed to get information of the respondents' use of five drugs. Conventional questionnaires yielded more response than questionnaires employing the RI technique; drug usage rates reported were not significantly different under the two techniques. The questionnaire return rate proved to be higher for officers than for enlisted men, particularly when they received advance notice of the survey. Since the research performed for this project is primarily methodological, this report is of interest especially tc personnel in the fields of operations research, data acquisition, management, and program planning. (Author)

Technical Report 75-14

HumRRO-TR-75-14

HumRRO

Randomized Inquiry vs. Conventional Questionnaire Method in Estimating Drug Usage Rates Through Mail Surveys

George H. Brown

HUMAN RESOURCES RESEARCH ORGANIZATION
300 North Washington Street • Alexandria, Virginia 22314

Approved for public release; distribution unlimited.

June 1975

Prepared for

U.S. Army Research Institute for the Behavioral and Social Sciences
1300 Wilson Boulevard
Arlington, Virginia 22209

The Human Resources Research Organization (HumRRO) is a nonprofit corporation established in 1969 to conduct research in the field of training and education. It is a continuation of The George Washington University Human Resources Research Office. HumRRO's general purpose is to improve human performance, particularly in organizational settings, through behavioral and social science research, development, and consultation. HumRRO's mission in work performed under Contract DAHC19-73-C-0004 with the Department of the Army is to conduct research in the fields of training, motivation, and leadership.

Published
June 1975
by
HUMAN RESOURCES RESEARCH ORGANIZATION
300 North Washington Street
Alexandria, Virginia 22314

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: HumRRO-TR-75-14
2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER

4. TITLE *(and Subtitle)*: RANDOMIZED INQUIRY VS. CONVENTIONAL QUESTIONNAIRE METHOD IN ESTIMATING DRUG USAGE RATES THROUGH MAIL SURVEYS

5. TYPE OF REPORT & PERIOD COVERED: Technical Report

6. PERFORMING ORG. REPORT NUMBER: Technical Report 75-14

7. AUTHOR(S): George H. Brown

8. CONTRACT OR GRANT NUMBER(S): DAHC19-73-C-0004

9. PERFORMING ORGANIZATION NAME AND ADDRESS: Human Resources Research Organization (HumRRO), 300 North Washington Street, Alexandria, Virginia 22314

10. PROGRAM ELEMENT PROJECT TASK AREA & WORK UNIT NUMBERS: 62107A; 2Q062107A745; 00; 716

11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. Army Research Institute for the Behavioral and Social Sciences, 1300 Wilson Boulevard, Arlington, Virginia 22209

12. REPORT DATE: June 1975

13. NUMBER OF PAGES: 32

14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*

15. SECURITY CLASS. *(of this report)*: Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

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

18. SUPPLEMENTARY NOTES

Research performed by HumRRO Eastern Division, Alexandria, Virginia, under Work Unit MODE.

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

Adjustment (psychology)	Drug usage	Prejudices	Survey methods
Alienation	Drugs	Questionnaires	Vocational guidance
Anxiety	Human behavior	Randomized Inquiry	
Decision making	Interview method	Research instruments	
Drug information	Motivation	Social perception	

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

The purpose of this study was to compare the conventional questionnaire and the Randomized Inquiry (RI) technique as methods of conducting a mail survey of illicit drug use. The latter technique is designed specifically to provide maximum assurance of anonymity. Also compared was the effect of advance notice upon return rate. Questionnaires of the appropriate type were sent to random samples of junior enlisted and junior officer personnel in the

(Continued)

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

20. Abstract (Continued)

U.S. Army in the Continental United States. Total number of target research subjects was approximately 4,000. Illustrative findings were that (a) return rates were significantly higher for the conventional questionnaire; (b) advance notice enhanced the return rate for officers, but not for enlisted men; and (c) reported drug usage rates were not significantly related to the method of data acquisition.

SUMMARY AND CONCLUSIONS

MILITARY PROBLEM

Accurately assessing the magnitude of social problems such as illicit drug use and interracial hostility is a difficult matter because many people are reluctant to express their true feelings on sensitive topics. Mail surveys can provide anonymity, but they have the disadvantage of generally low response rates. A need exists for developing a mail survey method that will overcome the problems of low validity and low response.

RESEARCH PROBLEM

A generalized method known as Randomized Inquiry (RI) offers promise of meeting the need for a more adequate survey method. The research problem addressed in this study was to develop a mail-back version of the RI technique and evaluate it as compared with a conventional mail questionnaire in the assessment of illicit drug use. An auxiliary objective was to determine whether response rates would be significantly enhanced by sending respondents an advance notice, alerting them to expect the questionnaire.

APPROACH

The essence of the RI method is that respondents randomly select and answer either sensitive or nonsensitive questions without revealing which question they have answered. Statistical processing of the data provides an estimate of the percentage of the group who possess the sensitive attribute (e.g., uses drugs). A version of this method judged to be suitable for mail surveys was devised for evaluation in this study. Five sensitive questions were developed, asking the respondent about his use, during the previous three-day period, of (a) marijuana, (b) psychedelics, (c) stimulants, (d) depressants, and (e) narcotics.

Four stratified random samples (approximately 500 men each) were drawn from each of two Army populations in the Continental United States (CONUS):

(1) Junior enlisted personnel (E1-E4).

(2) Junior officer personnel (01-02).

The resulting eight groups were employed in a factorial design such that the following independent variables could be investigated: (a) method (Randomized Inquiry vs. conventional questionnaire), (b) rank (officers vs enlisted men), and (c) advance notice. The dependent variables were: (a) questionnaire return rate and (b) drug usage rates for each of the five drug types.

Both the advance notice cards and the questionnaires (which incorporated a prepaid anonymous answer card) were sent out via First Class Mail during February 1973. A cut-off date for processing returned answer cards was established at five weeks after initial mailing.

RESULTS

The results of this study are summarized as follows:

(1) The questionnaire return rate ranged from a low of 18% for one of the enlisted groups to a high of 65% for one of the officer groups.

(2) In general, the return rate was significantly higher for officers than for enlisted men (51 vs. 27%).

(3) In general, the return rate was significantly higher for conventional questionnaires than for RI questionnaires (48 vs. 31%).

(4) Advance notice enhanced the return rate for officers (from 45 to 57%) but not for enlisted men (27 to 28%).

(5) Advance notice enhanced the return rate for conventional questionnaires (43 to 52%) more than for RI questionnaires (28 to 34%).

(6) Reported drug usage rates were significantly higher for enlisted men than for officers.

(7) Reported drug usage rates were not significantly related to method (RI vs. conventional questionnaires).

(8) Advance notice depressed reported drug usage rates only with respect to narcotics.

(9) With enlisted men, but not with officers, advance notice depressed reported drug usage rates.

(10) For the RI method, but not the conventional, the effect of advance notice was to depress reported drug usage rates.

CONCLUSIONS

On the basis of the data collected in this study, the following conclusions appear tenable:

(1) The mail-back version of the Randomized Inquiry method used in this study was less effective than a conventional mail questionnaire in producing high response rates.

(2) Reported drug usage rates as estimated by the two types of questionnaire data were equivalent.

(3) Advance notice enhanced return rate for officers more than for enlisted men, and for the conventional questionnaire more than for the Randomized Inquiry questionnaire.

(4) Reported drug usage rates were significantly higher for enlisted men (E1-E4) than for junior officers (01-02).

PREFACE

In these times of rapid social change, both the Army and the civilian world are troubled by problems such as illicit drug use, interracial hostility, and dissidence. In order to cope with these problems effectively, their magnitude needs to be accurately assessed. This report is the third in a series that focuses upon one of these problem areas, illicit drug use. The study reported herein represents an attempt to develop an economical and effective method for assessing the extent of illicit drug use in the Army.

This research was conducted by the Human Resources Research Organization, Eastern Division (formerly Division No. 7—Social Science), under Work Unit MODE, Sub-Unit I. Work Unit MODE, Research Into Methods of Data Acquisition in Selected Social Problem Areas in the Military, was initiated in January 1971. Dr. Arthur J. Hoehn was Director of the Division when the study was initiated and Dr. Robert G. Smith was Director during the final portion of the study. Dr. Daniel J. Lyons is currently Director of the Eastern Division. Dr. George H. Brown is the Work Unit Leader. PFC Steve Hartsock assisted in the data analysis.

The work was conducted under the sponsorship of the U.S. Army Research Institute for the Behavioral and Social Sciences with Dr. Douglas A. Ramsay serving as the technical monitor. Appreciation is expressed to personnel at U.S. Army Personnel Information Systems Command (PERSINSCOM) for providing the lists of target research subjects. Appreciation is also expressed to the thousands of individual subjects who cooperated in this study.

HumRRO research for the Department of the Army for Work Unit MODE was conducted under Army Contract DAHC19-73-C-0004. Army Training Research is conducted under Project 2Q062107A745.

Meredith P. Crawford
President
Human Resources Research Organization

CONTENTS

List of Tables

Randomized Inquiry vs. Conventional Questionnaire Method in Estimating Drug Usage Rates Through Mail Surveys

Chapter 1

INTRODUCTION

OBJECTIVES OF THE STUDY

This study compares the drug usage rates of Army personnel as shown by (a) a mail-back version of the Randomized Inquiry (RI) method, and (b) a conventional mail-back questionnaire. Interest centered on evaluating the RI method as a possible device for periodically assessing the magnitude of the Army's drug problem.

An additional objective was to assess the effect of advance notice upon return rate in a mail survey.

MILITARY PROBLEM

In the military as in the civilian world, social problems abound. Illicit drug use, interracial hostility, and discontent with the Army are examples of problem areas which, from time to time, reach critical levels of intensity.

Since many people are reluctant to express their true feelings on such sensitive topics, it is difficult to assess with precision the actual magnitude of such problems and consequently to take effective preventive or ameliorative actions. A clear need exists for improved methods of collecting valid information on critical social problems in the military.

In recognition of this problem, the U.S. Army Research Office commissioned HumRRO to conduct a series of studies under Work Unit MODE. The broad objective of this Work Unit is to develop, refine, and evaluate methods of collecting valid research data pertinent to social problems in the military.

As an example of a sensitive social problem, illicit drug use has been the area of inquiry in three previous MODE studies, and is used again in the present study. Study I (Brown and Harding, 1), compared three different research instruments in terms of the drug usage rates they yielded. Study II (Brown, 2) compared drug usage rates yielded by the anonymous questionnaire and by the personal interview. Study III (Brown, 2) explored the effect of type of administrator upon drug usage rates yielded by an anonymous questionnaire.

The conduct of surveys in the Army, or in any large organization, is an expensive and time-consuming operation. Mail surveys typically suffer from the disadvantage of low response rates. It would be highly desirable if a technique could be developed for rapidly and economically assessing, via mail, the magnitude of social problems such as illicit use of drugs.

The present study seeks to evaluate a mail-back version of the Randomized Inquiry technique as a possible procedure for meeting this need.

RANDOMIZED INQUIRY METHOD

Since the Randomized Inquiry (RI) method is of central concern in the present study, a brief description of its essential features is presented before the rationale and design of the present study are described.

BACKGROUND

The Randomized Inquiry method is a set of related techniques designed to increase the accuracy of survey findings when a sensitive topic is under study. The original paper on this method was written by Warner (3), who termed it Randomized Response. The newer label, Randomized Inquiry, was coined by Simmons (4), who believes, as does the present author, that it more accurately describes the technique.

The Randomized Inquiry method is based upon the concept that a more valid estimate can be made of the proportion of a group possessing a sensitive attribute (e.g., uses drugs) if respondents are questioned in a manner that virtually guarantees their safety from self-incrimination—that is, from identifying themselves as engaging in activities or holding opinions that could get them into trouble or be seriously embarrassing. This "guarantee" is provided by having the respondent randomly and secretly select one question from a pair of questions, one of which is sensitive and the other nonsensitive. The respondent then answers *Yes* or *No* to whichever question he has selected. Since he realizes that no one but himself knows which question he is answering, he has a much greater feeling of safety in answering honestly. Statistical processing of the data allows computation of an estimate of the proportion of the entire group having the sensitive attribute.

In using this technique, the researcher must (a) provide the respondent with some procedure for randomly selecting a question, and (b) control the probability with which each question will be selected. One technique for accomplishing this is to give the respondent a deck of 100 cards, 90 that contain the same sensitive question and 10 that contain a completely innocuous question. The respondent is directed to select a card at random and to give an honest answer to whatever question he has drawn. In such a deck, the probability that he will draw a sensitive question is .90, and the probability that he will draw an innocuous question is .10. These probability values are used in a subsequent computation of an estimate of the proportion of the group who possess the sensitive attribute.

Note that with this method, the researcher obtains no information that can be tied to a specific individual. If a respondent answers *Yes*, the researcher has no way of knowing whether he was answering the sensitive question or the nonsensitive question. But since the researcher knows what the probabilities (chances) were of each question coming up, he can use this information to estimate what proportion of the *Yes* answers (in the entire group) were in response to the sensitive question. The respondent need not fear the consequences if, for example, he admitted drug use, because no one could prove which question he had answered.

One phase of the first study conducted under Work Unit MODE compared the drug usage rates yielded by the RI method with those yielded by a conventional anonymous questionnaire. The RI method was rather similar to that described above, that is, it involved random selection from a deck of cards.[1] Five different sensitive questions were employed, each asking about the use of a different drug type during the previous month.

It was found that, among junior officer personnel but not among low-ranking enlisted personnel, the RI method consistently yielded higher estimates of drug use than did the questionnaire. This unexpected finding was difficult to explain. It had been anticipated that, since the RI method appears (and actually is) safer, it would yield higher drug usage rates, but it had not been expected that this would be true only of officers.

[1] See Appendix A for a more complete description, including computational formulas, of the RI method used in the earlier MODE study.

One possible explanation may be that officers feel more threatened than enlisted men by the possibility of apprehension for drug abuse, since they are expected to uphold higher standards of conduct, and may be better able to appreciate the greater assurance of anonymity afforded by the RI method. This hypothesis, while plausible, was not proved by the Study I data. One of the purposes of the present study was to determine whether the unexpected finding from Study I could be replicated with a different sample of subjects and with a modified form of the RI technique. If successful replication were achieved, it would tend to support the hypothetical explanation offered above and suggest that the RI method is most appropriate for use with officer personnel.

VARIETIES OF RANDOMIZED INQUIRY METHOD

As noted by Simmons (4), Randomized Inquiry is not a unique procedure but a large family of related procedures. All share the feature of requiring the respondent to answer questions that are known only to himself, thus providing him with assured protection against self-incrimination.

A disadvantage inherent in all RI procedures is that the estimates yielded are less precise (have higher standard errors) than those that would be yielded by a conventional questionnaire that was honestly answered. This loss in precision arises from the nature of the RI procedure (i.e., mathematical characteristics of the procedure for estimating proportions, and the fact that a portion of the respondents will not be answering the sensitive question).

Abernathy *et al.* (5) have developed a version of the RI method that provides estimates with smaller standard errors than obtained with previous models. The unique feature of the Abernathy model is that it uses nonsensitive questions that pertain to attributes possessed by a *known* proportion of the group. For example, if it is known what proportion of the group have 12 years of education, the nonsensitive question can be "Do you have 12 years of education?" The equation used later to estimate the proportion having the sensitive attribute incorporates the value representing the known proportion with 12 years of schooling. The net effect of including the known proportion values is to reduce the variance (i.e., increase the precision) of the estimate of primary interest.

The present research employs the Abernathy model. A more detailed description of the model, including computational formulas as used in this study, is provided in the next chapter.

RESPONSE RATES IN MAIL SURVEYS

WHY A MAIL SURVEY?

Obviously a mail survey is far less costly to conduct than a survey using live administrators. Unfortunately, however, mail surveys have at least one serious disadvantage: Response rates tend to be low, rarely exceeding 50%. The researcher also faces the sometimes unanswerable question of whether the nonresponders differ in consistent ways from those who did respond.

If a mail survey could be designed to yield high return rates—for example, 70% or more—it would then be possible and profitable to use such a technique to periodically assess the magnitude of social problems. Exploration of possible ways of improving response rates was a major objective of the present research.

Incidental observations made during study I of Work Unit MODE indicated that a mail-out survey using the RI technique might yield higher return rates than conventional mail surveys. The study included a version of the RI method in which subjects randomly selected a question from a deck of cards. This technique was administered live to about 1,100 men in groups of 25 to 30. Without exception, all groups expressed fascination, and sometimes bewilderment, when the procedure was described to them; none evidenced any reluctance to cooperate. The general impression the researchers obtained was that, particularly for the enlisted men, this was a "fun" activity. Possibly the physical act of shuffling cards, alone, was sufficient to create a party-like attitude. In a large sample mail survey, however, the card-deck technique is not practical. Another randomization device is described in the following chapter.

EFFECT OF ADVANCE NOTICE ON RESPONSE RATES

Several studies have found that response rates in mail surveys can be significantly increased by sending each target subject an advance notice, alerting him to expect the questionnaire and requesting his cooperation. These studies (Ford, 6, and Erodos, 7) involved samples drawn from the general population. Parsons and Medford (8) hypothesized that this result might not be found if mailing to a homogeneous population. They conducted two studies involving highly specialized homogeneous populations and found that the response rates of those who did and those who did not receive the advance notice did not differ significantly. However, in both cases the rates were quite high: 75 and 76% in one study, and 65 and 54% in the other. Parsons concluded that advance notice has virtually no impact when dealing with a homogeneous population. It is the opinion of the present author that it may not be homogeneity, per se, that accounted for Parsons' results, but the degree of interest (among the target subjects) in the topic of the survey.

Since the question of the effects of advance notice is quite important and research results have been mixed, it was decided to evaluate those effects for military personnel.

Chapter 2

METHOD

OVERVIEW OF THE RESEARCH DESIGN

A 2 × 2 × 2 factorial design was used in this survey, with the following independent variables: (a) method (Randomized Inquiry vs. conventional questionnaire); (b) rank (junior officers vs. low-ranking enlisted men); and (c) advance notice (receipt vs. non-receipt of an advance notice card). With three independent variables, each varied in two ways, eight groups of subjects were required. Each group numbered about 500. The research design is summarized in Table 1.

Table 1

The Research Design

Randomized Inquiry Method				Conventional Method			
Officers		Enlisted Men		Officers		Enlisted Men	
Advance Notice	No Notice	Advance Notice	No Notice	Advance Notice	No Notice	Advance Notice	No Notice

One dependent variable of interest was simply the response rate, that is, the proportion of each target group of subjects who actually mailed back their answer card. The other dependent variables were the proportions of each group acknowledging illicit drug use within the previous three days.

SAMPLING PLAN

Through the Army Research Office, arrangements were made with the U.S. Army Personnel Information Systems Command (PERSINSCOM) to provide the names, military addresses, and certain other information concerning men who would serve as research subjects. This agency maintains a computerized personnel file, updated once a month, for the entire Army population. The sample used in this project was drawn from the file of 31 December 1972.

The original research plan called for studying only two independent variables: method used in questionnaire and rank of participants. Thus, only four samples of subjects were requested of PERSINSCOM. When it was later decided to also study the effect of advance notice on response rate, each of the four samples of subjects was randomly divided in half by assigning names alternately to each of two subgroups.

The major guidelines provided to PERSINSCOM for drawing the samples were as follows:

(1) Four samples of subjects (1,000 men in each) should be drawn from the U.S. Army in CONUS—two samples of junior commissioned officers (01 and 02) and two samples of low-ranking enlisted personnel (E1-E4).

(2) All subjects must be male members of the active Army. (Exclude all females, and members of National Guard and Reserve Forces personnel.)

(3) Each of the two officer samples should be stratified by rank, that is, the proportion of 01s and 02s in each officer sample should approximate their proportions in the CONUS Army population of 01s and 02s.

(4) The enlisted men samples should also be stratified by rank. (E1s and E2s can be consolidated and treated as one category.) The proportions of E1s and E2s, E3s and E4s should approximate their proportions in the CONUS population of men in the category (E1-E4).

Actual selection of individual names was accomplished by computer on the basis of randomly selected terminal digits of Social Security Account Numbers.

The computer was also directed to extract the following items of information concerning each subject:

(1) Complete Army mailing address (rank, name, and military address, including ZIP code).
(2) Race.
(3) Marital status.
(4) Number of dependents.
(5) State of residence at entry on active duty.
(6) Date of birth.
(7) Pay grade.
(8) Academic education level at entry.

Items 2 through 8 were needed as a source of information on which to base the formulation of innocuous questions. As will be explained in more detail under Research Instruments, it was necessary to base innocuous questions on characteristics possessed by known proportions of each group.

All information requested from PERSINSCOM was provided in the form of a computer tape that was duplicated by HumRRO and then returned to PERSINSCOM.

The samples are described further in Chapter 3, Results.

RESEARCH INSTRUMENTS

Three different research instruments were used: (a) the advance notice card, (b) the conventional questionnaire, and (c) the RI questionnaire.

ADVANCE NOTICE CARD

This card measured 4 by 5 1/2 inches. The message read as follows:

> In a few days you will receive in the mail a very short questionnaire, consisting of exactly five questions. Each question can be answered Yes or No on a separate answer card. You will not be asked to sign your name anywhere.

The purpose of this note is to ask you in advance for your cooperation in filling out the questionnaire. It will take about one minute of your time, and you will be assisting in a research project dealing with an important area.

Thank you very much.

Sincerely,

Dr. George H. Brown
Project Director
Human Resources Research Organization

The cards were printed by a two-step process so that the signature of the project director could be printed in blue ink. To the casual glance the signature appeared to be handwritten and presumably looked more personal.

The address side of the card bore the HumRRO return address in the upper left corner and, just under the stamp position, the words "First Class Mail."

An advance notice card was sent to four of the eight groups of target subjects. It was mailed exactly one week prior to mailing the questionnaire.

CONVENTIONAL QUESTIONNAIRE

This instrument was conventional only in the sense that it asked straightforward questions about drug use (that is, it did not use the RI technique). It was actually unconventional in being extremely brief.

Physically, this form was a double-fold post card similar to business reply cards. The upper third of the inside surface contained the following message:

> Do you believe the results of drug surveys? Many people probably fudge a bit on drug surveys just to make sure they won't get into any trouble. HumRRO, a civilian research organization, is doing a very short, completely anonymous drug survey for the Army.
>
> A computer has selected your name by chance to receive this questionnaire. You can complete it in one minute and you don't sign your name to anything. Please answer the five questions below by checking *Yes* or *No* on the separate answer card. Then drop the card in the mail, no stamp is required.
>
> Please do it now. Thanks a lot.

The middle third of the same surface contained the following questions:

1. Have you used marijuana or hash within the last 3 days?
2. Have you used LSD, mesc, or any other psychedelic within the last 3 days?
3. Have you used any stimulants without prescription in the last 3 days (e.g., speed, diet pills)?
4. Have you used any depressant (downer) without prescription in the last 3 days?
5. Have you used any heroin (or other hard drug) in the last 3 days?

Notice that each question pertains to a time period of the last three days. This time frame was adopted so that the usage rates obtained would be comparable with those

obtained by the Army's urinalysis detection program. The latter procedure can normally detect the presence of drugs only if they have been used within the past three days.

The lower third of the form contained an answer card, the borders of which were perforated to permit easy detachment. The answer card appeared as follows:

Answer Card

1. Yes _____ No _____
2. Yes _____ No _____
3. Yes _____ No _____
4. Yes _____ No _____
5. Yes _____ No _____

After you have marked this answer card please tear it off and drop it in the mail.

The reverse side of the answer card bore the HumRRO address and the typical inscriptions of a business reply card.

A conventional questionnaire was sent to four of the eight groups of target subjects. The forms were printed on four different colors of stock so that returned answer cards could be identified as to the group from which they came.

RANDOMIZED INQUIRY QUESTIONNAIRE

In many respects, the RI questionnaire resembled the conventional one. The answer card portion was the same, and the drug questions were the same. The middle portion of the inside surface contained two sets of questions: Set A consisted of five innocuous questions and Set B contained the standard set of drug questions.

As explained in Chapter 1, the innocuous questions were formulated to pertain to characteristics possessed by known proportions of the target subjects. These questions were prepared on the basis of an examination of the types of information available in the personnel files maintained by the U.S. Army Personnel Information Systems Command (PERSINSCOM), the agency that provided the names and addresses (plus other information) of the target subjects.

Another constraint influenced the selection of the innocuous questions. The formula that was to be used for estimating the number of drug users is such that the estimate is most precise when the proportion of the group having the nonsensitive attribute deviates as much as possible from .5. In other words, it is desirable to ask questions that are likely to be answered *Yes* by either a very large or a very small proportion of the subjects.

Since the information maintained in the personnel files for junior officers and for junior enlisted personnel differs somewhat, it was necessary to compose different sets of innocuous questions for use with the two rank categories.

The innocuous questions used with the two samples of officers who received the RI questionnaire are listed in Table 2. To show the equivalence of the four groups, at least in regard to these characteristics, Table 2 also shows the percentage of each of the four officer groups who should have answered *Yes* if presented with this question.

Table 2

Innocuous Questions Used With Groups of Junior Officers

(And Percentage[a] Who Should Answer Yes)

Question	Randomized Inquiry Method		Conventional Method	
	Advance Notice	No Notice	Advance Notice	No Notice
1. Do you have a college degree?	88.9	90.4	89.0	90.3
2. Were you born in 1945 or earlier?	10.1	9.6	10.0	10.2
3. Are you married?	58.4	55.1	59.0	54.0
4. Do you have two or more dependents?	17.4	16.3	18.5	16.2
5. Are you a member of the white race?	94.9	95.4	95.0	94.8

[a]These percentages are based on the number of men in each group who presumably received a questionnaire. (Before computing each percentage, the Base N was adjusted by subtracting from it the number of forms returned by the Post Office as nondeliverable, as of the cut-off date of 16 March 1973.)

It is apparent that the four officer groups are highly similar, at least with respect to these five characteristics. The third question, concerning marital status, was not an ideal choice (the proportions are rather close to .5), but was the best one available that met the other criteria.

Analogous information with respect to the RI questionnaire used with the enlisted subjects appears in Table 3.

Table 3

Innocuous Questions Used With Groups of Junior Enlisted Men

(And Percentage[a] Who Should Answer Yes)

Question	Randomized Inquiry Method		Conventional Method	
	Advance Notice	No Notice	Advance Notice	No Notice
1. Is your pay grade E2 or higher?	45.9	48.2	46.6	46.6
2. Do you have at least two years of high school?	89.6	87.2	89.2	89.6
3. Were you born in 1953 or before?	90.3	91.7	94.1	89.2
4. Are you married?	37.3	30.5	31.4	42.8
5. Are you a PFC?	21.6	24.3	22.7	23.7

[a]These percentages are based on the number of men in each group who presumably received a questionnaire. (Before computing each percentage, the base N was adjusted by subtracting from it the number of forms returned by the Post Office as nondeliverable, as of the cut-off date of 16 March 1973.)

It is evident that the four groups of enlisted men are highly similar on most of these characteristics. The proportions of the various groups who are married appear to vary

more than would be expected by chance. The reasons for this are obscure, but probably unimportant since on *a priori* grounds marital status seems unrelated to the objectives of this study.

CONTROLLING THE PROBABILITIES OF EACH TYPE OF QUESTION BEING ANSWERED

In any version of the RI technique, it is necessary to provide the respondent with a randomization device, that is, a procedure for deciding which questions to answer. The procedure must be such that each type of question will be selected with a known probability.

In the earlier MODE study, the randomization device was a deck of cards containing sensitive and nonsensitive questions in different proportions. By having each respondent randomly select a card, each type of question should come up with an expected frequency. This technique, however, would not be feasible for a mail survey, since it is not practical to send each respondent a deck of cards.

Another method was devised for controlling the proportions of the group who would answer the two types of questions.[2] Census data indicate that of all the births each year, almost exactly 8% (1/12) take place in November. By directing all respondents who were not born in November to answer the sensitive questions, approximately 92% (100% minus 8%) should do so, and approximately 8% should answer the innocuous questions. Since some respondents might conceivably worry about the possibility that their answers could be linked to them through knowledge of their birthday, the technique was made even safer by directing the respondent to choose on the basis of his mother's birthday. Presumably no one would worry much about the possibility that his mother's birthday would be known to others.

It is perhaps appropriate to point out that this randomization "device" involves a slightly different principle from that involved in most other randomization devices that have been used in RI studies. In most other studies, the respondent, at the time he receives his instructions, faces the possibility of drawing either type of question. With the technique being used here, each respondent is "predestined," in a sense, to select a particular type of question. From the individual respondent's point of view, he is being directed to answer a particular set of questions (with no one other than himself knowing which set). From the researcher's point of view, it is a matter of chance which set of questions each respondent is directed to answer.

CALCULATION OF RANDOMIZED INQUIRY ESTIMATES

As mentioned in Chapter 1, this research study uses a version of the RI method that was developed by Abernathy *et al.* (5). This model requires that the researcher know what proportion of the group possesses the nonsensitive attribute. Tables 2 and 3 show the percentages of each group possessing the indicated attributes. These percentages were based upon the number of men in each target group who presumably received a questionnaire, rather than on that number who returned an answer card, since all answer cards were anonymous. It is necessary to assume that those who did and those who did not return an answer card were comparable with regard to the nonsensitive attributes. There is no way to verify the legitimacy of this assumption.

[2]This method is based upon a suggestion contained in an article by Simmons (4).

To actually compute an estimate of the proportion of an RI group who answered *Yes* to a drug question, the following formula was used (based upon one presented by Abernathy, 5):

Let π_1 = estimated proportion of the group having the sensitive attribute (e.g., use of LSD within the past three days).

λ = observed proportion of *Yes* answers.

π_y = proportion of group having the nonsensitive attribute (e.g., proportion who are married).

P = probability of drawing a sensitive question. (By directing people whose mother was not born in November to answer the drug questions, we thereby set P equal to .92.)

n = number of cases.

Then:

$$\pi_1 = \frac{\lambda - \pi_y \ (1-P)}{P}$$

The Standard Error (SE) of this estimate is given by the following formula:

$$SE_{\pi_1} = \sqrt{\frac{\lambda \ (1-\lambda)}{nP^2}}$$

IDENTIFICATION OF ANSWER CARDS

Since the entire survey was conducted with complete anonymity of respondents, it was necessary to devise a system for determining to which of the eight groups each returned answer card should be attributed. This was accomplished by using four different colors of stock for printing the questionnaire. To differentiate between any two groups using the same color, a subtle variation in the punctuation on the answer card was used. For one group, the phrase "at the dotted line" was enclosed in parentheses; for the other group, the parentheses were absent.

MAILING SCHEDULE

Advance notice cards were mailed on Friday, 9 February 1973. Questionnaires, both RI and conventional, were mailed one week later, on Friday, 16 February 1973.

Chapter 3

RESULTS AND DISCUSSION

EFFECTS ON QUESTIONNAIRE RETURN RATES

One of the dependent variables of interest in this study is return rate, that is, the extent to which each of the combinations of experimental variables tends to stimulate or inhibit return of the form. This turned out not to be a simple question. The original lists of names and addresses provided by PERSINSCOM included some that were missing a zip code. These were immediately removed from consideration, except where the zip code could be easily ascertained and added. Moreover, after the materials had been mailed, sizeable percentages (15 to 21% of each group) were returned by post office personnel as nondeliverable. It would be meaningless to compute return rates based upon the total number of names in the original list.

Table 4 contains numerical information with respect to the various groups. The first entry, "Original N", indicates the total number of names in each group at the time the samples were first obtained from PERSINSCOM. The second and third entries indicate the number and percentage of each group of names that were nondeliverable. These frequencies were subtracted from the original Ns to produce the figures appearing in line 3, the number of questionnaires presumably delivered within a five-week period. The last line in the table indicates the percentage of men in each group who actually returned an answer card, using as a base the number who presumably did receive a questionnaire, either Randomized Inquiry (RI) or conventional.

Table 4

Number of Forms Mailed Out, Number Presumably Delivered, and Number of Answer Cards Returned

Items of Information	Randomized Inquiry Method				Conventional Method			
	Officers		Enlisted Men		Officers		Enlisted Men	
	Advance Notice	No Notice	Advance Notice	No Notice	Advance Notice	No Notice	Advance Notice	No Notice
Original N	483	482	575	574	506	507	569	569
Number nondelivered	94	74	101	122	94	94	110	106
Percent nondelivered	19	15	18	21	19	19	19	19
Number presumably delivered (after 5 weeks)	389	408	445	421	412	413	459	463
Percent who returned answer cards (based on number delivered)	34.7	50.2	22.2	18.0	54.6	64.9	31.8	38.9

These return rates range from a low of 18% for one of the enlisted men groups to a high of 64.9% for one of the officer groups. A three-way analysis of variance was carried out in order to evaluate the effect of each of the three main experimental variables upon the dependent variable of response rate. This analysis is presented in Table 5.

Table 5

Analysis of Variance of Return Rate Data

Source	*df*	Mean Square	F^a
Rank (Officers vs. Enlisted Men)	1	23.47	38.5**
Method (Randomized Inquiry vs. Conventional)	1	11.57	19.0**
Interactions			
Rank x Method	1	.04	
Rank x Advance Notice	1	9.62	15.8**
Method x Advance Notice	1	8.43	13.8**
Within cells	3402	.61	

[a] ** indicates statistical significance, $p < .01$.

Highly significant *F*s were obtained for rank, for method, and for two of the interactions. The significant *F* for rank is interpreted as follows: The overall return rate for officers was 51%, and for enlisted men it was 27%. In other words, officers were almost twice as likely as enlisted men to actually cooperate in completing and mailing their answer cards.

The significant *F* for method arose from the fact that approximately 48% of all individuals who received a conventional questionnaire returned it, whereas only 31% of those who received an RI questionnaire returned it. Thus, contrary to expectations, the conventional anonymous questionnaire was more effective in eliciting returns than was the novel RI technique. It had been hoped that the novelty and "mystery" of the RI technique might capture the imagination of respondents and make them more likely to respond. It is apparent that this hypothesis was not confirmed. It is possible that it was this particular variety of RI technique that produced this result. Having the subject select questions on the basis of his mother's birthday may have been perceived by some respondents as frivolous and not worthy of their cooperation.

It is also likely that some drug users, simply because they could not understand the method, suspected subterfuge and refused to cooperate. As pointed out in an earlier section of this report, with the particular randomization device used in this technique there is a theoretical possibility of an individual respondent being identified. Conceivably, a drug user who is afraid of self-incrimination might reason that his response card bore a secret code that would enable him to be identified by name, and that further background checks might ascertain his mother's birthday and finally result in incriminating him as having admitted to illicit drug use. Anyone who felt such fears would obviously be inclined to play it safe by simply not responding at all. The randomization device used in the earlier MODE study, drawing from a deck of cards, was probably perceived, and correctly so, as being safer than the method used in this particular study.

The significant interaction between rank and advance notice arose from the fact that, among the officers, 57% of those who received an advance notice subsequently

returned their answer cards, whereas only 45% of those who did not receive an advance notice did so. For enlisted men, the corresponding figures were 28 and 27%. In other words, the advance notice tended to enhance return rate for officers, but not for enlisted men. Why this should be so is not completely clear. As will be seen below, for all drug types the usage rates were much lower for officers than for enlisted men. In other words, since very few officers use drugs, very few have anything to fear from a cooperative response to the questionnaire. Since much greater proportions of enlisted men are drug users, such men have more to fear from possible self-incrimination. A drug-using enlisted man who receives the advance notice and then subsequently receives the questionnaire may reason that since he has been reached twice through the mail that he may well be reached again, and perhaps be accused of illicit drug use. In other words, it is possible that the advance notice, when received by an enlisted man who is a drug user, actually elevated his fears of self-incrimination. This would be less relevant for officers.

The significant interaction effect between method and advance notice came about as follows: Among those who received a conventional questionnaire, returns were received from 52% of those who had received an advance notice and from only 43% of those who had not received an advance notice. Among those who received an RI questionnaire, returns were received from 34% of those who had received advance notice, and 28% of those who had not received an advance notice. In other words, the advance notice was more effective in stimulating response from recipients of conventional questionnaires than from recipients of the RI questionnaires. The same explanation offered above may apply here. An individual who is actually a drug user may have his anxiety intensified by (a) the mysteriousness of the RI method, and (b) the thought that he has been contacted twice by mail and might well be contacted again if he admits to anything incriminating.

EFFECTS ON REPORTED DRUG USAGE RATES

The questions relating to drug use in this survey were of the form, "Have you used _____ during the last 3 days?" The drug types asked about were (a) marijuana, (b) psychedelics, (c) stimulants, (d) depressants, and (e) narcotics.

For all RI groups, the formulas given on page 13 were used to compute estimates of the proportion who responded *Yes* to each drug question. For the group receiving the conventional questionnaire, the proportions who admitted drug use, and the standard errors of these values, were computed by conventional procedures.

The results will be presented and discussed in terms of percentages rather than proportions, since the former are more familiar and thus more readily grasped.

Tables 6 and 7 show, for officers and enlisted men, the percentages of each group who admitted using the indicated drug "during the last 3 days." With such a large mass of figures, it is difficult to detect significant differences or recognize trends. For this reason, analyses of variance were carried out with respect to the data on each of the five drugs.[1] The results of these analyses are summarized in Table 8.

METHOD

It is apparent in Table 8 that there are no significant *F*s for method, which means that reported drug usage rates were not significantly influenced by the method of data collection: RI vs. conventional questionnaire. As will be noted later, method did have significant effects when interacting with advance notice.

[1] The pooled with-in cells sums of squares was used as the error term, consistent with the fixed effects model for the experimental design.

Table 6

Drug Usage Rates of Junior Officers as Estimated by Randomized Inquiry and by Conventional Questionnaire

Drug Type	Randomized Inquiry Method				Conventional Method			
	Advance Notice (N = 205)		No Notice (N = 135)		Advance Notice (N = 268)		No Notice (N = 225)	
	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Marijuana	4.4	2.3	5.9	3.1	4.1	1.1	3.1	1.1
Psychedelics	1.3	1.0	1.5	1.4	1.1	.6	0	0
Stimulants	.3	1.6	4.9	2.7	.7	.5	.4	1.4
Depressants	1.3	1.2	.1	1.1	1.1	.6	.4	1.4
Narcotics	.2	2.0	1.2	2.7	.7	.5	0	0

Table 7

Drug Usage Rates of Junior Enlisted Men as Estimated by Randomized Inquiry and by Conventional Questionnaire

Drug Type	Randomized Inquiry Method				Conventional Method			
	Advance Notice (N = 76)		No Notice (N = 99)		Advance Notice (N = 180)		No Notice (N = 146)	
	Percent	SE	Percent	SE	Percent	SE	Percent	SE
Marijuana	21.8	5.6	36.7	5.4	32.8	3.5	33.6	3.9
Psychedelics	-1.4[a]	2.8	11.4	4.1	7.8	1.9	8.9	2.3
Stimulants	6.8	3.4	10.1	10.8	8.3	2.0	9.6	2.4
Depressants	2.4	2.8	11.4	3.7	9.4	2.0	10.3	2.5
Narcotics	-3.5[a]	2.4	7.5	3.8	2.2	1.1	8.2	2.2

[a]The formula for computing RI estimates (see page 19) can produce negative values; in light of their standard errors (SE), it is most reasonable to regard such values as equivalent to zeroes.

RANK

As anticipated, reported drug usage rates varied significantly as a function of rank. This was true for all of the drug types except narcotics, where the difference failed to reach significance.

Table 9 shows, for the data from this study, the direction and magnitude of the differences associated with rank, without regard to the other experimental variables.

Table 8

Summary Table Showing Significant[a] Fs Emerging From the Five Analyses of Variance

Source of Variance	Marijuana	Psychedelics	Stimulants	Depressants	Narcotics
Rank (Officers vs. Enlisted Men)	76. **	10.7**	9.4**	18.9**	
Method (Randomized Inquiry vs. Conventional)					
Notice (Advance Notice vs. No Notice)					5.4*
Interactions					
Rank x Method			18.3**		
Rank x Advance Notice	8.4**	18.5**	5.8*	8.0**	22.4**
Method x Advance Notice	8.7**	17.4**	6.0*	6.3*	22.5**

[a]** indicates statistical significance, $p < .01$ (an F of 6.7 is required); * indicates $p < .05$ (an F of 3.8 is required).

Table 9

Percentages of Junior Officers and of Junior Enlisted Men Who Reported Drug Use Within the Last Three Days

Rank	Marijuana	Psychedelics	Stimulants	Depressants	Narcotics
Officers (O1-O2)	4.2	.6	1.2	.7	.4
Enlisted Men (E1-E4)	32	7.5	8.7	8.9	4.5

ADVANCE NOTICE

Only for the case of narcotics did receipt of an advance notice have significant effect upon reported drug usage rate. Specifically, the estimated drug usage rate for those who received an advance notice was essentially zero (the computed estimate was actually -3.5%). For those who did not receive advance notice, the estimated usage rate was 4.2%.

Evidently, receipt of an advance notice depressed the tendency to admit narcotics use. As hypothesized earlier, in discussing the return rate data, narcotics users might well be intimidated by receiving both an advance notice and a subsequent questionnaire. Any anxiety thus aroused might be abated by the users in one of two ways: (a) by denying narcotics use in marking their answer cards, or (b) by simply not returning their answer cards. It is reasonable to assume that narcotics users would feel more threatened than users of other drugs, because of the greater stigma associated with hard drug use, even within the drug subculture.

INTERACTIONS OF VARIABLES

Rank by Method

The rank by method interaction was significant only for the data on stimulants. If accepted at face value, it would mean that for junior officers, but not for junior enlisted men, the RI method yielded higher stimulant usage rates than did the conventional questionnaire. Since this finding occurred for only one of the five sets of data, and since there is no apparent reason why only stimulants should have produced this effect, it seems reasonable to regard this apparently significant interaction as, in fact, a chance result.

In an earlier MODE study (described on page 10) the results suggested that the RI method tended to show higher drug usage rates than the conventional method, but only for officers and not for enlisted men. The failure, in the present study, to find convincing confirmation of the earlier tentative finding suggests that it was indeed artifactual.

Rank by Advance Notice

The rank by advance notice interaction was significant for all five drug types. This finding can be more readily understood by examining the sample set of data in Table 10. It is clear that for enlisted men, but not for officers, drug usage rates were higher for those who did not receive an advance notice. For officers, the advance notice had no effect on reported drug usage rates, whereas, for enlisted men, the advance notice clearly depressed reported drug use. (The findings were similar for each of the other four drug types.)

Table 10

Interaction Between Rank and Advance Notice: The Marijuana Data

(Percentages Who Reported Drug Use)

Rank Group	Advance Notice	No Notice
Officers	4.2	4.5
Enlisted Men	27.8	35.1

The results may be explained as follows: Only drug users are likely to feel threatened by receiving a drug questionnaire. Such people may feel doubly threatened when the questionnaire has been preceded by an advance notice, since this means that someone who wants to know about his drug use has twice reached him by mail. Many such subjects may feel sufficiently threatened so that they would either deny their use of drugs or simply not respond. Since there appear to be far more drug users among enlisted men than among officers, it follows that the advance notice would depress drug usage rates only for enlisted men.

Method by Advance Notice

For all drug types, the method by advance notice interaction was significant. This means that for the RI method, but not for the conventional method, advance notice depressed reported drug usage rates.

The most plausible explanation for this finding is along the same lines as that offered in the previous section. Drug users are more threatened by questionnaires than

are non-drug-users. This version of the RI method, because of its strangeness, is more threatening than the conventional method. The threat is intensified by receipt of an advance notice. Since the perceived threat is smaller for a conventional questionnaire, the exacerbating effect of the advance notice is smaller.

EFFECTIVENESS OF RANDOMIZED INQUIRY METHOD IN MAIL SURVEYS

The Randomized Inquiry technique in one form of another has been used in a number of studies aimed at investigating sensitive topics such as induced abortions. In earlier MODE research it was used with apparent success in investigating illicit drug usage. The particular version of the method that was used required the subjects to randomly select a question by drawing from a deck of cards; it was administered to live groups of 25 to 30 subjects. Both with junior officers and junior enlisted men, the technique appeared to be extremely interesting to the subjects, and no one refused to cooperate or displayed any reluctance to participate. Under optimal conditions, the card-drawing technique does provide an extremely high assurance of protection against self-incrimination.

Since the technique appeared to be so well received by the subjects in the earlier study, it seemed worthwhile to attempt to create a version suitable for use in a mail survey. The card-drawing technique would obviously be impractical, since printing and postage costs would obliterate the economies usually associated with mail surveys. For this reason, another randomization device was sought. It was thought that having the subject select sensitive vs. nonsensitive questions on the basis of the date of his mother's birth would accomplish the researcher's objective of controlling the probabilities that each of the two types of questions would be answered. However, from the subject's point of view, his choice of questions is not random; he is being directed to answer a particular set of questions. How safe he feels against self-incrimination, if he is a drug user, will depend upon at least two factors: (a) whether he thinks anyone is likely to be aware of his mother's birthday, and (b) the extent to which the mysteriousness of these instructions intimidate him.

It seems reasonable to assume that almost no one would be concerned about the possibility that his mother's birthday would be widely known. (Standard Army personnel records do not contain this information.) Therefore, the significantly lower return rates for the RI forms in the present study would be attributed in a large part to some generalized anxiety reaction to the receipt of a mysterious questionnaire. The fact that advance notice depressed drug usage rates only for the RI method, and not for the conventional method, strengthens the belief that this version of the RI method was perceived as threatening, and especially so by drug users.

Undoubtedly each recipient of an RI questionnaire will scan both sets of questions. If he is not a drug-user, his decision to respond or not respond will be based primarily upon whatever combination of factors generally operate in such situations, for example, his conscientiousness, his interest in research, his desire to assist in Army-sponsored activities, and so forth. If he is able to discern, in even a tentative fasion, the statistical principles on which the RI method is based, he will probably perceive the safety of the method and is likely to cooperate. If he is baffled by the method (and many probably are), he is less likely to respond for fear that he might unwittingly get himself into trouble.

If the recipient of an RI questionnaire is in fact a drug user, his decision to respond or not respond will be governed by much the same factors as those mentioned. Inability to perceive the safety of the method would be expected to arouse more anxiety in the user than in the nonuser and would strongly depress the tendency to respond.

The present data do not indicate that the RI method has any advantage over the conventional questionnaire in the conduct of mail surveys. However, the possibility remains that other versions of the method could be developed that would be superior to the conventional method. Such an RI method would have to incorporate a randomization device that is obviously safe; it is likely that the critical feature in an effective RI method is that the subject be able to see for himself that his selection of questions is determined by chance. The chance determination of question selection probably must operate *after* the instrument is in the subject's hands, and not *before*, as was the case in the present study. It is hoped that future research may clarify this concept.

LITERATURE CITED

AND

APPENDIX

LITERATURE CITED

1. Brown, G.H. and Harding, F.D. *A Comparison of Methods of Studying Illicit Drug Usage*, HumRRO Technical Report 73-9, April 1973.
2. Brown, G.H. *Drug Usage Rates as Related to Method of Data Acquisition*, HumRRO Technical Report 74-20, August 1974.
3. Warner, S.L. "Randomized Response: A Survey Technique for Eliminating Evasive Answer Bias," *Journal of the American Statistical Association*, vol. 60, 1965, pp. 63-69.
4. Simmons, W.R. "Response to Randomized Inquiries," *Administrative Applications Division Conference Transactions, American Society for Quality Control*, ch. 4-13, 1970, pp. 1-10.
5. Abernathy, J.R., Greenberg, B.G., and Horvitz, D.G. "Estimates of Induced Abortion in Urban North Carolina," *Demography*, vol. 7, no. 1, 1970.
6. Ford, N.M. "The Advance Letter in Mail Surveys," *Journal of Marketing Research*, vol. 4, 1967, pp. 202-204.
7. Erodos, P.L. "Successful Mail Surveys: High Returns and How to Get Them," *Printers' Ink*, vol. 258, 1957, p. 60.
8. Parsons, R.J. and Medford, T.S. "The Effect of Advance Notice in Mail Surveys of Homogeneous Groups," *Public Opinion Quarterly*, vol. 36, no. 2, pp. 258-259.

Appendix A

DESCRIPTION OF THE RANDOMIZED INQUIRY METHOD USED IN THE EARLIER MODE STUDY

The earlier MODE study used a version of the RI method developed by Simmons (1970). That version requires the use of two non-overlapping samples of subjects, which differ in the probabilities of drawing sensitive and non-sensitive questions. Accordingly, each group of 25 subjects was divided into two subsamples with Ns of 20 and 5, respectively. (The mathematics of the procedure are such that unequal Ns produce a smaller variance for the final estimated proportion of subjects with the sensitive attribute.)

As a randomization device, each subject was given a deck of 50 cards on which questions were printed. Deck 1, which was used with subgroup N_1, consisted of 40 cards having the sensitive question, "Have you used marijuana or hashish during the past month?" and 10 cards with the nonsensitive question "Have you eaten a cheeseburger during the past month?" Thus, for group N_1 the *p* value (probability of drawing a sensitive question) was .8. Deck 2, which was used with subgroup N_2, consisted of 10 cards with the sensitive question, and 40 with the nonsensitive question. For this group, the p value was .2.

Subjects were told to glance through their deck to see for themselves that it contained two kinds of questions. Next they were to draw a card, and to respond honestly Yes or No on their answer sheet to whatever question they had drawn.

Let: $\hat{\pi}$ = estimated proportion of the combined sample who possess the sensitive attribute (using marijuana).

$\underline{P}_1$ = proportion of cards in deck 1 which contain the question "Have you used marijuana, etc.?"

$\underline{R}_1$ = proportion of men in group N_1 who answer "Yes" (to whatever question they have drawn).

$\underline{P}_2$ = proportion of cards in deck 2 which contain the sensitive question.

$\underline{R}_2$ = proportion of men in group N_2 who answer "Yes" (to whatever question they have drawn).

According to the Simmons paper (4), the following formula provides an estimate of the proportion of the combined sample who have the sensitive attribute:

$$\hat{\pi}1 = \frac{\underline{R}_1 (1 - \underline{P}_2) - \underline{R}_2 (1 - \underline{P}_1)}{\underline{P}_1 - \underline{P}_2}$$

The variance of this estimate is given by:

$$\text{Var } (\pi\ 1) = \frac{1}{(\underline{P}_1 - \underline{P}_2)^2} \left[\frac{(1 - \underline{P}_2)^2 \underline{R}_1 (1 - \underline{R}_1)}{\underline{n}_1} + \frac{(1 - \underline{P}_1)^2 \underline{R}_2 (1 - \underline{R}_2)}{\underline{n}_2} \right]$$

This technique was originally conceived as a device to be used in connection with live interviewing. Simmons' article describes his technique in terms of asking a single critical question of each respondent. However, in the research now being described, the

technique was extended to include a number of critical questions. Each critical question was paired with a noncritical question, and for each pair of questions, two separate decks of cards were prepared.

Since the technique is somewhat cumbersome, it was used with only the following five critical questions:

1. Have you used marijuana (or hashish) during the past month?
2. Have you used LSD (or any other hallucinogen) during the past month?
3. Have you used speed or any other "upper" during the past month?
4. Have you used any barbiturates (downers) during the past month?
5. Have you used heroin (or any other hard drug) during the past month?

The nonsensitive questions that were paired with the five critical questions were:

1. Have you eaten a cheeseburger during the past month?
2. Do you have any brothers?
3. Were you born in the Eastern part of the U.S.?
4. Are both of your parents still living?
5. Have you seen any movies during the past month?

In selecting the nonsensitive questions, the following criteria were used: (a) They must be clearly nonthreatening, and (b) they should be of such a nature that a substantial proportion, but not a preponderance, of the group could honestly answer Yes.

HUMAN RESOURCES RESEARCH ORGANIZATION

300 North Washington Street • Alexandria, Virginia 22314

President	Dr. Meredith P. Crawford
Executive Vice President	Dr. William A. McClelland
Executive Officer	Mr. Saul Lavisky
Vice President & Treasurer	Mr. Charles W. Smith
Director for Program Development	Mr. David S. Bushnell
Director Editorial & Production Center	Mrs. Lois M. Zook

RESEARCH DIVISIONS

HumRRO Eastern Division
300 North Washington Street
Alexandria, Virginia 22314
Dr. J. Daniel Lyons
Vice President & Director

HumRRO Central Division
Suite 8, 313 N. Foster Street
Dothan, Alabama 36301
Dr. Wallace W. Prophet
Vice President & Director

Louisville Research Office
1939 Goldsmith Lane
Louisville, Kentucky 40218
Mr. William C. Osborn
Office Director

Columbus Research Office
Suite 23, 2601 Cross Country Road
Columbus, Georgia 31906
Dr. Joseph A. Olmstead
Office Director

Dothan Research Office
P.O. Box 428
Fort Rucker, Alabama 36360
Dr. Paul W. Caro
Office Director

HumRRO Western Division
27857 Berwick Drive
Carmel, California 93921
Dr. Howard H. McFann
Vice President & Director

El Paso Research Office
P.O. Box 6057
Fort Bliss, Texas 79916
Dr. Robert D. Baldwin
Office Director