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## Psychiatric Screening of Navy Recruits: Pre-Enlistment Factors Related to Success in Recruit Training

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PSYCHIATRIC SCREENING OF NAVY RECRUITS:  
PRE-ENLISTMENT FACTORS RELATED TO  
SUCCESS IN RECRUIT TRAINING

by

John Avner Plag

A Dissertation Submitted to the Faculty of the Graduate School  
of Loyola University in Partial Fulfillment of  
the Requirements for the Degree of  
Doctor of Philosophy

## LIFE

John Avner Plag was born in Woodbury, New Jersey on April 30, 1927.

He was graduated from Woodbury High School, Woodbury, New Jersey in June of 1944 and from Yale University, New Haven, Connecticut in February of 1948 with the degree of Bachelor of Arts. From September of 1950 until August of 1952 he attended Bradley University, Peoria, Illinois where he received the degree of Master of Arts. His graduate studies at Loyola University were begun in September of 1953.

The author served a psychology internship at the Elgin State Hospital in Elgin, Illinois from June of 1948 until June of 1949 and was a member of the psychology staff at the East Moline State Hospital, East Moline, Illinois from July of 1949 until March of 1950. At that time he was transferred to the Psychology Department of the Peoria State Hospital in Peoria, Illinois where he remained until August of 1952. On that date the writer was employed as a civilian psychologist by the Department of the Navy at the U. S. Naval Training Center at Great Lakes, Illinois, a position which he occupied until December of 1959. In January of 1960 he was transferred to the U. S. Navy Medical Neuropsychiatric Research Unit in San Diego, California where he currently holds the position of research psychologist.

The author has been a member of the American Psychological Association since January of 1956.

## PREFACE

Part of the financial support for this investigation was obtained from the Research Division, Bureau of Medicine and Surgery, Department of the Navy under Research Task - MR 005.12-2502, Subtask 1. Additional funds were provided by the author and by the Medical Department of the Administrative Command, U. S. Naval Training Center, Great Lakes, Illinois.

The opinions and views expressed in this report are those of the author only. They are not to be construed as necessarily representing the official policy or opinions of the United States Navy.

The original design of this project was indeed grandiose. It called for a thorough survey of the literature on psychiatric screening in all branches of the Armed Forces, the conduct of the major experiment, and extensive follow-up studies in an effort to cross-validate completely the major research results. It soon became apparent that time and staff limitations prohibited such an exhaustive undertaking. As a result, this report contains only a superficial survey of the major contributions to psychiatric screening in the literature, a report on the development of a psychiatric screening questionnaire, and a minor cross-validation.

The Bureau of Medicine and Surgery of the Department of the Navy has established within the past year a psychiatric research unit, which has as one of its missions, the investigation and evaluation of preventive psychiatry pro-



grams. The resources and facilities of this organization will allow for the more extensive and thorough research alluded to in this report. As a matter of fact, some of the recommendations for further study contained herein have already been incorporated into the research plans of this organization.

Since 1957 so many individuals have cooperated in serving as subjects and in lending support and constructive suggestions for this project, that space does not permit each to be mentioned by name. However, those persons who were to a great extent responsible for the completion of this study deserve special thanks.

Captain A. J. Zuska, Commander H. F. Schwenker, and Lieutenant Commander E. M. Flaherty of the Recruit Evaluation Unit, Great Lakes, as well as other members of the Medical Department, were most cooperative in allowing the author time, despite heavy interviewing schedules, for the collection of the data. The corpsmen of the Recruit Evaluation Unit, in particular, E. Peoples, HN, G. Glick, HN, and H. Cooley, HN, who were saddled with the routine of data collection and some of the statistical analyses, made a major contribution through their devoted and effective service.

The interest of the Recruit Training Command at Great Lakes, and particularly the enthusiasm of Captain C. B. Jackson, Jr., Commanding Officer, and Commander H. F. Vaughn, Executive Officer, gave the author much encouragement and help as a result of their continual desire to improve recruit selection procedures. Without the I.B.M. facilities which were made available by the Naval Medical Research Unit, Great Lakes, this project could not have been completed. Particular thanks are due to Mr. W. T. Stille of that facility.

Finally, Dr. H. J. A. Rimoldi of the Psychometric Laboratory of Loyola Un-

iversity served as the author's major advisor during the three years of this project and spent many hours refining the experimental design and aiding in the solution of problems posed by the factor analytic procedures. For his patient and kind help, the author is deeply indebted.

San Diego, California  
November 1960

J. A. P.

## TABLE OF CONTENTS

Chapter	Page
PREFACE . . . . .	iv
LIST OF TABLES. . . . .	ix
LIST OF FIGURES . . . . .	.xiii
 I. THE PROBLEM. . . . .	 1
<p>Introduction--Purposes of the study--The factor analytic approach--Necessity of the study--Validity of the initial clinical assessment--Reliability of the initial clinical examination--Clinical vs. statistical prediction--Advantages of the actuarial approach.</p>	
 II. CURRENT SCREENING PROCEDURES . . . . .	 29
<p>Introduction--Induction procedures--In-processing procedures --Physical profiling--Psychiatric assessment procedures-- Assumptions underlying psychiatric assessment.</p>	
 III. THE EXPERIMENTAL QUESTIONNAIRE . . . . .	 50
<p>Other assessment procedures--Selection of inventory items-- Format of the experimental questionnaire.</p>	
 IV. THE EXPERIMENTAL PROCEDURE . . . . .	 77
<p>Introduction--Selection of the sample--Changes in sample and experimental procedures--The criterion variables--Independence of the criterion variables--Statistical analysis--Selection of the significant inventory items--Inter-item correlations and the factor analysis--Construction of the Personal History Record-- Independence of the predictor variables--Clinical vs. statistical prediction with the Personal History Record.</p>	
 V. RESULTS. . . . .	 117
<p>Introduction--Responses to the inventory items--Stability of the criterion variables--Significance of the predictor variables--</p>	

## TABLE OF CONTENTS (continued)

Chapter	Page
V. RESULTS (continued)...	117
Effects of sample size--Item significance discrepancies between phases I and II--Selection of inventory items-- Reliability of the experimental inventory--The original hypotheses--Comparison of eastern and midwestern recruits --Recording and computational errors--Independence of the predictor variables--Data preparation for factorization-- The interitem correlations--The factor analysis--Rotation to simple structure--Interpretation of the factors--The Personal History Record--Clinical vs. statistical predic- tion with the Personal History Record.	
VI. SUMMARY AND CONCLUSIONS . . . . .	180
BIBLIOGRAPHY . . . . .	191
APPENDIX I. QUESTIONNAIRES AND FORMS. . . . .	197
APPENDIX II. CRITERION MEASUREMENT. . . . .	217
APPENDIX III. DATA PERTAINING TO THE VALIDATION OF THE RECRUIT PERSONAL HISTORY INVENTORY. . . . .	223
APPENDIX IV. THE FACTORIZATION. . . . .	241

## LIST OF TABLES

Table	Page
1. Trial Duty Rates for Recruits Entering Training at Great Lakes during the First Five Months of 1958 . . . . .	7
2. Initial Psychiatric Status of Recruits Discharged from the Naval Service at Great Lakes during the Period of 18 February through 17 June 1958 . . . . .	8
3. Distribution of the Ages of Recruits at Great Lakes during Mid-1952 and of All Navy Males during the Second Quarter of 1960 . . .	12
4. Distribution of the Ages of Soldiers Entering the Army during the Last Four Months of 1942 . . . . .	13
5. Percentage Distribution of Psychiatric Diagnoses Among 600 Recruits Discharged by the Navy Early in World War II . . . . .	14
6. Contingency Coefficients as Estimates of Inter-Judge Reliability for the Initial Psychiatric Screening Interview . . . . .	18
7. Predictive Validity of the Clinical Interview and the Standard Medical Screening Form A Using Various Cutting Scores . . . . .	22
8. Validity Comparisons of Three Screening Techniques . . . . .	25
9. AFQT Percentile Scores and Approximate Quotas for Mental Levels . .	32
10. Diagnoses of Recruits Discharged from U. S. Naval Training Center, Great Lakes during 1958 . . . . .	39
11. Average Monthly GCT Scores of Recruits Received for Training during 1956 and the First Quarter of 1957 . . . . .	79
12. Number and Percentage of Identical Company Commander Ratings . . . .	90
13. Definition of Classroom Performance Categories . . . . .	94
14. Distribution of Cases Within Each Military Performance Category . .	95

## LIST OF TABLES (continued)

Table	Page
15. Distribution of Subsample Cases within Military and Classroom Performance Criteria . . . . .	98
16. Data Utilized in the Computation of the Quadriseserial Correlation between Classroom and Military Performance . . . . .	99
17. Arrangement of Data for Calculation of Chi-square Values for Each Predictor Variable . . . . .	102
18. Distribution of Cases within GCT Groupings for Phases I and II . .	119
19. Distribution of Cases within Educational Groupings for Phases I and II . . . . .	119
20. Distribution of Cases Comprising the Criterion Categories for Phases I and II. . . . .	120
21. Number of Significant Items within Each Criterion for Phases I and II . . . . .	122
22. Distribution of Items Constituting Significant--Non-significant Dichotomy Groupings between Phases I and II for MIC and Other Criteria . . . . .	124
23. Item 171, Phase II: Obtained and Expected Frequencies for Calculation of Chi-square Values within Military and Classroom Performance Criteria. . . . .	129
24. Item 165, Phase II: Obtained and Expected Frequencies for Calculation of Chi-square Value within Military Performance Criterion. . . . .	129
25. Phi-coefficients between Like Items in the Recruit Personal History Inventory. . . . .	131
26. Percentage of Agreement between Mutually Inclusive Items . . . . .	133
27. Percentage of Agreement between Mutually Exclusive Items . . . . .	134
28. Agreement between Mutually Exclusive Items Reflecting Educational Achievement. . . . .	135
29. Distribution of Selected Items among Postulated Psychological Areas. . . . .	137

## LIST OF TABLES (continued)

Table	Page
30. Comparison of a Subsample of Eastern and Midwestern Recruits in Each of the Criterion Variables . . . . .	139
31. Directional and Significance Differences between Eastern and Midwestern Recruits on Inventory Items Displaying the Greatest Percentage Shifts from Phase I to Phase II. . . . .	141
32. Mean GCT Scores of Quartile Subgroups for Each Experimental and Control Group used in the Determination of the Independence of Predictor Variables . . . . .	146
33. Mean and Standard Deviation Values of GCT Scores for Experiment- al and Control Groups used for the Determination of the Independence of Predictor Variables . . . . .	146
34. GCT Score Statistics for Revised Experimental and Control Groups used for the Determination of the Independence of Predictor Variables . . . . .	147
35. Inconsistency Score Statistics for Experimental and Control Groups used for the Determination of the Independence of Predictor Variables . . . . .	148
36. Critical Ratio and Probability Values for the Significance of the Difference between Mean Inconsistency Scores for Experi- mental and Control Groups used for Determination of the Independence of Predictor Variables . . . . .	148
37. Data Pertaining to the Significance of the Differences in the Correlations between Phases I and II for Selected Experi- mental Inventory Items. . . . .	153
38. Final Transformation Matrix . . . . .	160
39. Cosines of the Oblique Reference Vectors. . . . .	161
40. Correlations between the Primary Factors. . . . .	162
41. Summary of the Obtained Factors . . . . .	173
42. Clusters and Intercorrelations of the Extracted Primary Factors . .	175
43. Comparisons of the Predictive Validity of Individual Interviewers and the Scored Personal History Record. . . . .	178

## LIST OF TABLES (continued)

Table	Page
44. Average Weekly Test Grades and RFAT Score Equivalents. . . . .	221
45. Responses to Recruit Personal History Inventory Items. . . . .	223
46. Chi-square Values of Recruit Personal History Inventory Items with Criteria in Phases I and II . . . . .	230
47. Percentage of Recruits in Experimental and Control Groups of Investigation to Determine Item Halo Effects with Changed Answers on Retest. . . . .	237
48. Item Numbers Preparatory to Factorization and Their Designation in the Recruit Personal History Inventory. . . . .	240
49. Tetrachoric Correlations between Significant Inventory Items . . .	289
50. The Centroid Factor Matrix . . . . .	308
51. The Oblique Factor Matrix . . . . .	314
52. Projections of the Questionnaire Items on the Oblique Reference Vectors. . . . .	320



## LIST OF FIGURES

Figure	Page
1. Schematic Representation of the Psychiatric Assessment Program . .	42
2. Diagram of Experimental Procedure, Part I. . . . .	85
3. Plots of Successive Column Pairs for Obliquely Rotated Factor Matrix . . . . .	241

## CHAPTER I

### THE PROBLEM

#### Introduction

Just prior to World War II the services of psychiatrists and clinical psychologists were made available to the United States Navy for the purpose of identifying and eliminating from the military those recruits whose predicted adjustment would be unsatisfactory. Even at that time psychiatric screening was not a novel procedure. The modern concept of military psychiatric screening dates back to World War I, at which time the impetus for such procedures emanated from a cable sent by General Pershing in Europe to the Chief of Staff. It stated, "Prevalence of mental disorders in replacement troops recently received suggests urgent importance of intensive efforts in eliminating the mentally unfit from organizations new draft prior to departure from United States."<sup>1</sup> Although Woodworth's Personal Data Sheet, which underwent several revisions, finally received an intensive try-out at the end of World War I, it was not until World War II that psychiatric screening was practiced on a major scale. However, even today, the purposes and goals of psychiatric screening are almost identical with those implied by the general's cable.

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<sup>1</sup>Joseph Zubin, "Recent Advances in Screening the Emotionally Maladjusted", J. clin. Psychol., IV (1948), 56-63.

Since 1940, literally thousands of articles, books, and other publications have appeared which deal with military psychology and psychiatry.<sup>2</sup> A high percentage of these deal directly with the problem of screening military personnel. The vastness of such literature serves as a measure of the importance attached to this procedure. In terms of the almost astronomical costs involved in the care of the wartime psychiatric casualty, the resultant inefficiency and lowered morale of the unit to which he was attached, and the consequent burden which such a liability may cause the country after the cessation of hostilities, this importance is not exaggerated. Even in peacetime, the costs of inducting and training military personnel, which in a relatively short time develop into liabilities for the service, are so high that some procedure for the early detection and elimination of the psychiatric casualty is imperative.

#### Purposes of the Study

Although many improvements were brought about in screening procedures during World War II, much that was learned during that period is not directly transferrable to present-day screening. The reasons for this are discussed in the sections to follow. Furthermore, the extremely heavy workload demands of the war years, particularly on the services of the clinical psychologist, prevented the time-consuming tasks of experimenting with screening method variations and conducting adequate appraisals of the effectiveness of technique. It is the purpose of this report to explore certain aspects

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<sup>2</sup> N. D. C. Lewis and B. Engle, Wartime Psychiatry (New York, 1954).

of these problems and to establish a more sound and valid basis for some of the current screening practices.

Specifically, the goals of this study are three-fold. First, it is proposed that a valid screening questionnaire be devised for the use of the clinical examiner in his initial psychological evaluation of recruits entering naval training. The validity of questionnaires utilized heretofore in the Navy has not been adequately demonstrated.

Secondly, it is proposed to study the predictive efficiency of an actuarial method of initial screening in relation to presently utilized clinical methods. Such a purpose presupposes the construction of a screening instrument capable of being mechanically scored.

The third function of this study is to investigate those psychological factors, in the sense of factor analysis, which are related to the performance of recruits in basic training. These goals are not at all independent; each of the latter two is predicated on the first. Of course, the long-range goal of an exploratory factor analytic investigation is the eventual factorial derivation of a predictively valid screening instrument as well as a clear-cut definition of the parameters governing military adjustment. To achieve such an ideal goal is not the purpose of the exploratory study herein described.

#### The Factor Analytic Approach

Impetus for the factorial approach in the construction of screening questionnaires is provided by J. P. Guilford. The following excerpt from his presidential address, delivered to the Western Psychological Association

at San Diego State College on 19 June 1947, is directly applicable:

Of all approaches to test development and to the exploration of human resources, factor analysis seems to offer the most illuminating and fruitful results. Intercorrelations of tests and of tests with practical criteria became [referring to the AAF psychological program]<sup>3</sup> quite intelligible in terms of common factors. Both tests and criteria could be accurately and meaningfully described in relation to the same dependable categories. I have elaborated upon the many advantages of the factorial approach in a forthcoming article and so will not go into details here. I wish merely to say that as a result of a factorial survey of AAF tests and criteria, a basis was laid not only for further material improvement in methods of selecting aircrew trainees but also for considerable new progress in vocational psychology in general. It is my firm conviction that the factorial categories and factorial theory and methods give us the stable foundation that vocational psychology needs.

In one sense factor analysis could provide the clinical examiner with a frame of reference or a list of parameters from which he could guide his queries in order to cover the entire domain necessary for making an accurate predictive judgment.

This, however, is not the entire function of the factorial approach. Harold Burk, as recently as 1960 makes the following statement: "In psychology, factor analytic methods could have wider use than simply the delineation of a set of basic functional unities in an unstructured domain. For instance, in the prediction of college grades or of success in various areas in industry or the Armed Forces, situations occur where many predictors are available. If the intercorrelations of twenty or thirty predictors were accounted for by, say, five factors, then these factors could be weighed in a regression equation."<sup>4</sup> In developing screening instruments the usual

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<sup>3</sup>Material in brackets is not part of the quotation.

<sup>4</sup>H. W. Burk, The Effect of Limiting the Number of Iterations on a Principle Axes Factor Analysis Solution (Seattle, 1960).

problem is the empirical weighting of many predictors in order to ascertain a criterion. The criterion of successful military adjustment is so exceedingly complex that a large number of predictors are required. Factor analytic techniques serve the purpose of reducing this large number of variables to a workable quantity.

### Necessity of the Study

Impetus for this investigation stems from a variety of dissatisfactions with current psychiatric screening assumptions, procedures, and results, in addition to an optimism for their resolution generated by Meehl's<sup>5</sup> careful analysis of clinical and statistical predictions.

The questionable reliability of the initial psychiatric screening examination, difficulties in describing behavioral variables or clusters of traits which are related to satisfactory service performance, some disconcerting findings regarding the validity of the initial psychiatric judgment, the assumption of a one-to-one relationship between severity of personality pathology and on-the-job performance, and the questionable generalization of findings and utilization of procedures derived during World War II to screening methodologies currently practiced in a peacetime military organization represent but a few of the ponderings of the clinician currently engaged in the assessment of the new recruit.

Since many of these dissatisfactions center around the initial clinical screening process, it is perhaps only natural that its chief competitor,

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<sup>5</sup>P. Meehl, Clinical vs. Statistical Prediction (Minneapolis, 1954).

namely actuarial prediction, should be looked to for a resolution. Meehl demonstrates that in a wide variety of situations clinical impressions fail to achieve the predictive validity evidenced by statistical techniques. Challenged by these findings, it was perhaps to be expected that investigations, in the form of pilot studies, should ensue for the purpose of testing the applicability of Meehl's conclusions to the Navy psychiatric screening program.

In the sections to follow, data collected by the author in pilot studies are presented as a basis upon which to justify the launching of the present investigation. While no one of the following studies serves as complete justification for the above dissatisfactions, taken together they pose a serious criticism of the value of the currently practiced procedure of initial clinical assessment for screening newly inducted naval enlisted personnel.

#### Validity of the Initial Clinical Assessment

As one measure of the validity of the initial psychiatric screening interview in terms of graduation from training, records were kept of trial duty rates for the period of January through May of 1958 as well as the initial judgments of screeners on recruits separated from the service via the Naval Aptitude Board during the period of 18 February through 17 June 1958<sup>6</sup>. Recruits separated from service during this period entered training,

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<sup>6</sup>Additional checks on screening rates, etc. have been made at other times during the past six years. The findings are very similar to those reported here.

for the most part, during the time for which trial duty rates were recorded<sup>7</sup>. The trial duty rates for this period are reported in Table 1. Table 2 reports the initial psychiatric status of recruits discharged by months during this period.

Table 1

Trial Duty Rates for Recruits Entering Training at Great Lakes during the First Five Months of 1958

Month	Total receipts	No. placed on trial duty	Percent placed on trial duty
January	3006	781	25.9
February	3667	841	22.9
March	3924	1052	26.8
April	2529	710	28.0
May	3180	744	23.3
Total	16306	4128	25.3

Per cent accuracy, as one aspect of screening efficiency, is the ratio of the number of recruits discharged, and initially labeled as trial duty, to the total number of recruits discharged.

Chi square, computed from a four-celled contingency table, equals a value of 334.69, yielding a probability which is much less than .001, indicating that the initial psychiatric prediction, when compared with a criterion

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<sup>7</sup>For an explanation of screening procedures and terminology the reader is referred to Chapter II.



of psychiatric discharge during recruit training, is unquestionably of significant validity. The value of the initial psychiatric evaluation, however, must be considered in terms of its practical utility, a criterion which is not easily defined. However, some evidence of what experienced clinicians consider to be an efficient screening procedure is supplied in reports of psychiatric screening during World War II.

Table 2

Initial Psychiatric Status of Recruits Discharged from the Naval Service at Great Lakes during the Period of 18 February through 17 June 1958

Month	Number Discharged	No. full duty Discharged	No. trial duty Discharged	Per cent Accuracy
February (18-28)	44	18	26	59.0
March	85	24	61	71.7
April	124	51	73	58.8
May	128	49	79	61.7
June (1-17)	59	22	37	62.7
Total	440	164	276	62.7

In 1943 Wittson et al.<sup>8</sup> reported trial duty rates approximating eight per cent, with 87 per cent of the recruits subsequently discharged having been originally labeled as trial duty. Miles et al.<sup>9</sup> in screening Marine

<sup>8</sup>C. L. Wittson et al., "The Neuropsychiatric Selection of Recruits," Amer. J. Psychiat., XCIX (1943), 639-650.

<sup>9</sup>D. W. Miles et al., "The Efficiency of a High-speed Screening Procedure in Detecting the Neuropsychiatrically Unfit at a U. S. Marine Corps. Recruit Training Depot," J. Psychol., XXI (1946), 243-268.

Corps recruits, reported in 1946 the development of a procedure, including an inventory and an interview, which resulted in the initial detection of 78 per cent of recruits subsequently discharged and a trial duty rate of approximately 15 per cent. In another article,<sup>10</sup> Wittson et al. report, "About 90 per cent of our rejections are being detected, or 'spotted', during the re-examination immediately after a recruit has arrived at the station. The remaining 10 per cent represent recruits who are not detected during the examination but break down during the training period and are referred to the neuropsychiatric service from other sources. From this it would appear that, while the three minute interview is not a perfect detection instrument, it does function satisfactorily." These figures of the efficiency of the initial psychiatric screening examination for naval selection during World War II are decidedly superior to those presented for Great Lakes during 1958. Since these authors describe their screening rates during World War II as only satisfactory, by the same standards present day screening figures would be considerably less so.

There are several possible explanations of these differences. Although there are not data available for support of the contention that under the urgencies of World War II a much greater emphasis was placed upon the quantity of personnel graduated from training for the manning of naval ships and stations than upon graduating a quality recruit, there are many who expound this view. If the present day recruit graduate is better trained than he was during World War II, failures today would be more frequent,

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<sup>10</sup>C. L. Wittson et al., "Neuropsychiatric Examination of Recruits", War Med., II (1942), 944-951.

as is seemingly the case, making the intricacies of predicting quality of performance more difficult. Such an explanation of screening efficiency differences, while perhaps plausible, is not considered to be of paramount importance.

Secondly, differences in the quality of the psychiatric and psychological screening teams may be a pertinent variable. There are some who would contend that the psychologists functioning as screeners during World War II had received more formal graduate training than the military psychologists functioning as screeners today. On the other hand, evidence is gradually accumulating which would suggest that the efficiency of any particular screener is not as much dependent upon formal training in psychology and psychiatry as upon a thorough understanding, in a variety of situations, of the duties and responsibilities of military personnel. Certainly no one could claim that the psychiatrists and psychologists responsible for naval selection at the outbreak of World War II had had many years of military experience. Today, however, such experience characterizes many of the military personnel serving as psychiatric screeners. Therefore, the evident differences in screening efficiency certainly cannot be attributable to this variable.

Probably the most tenable explanations of these differences is offered through variations in the age of personnel being recruited as well as their motivation for military service. During World War II almost all men of draft age were serving as part of the military establishment and any individual who was not part of these organizations was looked upon with disfavor by the majority of the civilian population. At that time there existed a

readily recognizable and easily definable threat to our democratic way of life. Today, the threat to our national security is much more intangible and more difficult for the average layman to comprehend. The 18 or 19 year old youth with his present-day mobility and abundant opportunities for the fulfillment of his material and educational wants is not easily swayed by the military enlistment slogans which are designed to appeal to his loyalty and sense of national pride. Likewise, the recruit who is experiencing mild adjustmental difficulties is able, with some justification, to rationalize his poor motivation and desire for separation from the military service. The poorer motivation of today's youth in military service confounds the basic problems of selection and assessment.

It is this author's opinion that the most important variable contributing to the differences in screening efficiency between World War II and the present is the age of recruits at the time of their enlistment. Table 3 shows the distribution of ages for two samples of recruits entering the Navy. The first sample was drawn from recruit receipts at the U. S. Naval Training Center, Great Lakes during the period of April to November of 1952<sup>11</sup>, while the second sample is the total number of recruits entering the Navy during April, May, and June of 1960<sup>12</sup>. Table 4, on the other hand, is taken from Ginzberg<sup>13</sup> and shows the age distribution of soldiers at the time of their

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<sup>11</sup>J. A. Plag, "A Brief Validation Study of the Standard Medical Screening Form A and a Proposed Screening Technique", Unpublished Master's Thesis, Bradley Univer., Peoria, Ill., 1953).

<sup>12</sup>Department of the Navy, Navy and Marine Corps Military Personnel Statistics, NAVPERS 15658 (30 June 1960), p. 85.

<sup>13</sup>E. Ginzberg et al., Patterns of Performance, The Ineffective Soldier, Vol. III (New York, 1959), p. 92.

Table 3

Distribution of the Ages of Recruits at Great Lakes during Mid-1952 and of All Navy Males during the Second Quarter of 1960

Age	Great Lakes - 1952		All Navy - 1960	
	Number	Per cent	Number	Per cent
17	72	22.5	4314	19.4
18	95	29.7	10356	46.5
19	94	29.4	4109	18.4
20	29	9.1	1656	7.4
21	12	3.8	669	3.0
22	10	3.1	362	1.6
23	6	1.8	276	1.3
24	2	0.6	111	0.5
Over 24	0	0.0	410	1.9
Total	320	100.0	22265	100.0

entry into the Army during the last four months of 1942. Since all services were drafting personnel at that time, the figures for the Army are no doubt comparable to those for the Navy. In the Ginzberg study, the per cent of men over 22 years of age is 52.8, while for the Navy samples the per cents are 2.4 and 3.7, demonstrating the marked difference in the age of recruits entering service today as compared with the war years.

The significantly lower mean age, as well as less variability in the ages of recruits inducted into the Navy today, results in increased difficulties for the psychiatric screener. Aberrant behavior in the 17 year old adolescent may be much less indicative of serious emotional pathology than would be the same behavior in an older man. Because the range of acceptable

Table 4

Distribution of the Ages of Soldiers  
Entering the Army during the Last  
Four Months of 1942

Age at Entry	Per cent
18 - 22	47.2
23 - 27	19.0
28 - 32	12.7
33 - 37	8.9
38 and older	12.2

behavior is so much greater for the adolescent than for the young adult, the diagnosis of significant patterns of pathology is more time-consuming and accomplished with much greater error. Furthermore, the psychiatrist or psychologist who examines the young adult in his late twenties possesses a good deal more information relative to his accomplishments and adjustmental patterns than does the screener who examines the 17 year old adolescent. Having encountered more of life's problems and usually having undergone a greater variety of stressful situations results in a great deal more information to supply to the predictive equation in the case of the older recruit.

Correlated with a greater range in the ages of recruits during the war years is a greater variation in the pathologies encountered. Wittson et al.<sup>14</sup> report on the percentage incidence of types of neuropsychiatric unfitness in 600 cases discharged by the Navy early in World War II. This

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<sup>14</sup>C. L. Wittson et al., "Neuropsychiatric Examination of Recruits", War Med., II (1942), 950.

information is presented in Table 5. Another distribution showing the percentage of discharged recruits in each diagnostic category for Great Lakes

Table 5

Percentage Distribution of Psychiatric Diagnoses  
Among 600 Recruits Discharged by the Navy  
Early in World War II

Diagnostic Category	Per cent
Mental Deficiency	33
Constitutional Psychopathic State (and Inferiority)	26
Neurologic Disorder	24
Psychoneurosis	8
Psychosis	5
Illiteracy	4

during 1958 is presented in Chapter II. In comparison it is noted that a significantly higher percentage of recruits during World War II were diagnosed as mentally deficient, as psychotic, as psychoneurotic, and as presenting neurologic disorders. Today these nosological groupings are seldom utilized because of the relative infrequency of these conditions among the recruit population and because of what are probably some shifts in the emphasis being placed upon certain components of the psychiatric nomenclature. Ginzberg presents figures which rather dramatically demonstrate the positive relationship between age and the psychoses and psychoneuroses. "The most striking finding is the extent to which the separation rate for psychoneurosis rises with age. Between the youngest men--eighteen-and-nineteen-year-olds--and the oldest group--thirty-six and seven--the rate increases from just over 6

per 1,000 to over 45 per 1,000 or sevenfold. The curve rises steadily and sharply. For men separated because of psychosis the rate rises with age, but the increase is less pronounced. Among the undesirables there appears to be little systematic relationship between the rate and age.<sup>15</sup> Another reason for the differences in the diagnosis of discharges is the present-day emphasis placed upon the measurement of intelligence at the Armed Forces Examining Center<sup>16</sup> where most mental deficientes are originally eliminated.

The fact that younger recruits pose different screening problems is attested to in a report by Marmor and Zander<sup>17</sup> who comment on the psychological problems encountered in screening 16 and 17 year old recruits in 1944, at a time when reductions in maritime service enrollment necessitated the acceptance of younger men. "The greatest problem was immaturity, actual because of youth, which made screening of those so emotionally immature as to be unfit for sea duty difficult. . . . Many had joined the service with unrealistic expectations of adventure and high pay. . . . The Shipley Inventory was found fairly efficient in picking out psychoneurotics but less effective in other regards because of the age and lower intelligence score of the group; . . . Personal interviews had to be raised 25-30 per cent above the old average. . . . A fairly high attrition rate persisted, despite the thorough and careful screening. . . ."

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<sup>15</sup>E. Ginzberg et al., The Lost Divisions, The Ineffective Soldier, Vol. I (New York, 1959), p. 109.

<sup>16</sup>See Chapter II.

<sup>17</sup>J. Marmor and A. F. Zander, "Psychological Problems in Training 16-and 17-year-old Youth in the United States Maritime Service", Amer. J. Orthopsychiat., XV (October 1945), 571-583.



Another aspect of the screening problem for the younger age group is the lack of adequately validated psychiatric questionnaires. For example, the enumeration of somatic complaints by the 17 year old is much less often indicative of serious pathology than is a listing of such complaints among the recruit in his twenties. In comparison with the older recruits, the 17 year old adolescent has not developed a sense of responsibility, is not as willing to fulfill his obligations, does not as easily recognize the implications of his behavior, has less appreciation of life's goals and purposes, and finds greater difficulty in postponing immediate gratifications. Furthermore, the adolescent is more apt to act out his feelings and attitudes on an overt level, be less able to withstand certain types of deprivation, and possesses more superficial and less realistic motivations. It is, therefore, little wonder that the development of a more valid questionnaire is necessitated.

In summary, evidence has been presented to demonstrate the less than satisfactory efficiency of World War II screening methodologies when applied to present-day recruit populations. These differences have been attributed fundamentally to shifts toward the younger side of the age continuum. Such evidence is considered to substantiate the position that the screening methodologies and psychiatric questionnaires of the World War II era are in need of overhaul and revision.

#### Reliability of the Initial Clinical Examination

Discussions with psychologists and psychiatrists engaged in the initial psychiatric screening process have led to the hypothesis that there is relatively little unanimity of opinion even among experienced screeners as

regards the importance of particular symptoms or traits for the prediction of military adjustment. If this were a correct hypothesis, at least some explanation could be offered for the low practical validity of the initial psychiatric screening interview.

To obtain some estimate of the concurrence among judges during the initial psychiatric screening examination, 47 recruits who had been on board the training center for one day were interviewed separately for a period not exceeding three minutes by each of six examiners. The raters, consisting of four civilian and military psychologists and two military psychiatrists, were considered to be well versed in the procedures and aims of psychiatric screening since the range of their experience was from two to six years with a mean of 3.3 years. Each examiner was instructed to conduct his interview in the manner to which he was accustomed and to rate each recruit along a continuum consisting of three categories dependent upon his prediction of the recruit's probable adjustment to Navy life. These three categories were the following: (a) no significant pathology--predicted good performance; (b) mild maladjustment not requiring extensive later reexamination--predicted fair performance; and (c) severe pathology necessitating a label of trial duty--predicted unacceptable performance. Each recruit had completed Standard Medical Medical Screening Form A on the previous day and this questionnaire of psychiatric symptomatology served as an aid for the clinician in directing his interview and in arriving at a predictive decision. Contrary to regular screening procedures, no notations nor remarks were entered upon the recruit's Standard Medical Screening Form A and no examiner was aware of the rating which had been assigned to the recruit by any previous examiner. Each

examiner's judgments were recorded on a separate tabulation sheet.

The judgments of each rater were compared with every other rater for each of the 47 recruits examined and contingency coefficients were calculated from nine-celled tables as measures of the agreement existing between each of the examiners. These coefficients are reported in Table 6.

Table 6

Contingency Coefficients<sup>a</sup> as Estimates of Inter-Judge Reliability  
For the Initial Psychiatric Screening Interview

Judge	A	B	C	D	E	F
B	.452 (.553) <sup>b</sup>					
C	.614 (.752)	.606 (.742)				
D	.450 (.551)	.524 (.642)	.583 (.714)			
E	.557 (.682)	.603 (.738)	.567 (.694)	.531 (.650)		
F	.553 (.677)	.562 (.688)	.616 (.754)	.624 (.764)	.521 (.638)	

<sup>a</sup>All coefficients are positive.

<sup>b</sup>The maximum possible contingency coefficient in a nine-celled table is .816. The figure in parentheses is a ratio of the obtained coefficient to the maximum coefficient, yielding a figure which more nearly approximates a Pearson r.

Two of the correlations are not significant at the .01 level of con-

fidence and none of the reliabilities is substantial. Expressed in somewhat different terms, the overall mean number of agreements between judges is 30.07, giving a mean percentage of agreement of 63.9. With agreements as low as these, it is little wonder that the validity of the initial screening interview is so poor.

Despite the fact that an attempt was made with this investigation to duplicate an actual work situation, certain discrepancies are obvious. Each examiner was of course aware of the fact that other examiners were interviewing the same recruits. Whether this awareness and the knowledge that comparisons would later be made between judges' ratings had any influence upon the examiner's decisions is problematical. It would seem, however, that if such awareness did play a part in the judgments of the raters, it would have had the effect of producing greater similarity between the ratings. Furthermore, it might be argued that the clinical picture presented by each recruit changed from examiner to examiner as a result of the influences of the previous examination. If such were the case, it is possible that the judgments of the raters who interviewed the recruits first would have been significantly different from the judgments made by the raters who conducted their examinations last. A review of the findings indicated that this was not the case.

Since this investigation was conducted at a time when the number of recruits reporting aboard was minimal and by personnel with many months of screening experience, it is probable that the obtained reliabilities are optimal. Even though the obtained correlations and number of agreements may appear sizable when contrasted with the reliabilities of psychiatrists

in predicting success among Marine Corps officer candidates, as reported by Raines and Rohrer,<sup>18</sup> they are hardly of sufficient magnitude to merit wholehearted acceptance of the initial psychiatric screening interview as a reliable predictor of a recruit's service adjustment. Actuarial predictors, in the opinion of Sarbin et al.,<sup>19</sup> would probably possess greater reliability and hence eliminate this major criticism of the presently practiced initial psychiatric assessment. The validity of such actuarial predictors would of course have to match the validity of the currently utilized clinical examination.

#### Clinical vs. Statistical Prediction<sup>20</sup>

In the previous sections of this report criticisms of the predictive validity and the reliability of the initial clinical screening examination have been enumerated. Actuarial assessment has been proposed as a possible remedy. It is the purpose of this section of the report to enumerate, several exploratory studies which were conducted at Great Lakes to investigate the feasibility of the actuarial approach.

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<sup>18</sup>G. N. Raines and J. H. Rohrer, "The Operational Matrix of Psychiatric Practice: I. Consistency and Variability in Interview Impressions of Different Psychiatrists", Amer. J. Psychiat., CXI (1955), 721-733.

<sup>19</sup>T. R. Sarbin, R. Taft, and D. E. Bailey, Clinical Inference and Cognitive Theory (New York, 1960).

<sup>20</sup>Most of the material presented in this and the preceding section (Reliability of the Initial Clinical Examination) has been accepted for publication. It will appear as an article entitled, "Some Considerations of the Value of the Psychiatric Screening Interview" in the January 1961 issue of the Journal of Clinical Psychology.

The small number of recruits received for training during June, July, and August of 1953 permitted followup interviews during the third week of training to be given to a total of 1813 recruits reporting aboard the station during that period. For the purpose of comparing the predictive validity of the initial screening interview and a scored screening test, the trial duty--full duty predictions of both screening techniques were determined independently and filed for later analysis in terms of the graduation--discharge criterion. The initial screening interviews were conducted by a group of five psychologists and psychiatrists. The screening test consisted of the same Standard Medical Screening Form A utilized as an adjunct by the interviewer but scored according to a prior determination<sup>21</sup> of the significance of the items. While the clinician possessed the same information used in computing the screening test score, and in addition was able to assess the recruits' affective and factual responses in a face-to-face interview situation, he was not aware of the results of the actuarial prediction.

It should be pointed out that the criterion of graduation from training was to some extent a contaminated one. Recommendations for discharge were made by the same clinicians responsible for the initial screening judgment. This is not considered to be a serious flaw in the design, however, since the recommendations for discharge by the clinician were positively related to performance except for those few cases where the psychiatric defect was absolutely disqualifying. Furthermore, the final judgments of the clinician were invariably supported by a board of other medical and line officers

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<sup>21</sup>Plag, pp. 51-53.

resulting in the actual service separation of 99 per cent of the cases so recommended.

At the time of the three-week followup interview, the examining clinician was not aware of the trial duty--full duty category to which the recruit had originally been assigned by either of the two assessment techniques.

Sixty seven or 3.7 per cent of the recruits received for training during this period were discharged from service as psychiatrically unsuitable. Table 7 reports the predictive validity of the initial clinical evaluation and the scored Standard Medical Screening Form A using three different cutting scores. The chi-square values, used as a measure of predictive

Table 7

Predictive Validity of the Clinical Interview and the Standard Medical Screening Form A Using Various Cutting Scores

Screening technique	% Placed on trial duty	% Discharged recruits on trial duty	$\chi^2$	p
Clinical interview	40.3	83.6	54.17	<.001
S.M.S.F.A <sup>a</sup> score of 6 or higher	29.5	74.6	68.54	<.001
S.M.S.F.A score of 5 or higher	35.2	77.6	54.78	<.001
S.M.S.F.A score of 4 or higher	43.2	86.6	53.00	<.001

<sup>a</sup>Standard Medical Screening Form A.

validity, were computed from four-celled contingency tables. One of the dichotomized variables, namely the predictions, was represented by the number of recruits in the trial duty-full duty categories, while the other dichotomized variable, the criterion, contained, for the same recruits, the number in the discharged--graduated categories. The use of chi-square as a measure of predictive validity is not entirely satisfactory,<sup>22</sup> but does serve the purpose of allowing for the comparisons needed here.

The results of this study portray no significant differences between the two screening techniques, although an optimal cutting score of six for the Standard Medical Screening Form A is suggested. The fact that a hastily conceived questionnaire such as the Standard Medical Screening Form A, when scored objectively, can result in predictions which are as valid as those of the trained clinical examiner, lends support to the position that the derivation of a questionnaire embodying a greater number of parameters and based upon factorial validity would be a worthwhile endeavor.

Another study, conducted during the summer of 1956 at Great Lakes, compared the predictive validity of three independent measures of adjustment: (a) the initial psychiatric screening interview; (b) the objectively scored Standard Medical Screening Form A; and (c) the Draw a Person Test, subjectively evaluated. The initial psychiatric interview was conducted by a single psychologist using the Standard Medical Screening Form A as an adjunct. The objectively scored Standard Medical Screening Form A was essentially the

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<sup>22</sup>This problem has been discussed in detail in an unpublished paper by the author entitled, "A Comparison of Methods for Determining Screening Efficiency".



same "screen test" described in the former investigation except for several slight modifications in scoring which were necessitated by shifts in the baseline characteristics of recruits received for training during that period. Scores ranged from a -1 to a +20, and recruits with scores of +8 or higher were placed on trial duty. The Draw A Person Test was administered to each recruit at the time of the administration of the Standard Medical Screening Form A, namely on the first day of the recruits' arrival at the Naval Training Center. This projective technique was evaluated subjectively by a clinician well versed in the subtleties of personality and intellectual assessment from indicators of pathology revealed by such an instrument. These assessment techniques were applied to a sample of 1945 recruits received for training from 5 July through 12 July. The "judgments" of each technique were dichotomized into trial duty and full duty categories, and all recruits labeled as trial duty by any one of the three screening techniques were reexamined during the course of training. Of course, the designation of trial duty--full duty by each of the predictive techniques was made independently of the others, and at the time of the followup interviews no one of the examining clinicians was aware of the technique or techniques responsible for the initial trial duty assignment.

Twenty nine recruits comprising the sample were discharged from service as psychiatrically unsuitable. The validity of the techniques was ascertained in terms of the discharge--graduation criterion by computing chi-square values from four-celled contingency tables in the same fashion as reported in the previous investigation. These findings are reported in Table 8. Although all three techniques yielded significant validities, the chi-square

Table 8

## Validity Comparisons of Three Screening Techniques

Screening	% Placed on trial duty	% Discharged recruits on trial duty	$\chi^2$	p
Clinical interview	20.0	65.5	38.62	<.001
Scored Standard Medical Screening Form A	24.5	79.3	48.49	<.001
Draw A Person Test	24.0	44.8	6.97	<.01

value obtained for the Draw A Person Test was substantially lower than those obtained for the other two. These findings, in-so-far as the clinical interview and the scored Standard Medical Screening Form A are concerned, are in keeping with the findings of the previous investigation and also would tend to give credence to the value of pursuing the development of a more valid screening questionnaire.

## Advantages of the Actuarial Approach

In the previous sections of this chapter the theoretical rationale for dealing with the initial screening process on the basis of an actuarial approach has been presented. Additionally, and perhaps of equal importance, is the practical value of a mechanized screening procedure.

The obvious advantage of a mechanical screening process, assuming a predictive validity equal to or greater than that for the initial clinical examination, is that the initial psychiatric screening need not occupy the

time of the skilled psychologist or psychiatrist whose training is such that he can more advantageously apply his skills in the area of extensive personality examinations and psychotherapeutic endeavors. The rapid-fire initial interview screening, which always must be accomplished in a period of less than three minutes, and on occasion, when the number of men to be examined is large, in considerably less time, is a procedure with which the newly commissioned psychiatrist has had no familiarity. During the first month or two of screening duty his performance is of quite limited value. It is little wonder that one psychiatrist, not previously acquainted with interview screening, likened the process to "attempting to count the rivets on a jet plane passing in front of you at a speed of 500 miles an hour".

For the screener, the initial evaluation process quickly becomes an extremely fatiguing process. During periods of heavy recruit input, which all too often occur at a time of understaffing, it is not infrequent for a single examiner to be called upon to complete the screening of from 300 to 500 recruits in only three or three and a half hours. At such times the intriguing procedure of delving into the many parameters of personality and performance, through queries prompted by hints of underlying pathology, ceases to be an interesting challenge and is quickly reduced to a monotonous, tiring routine. The first 50 to a 100 examinations can be accomplished with some clinical skill, but the examiner's ability to remain cognizant of the more subtle indications of pathology quickly diminishes as more interviews are undertaken, and he more than likely finds himself basing his judgment of full duty--trial duty on fewer and fewer indices of adjustment. To say the least, this undoubtedly has a marked effect upon staff efficiency and

certainly upon staff morale.

Another problem inherent in the initial screening procedure is what may be termed the "recruit halo effect". That is, the judgment made about one individual is influenced by the judgments made on the previously examined recruits. Without ignoring serious pathology, the interviewer is required to keep his trial duty rate within realistic boundaries, since the number of recruits judged as requiring followup examinations has a pronounced effect upon the future workload of the psychiatric unit. Every interviewer, during the initial clinical examination, maintains a subjective impression of his ongoing trial duty rate. Should he become aware that this is running high, that is, beyond the realistic limitations of staff and time for later follow-up examinations, a shift in his standards will no doubt occur, resulting in borderline cases sometimes being placed on trial duty and at other times not. Although experience with the screening process reduces this "recruit halo effect", it is never entirely eliminated and jeopardizes the reliability of the judgment of even the experienced clinician. The point implied by this discussion is that it is much more difficult to maintain a certain standard for trial duty placement by clinical means than by some objective, mechanized procedure.

From week to week and from month to month there are frequently marked variations in the number of psychiatric unit staff personnel available for conducting the more extensive followup examinations. Extra duties, such as serving on court-martial boards, conducting inrate examinations, etc. are frequently required for the military members of the unit, and periods for leave, illness, and attendance at professional meetings are necessary for

all members of the staff. Many of these fluctuations in available number of staff personnel are predictable and there can be planning for them in terms of unit workload. Such planning, however, requires some control being exerted over the initial trial duty rate. A conscious attempt to do this via the initial clinical interview is extremely difficult, while a simple change in in the cut-off score of a mechanical screening technique is relatively easy to effect.

In contrast to the initial clinical evaluation, an actuarial technique for the initial psychiatric assessment eliminates the idiosyncrasies of individual examiners, permits long-term adherence to the same standards of initial assessment despite marked variations in the quality of recruit receipts from month to month, allows for a more trustworthy meaning to be attributed to the PUHLES system when utilized by classification departments for the assignment of personnel to special billets such as aviation and submarines, and simplifies the process so that it can be carried out by trained corpsmen.

## CHAPTER II

### CURRENT SCREENING PROCEDURES<sup>23</sup>

#### Introduction

Justification for the psychiatric assessment of newly enlisted naval personnel is predicated upon the assumptions that neuropsychiatric screening results in improved military efficiency, aids the recruit by preventing an exacerbation of personality difficulties, serves as a financially economical procedure by reducing pensions and disability benefits, and provides valuable information concerning the mental health of our military population for the making of manpower decisions. At least some of these functions have been demonstrated by studies<sup>24, 25, 26</sup> which have sampled the performance of naval

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<sup>23</sup>This chapter is included for those readers who are unfamiliar with existing naval psychiatric screening procedures and assumptions. It is not intended as a comprehensive description of operating methods. For a more detailed account of such procedures, the reader is referred to: Department of the Navy, Bureau of Medicine and Surgery, Neuropsychiatric Branch, Professional Division, Psychiatric Unit Operational Procedures, Revised Edition (1954).

<sup>24</sup>W. A. Hunt, C. L. Wittson, and H. W. Burton, "A Validation Study of Naval Neuropsychiatric Screening", J. consult. Psychol., XIV (1950), 35-39.

<sup>25</sup>C. L. Wittson, W. A. Hunt, and I. Stevenson, "A Followup Study of Neuropsychiatric Screening", J. abnorm. soc. Psychol., XLI (January 1946), 79-82.

<sup>26</sup>W. A. Hunt, R. S. Herrmann, and H. F. Noble, "The Specificity of the Psychiatric Interview", J. clin. Psychol., XIII (January 1957), 49-53.

personnel several years following their enlistment. Although there is little argument with these objectives or with the overall findings of the studies cited, such ex post facto demonstrations of psychiatric screening efficiency cannot legitimately be substituted for well controlled experimental investigations.

Achievement of these ideal goals in psychiatric assessment poses enormous methodological and administrative complexities. Perhaps an ideal screening procedure would be one permitting the extensive psychiatric examination of all applicants for entrance into the naval service at the recruiting station or at the Armed Forces Examining Station. Unfortunately, limitations in the number of psychiatrically trained personnel in the military prohibit the adequate staffing of these numerous points of induction. Indeed, personnel limitations are even such as to hinder the adequate staffing of the two U. S. Naval Training Centers! Additionally, there exists the problem of the validity which could possibly be attributed to even thorough pre-induction psychiatric examinations. Aside from the rejection of the manifestly unsuitable youth, which such assessment could be expected to achieve, numerous character and behavior disorders, not clearly disqualifiable at the time of enlistment, would require periods of trial duty for their proper evaluation. Although research designed to investigate objective parameters of adjustment for use at the recruiting stations is indeed worthwhile, present limited knowledge and personnel understaffing require psychiatric assessment be undertaken at the training centers.

Perhaps as a result of the poorer motivation of recruited personnel today, as contrasted to the World War II era, or because of the current emphasis on predicting performance in addition to the detection of serious pathology, research findings to date indicate that no single screening instrument or pro-

cedure is more than moderately successful in detecting those individuals who should either be denied entrance into service or whose mode of adjustment is precarious to the point of requiring further extensive examination. As a result, the emphasis upon screening as a 'one-shot' procedure has diminished, and a shift has occurred in the direction of viewing selection as a longitudinal process, with various instruments and procedures being of value at different points in time during the serviceman's career. The process of successive screening and rescreening during recruit training, as well as the assumptions implied therein, is the subject of this chapter.

### Induction Procedures

Prior to his arrival at the Naval Training Center, each recruit has been subjected to a series of examinations designed to classify broadly his potentialities for the purpose of meeting quota restrictions imposed by the Department of Defense and for detecting the manifestly unsuitable personality disorders. The Armed Forces Examining Station (AFES) is delegated the responsibility of examining and classifying applicants for entrance into all of the military services.

To guarantee the equivalent allocation to each branch of the Armed Forces of men within various intellectual categories, the Department of Defense has established mental groups, based upon the Armed Forces Qualification Test percentile score, within which each military service is permitted an equivalent percentage quota. Table 9 depicts the AFQT percentile score for each mental group and the approximate percentage quota allowed for each military service. No mental Group V personnel are accepted for military service, but should any



Table 9<sup>a</sup>

## AFQT Percentile Scores and Approximate Quotas for Mental Levels

Mental group	AFQT raw score limits	Percentile score limits	Per cent quota
I	81 - 90	93 - 100	8
II	65 - 80	65 - 92	31
III	47 - 64	31 - 64	38
IV	27 - 46	10 - 30	23
V	below 27	below 10	0

<sup>a</sup>Department of the Navy, Bureau of Medicine and Surgery, Psychiatric Unit Operational Procedures, p. 139.

particular military branch fail to meet its quota for the first three mental groups, substitution of mental group IV personnel is allowable. Hence, although a service's quota may never exceed the percentages shown in Table 9 for the first three mental groups, the percentage of inducted personnel in groups I, II, and III may be considerably less than the maximum authorized. For example, in March of 1955, 48.1 per cent of Navy recruits were obtained from mental group IV<sup>27</sup>!

The AFQT, which is administered at the Armed Forces Examining Station, represents a joint effort of technicians in all the Armed Services. The test, which consists of 100 items with a working time of 50 minutes, is designed to measure abilities in the verbal, arithmetical, mechanical, and spatial areas.

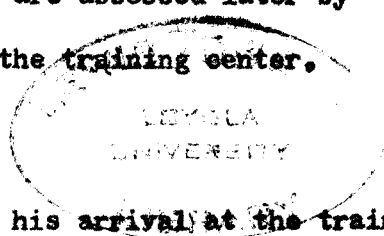
<sup>27</sup>Department of the Navy, Bureau of Naval Personnel, Operational Implications of Increased Accessions of Mental Level IV Men, Personnel Research Memorandum, Pers - 152, Memo 55 - 1 (23 May 1955), 1.

To save expense by sending to the AFES a minimum number of applicants for enlistment into the Navy who do not conform to the intellectual restrictions established by the Department of Defense, each perspective recruit is administered, by the Navy recruiting office, the Applicant Qualification Test (AQT). This test, which is composed of 90 items with a working time of 50 minutes, is designed to measure verbal reasoning, quantitative thinking, and mechanical ability. The AFQT and the AQT correlate above  $+ .80$ , but in individual cases a great disparity often exists because of inaccuracies in the administration and scoring of the AQT by Navy recruiters.

The Armed Forces Examining Station is also responsible for the physical examination of each new entrant into military service, facilitating a uniform interpretation of physical standards for all of the military services. At the time the perspective recruit undergoes this initial physical examination, he has completed Standard Form 89, Report of Medical History (Appendix 1) usually with the aid of the Navy recruiter. This form, which contains questions relating to frequent or severe headaches, dizzy or fainting spells, depression, alcoholism, bedwetting, sleepwalking, and the like, serves as a preindiction screen. In reality, few recruits are rejected from naval service at the Armed Forces Examining Station as a result of psychiatric difficulties. Such conditions as overt psychosis and epilepsy may cause rejection, but most of the more subtle immaturity and character and behavior disorders are assessed later by the more detailed psychiatric screening procedures at the training center.

#### In-processing Procedures

For a period of approximately four days following his arrival at the training center, the newly inducted recruit undergoes examinations and indoctrinat-



ion procedures to prepare him to commence training. The issuance and stenciling of clothing, a lecture on the Uniform Code of Military Justice, physical, dental, and classification examinations, etc. take place during this period. Two procedures occurring at this time, namely the classification examinations (described in this section) and the initial psychiatric screening (described later), are of prime importance as assessment devices and therefore require more detailed explanation.

It is the responsibility of the Classification Department to administer the basic test battery<sup>28</sup> which is composed of four tests--General Classification Test (GCT), Arithmetic Test (ARI), Mechanical Test (MECH), and Clerical Test (CLER). Although, to some degree, these four tests are a duplication of the pre-induction testing with the AFQT and the AQT, the latter tests are entirely selection instruments, while the basic battery tests are used almost exclusively for the classification of already inducted personnel.

The GCT is a 100-item test designed to measure the ability to comprehend material of a verbal nature. It is composed of 40 sentence-completion items and 60 verbal analogy items. It is a multiple-choice test, with five possible answers supplied for each question, and requires 35 minutes to administer.

The ARI is composed of two subtests, a 20-item Arithmetic Computation Subtest and a 30-item Arithmetic Reasoning Subtest. Each of the subtests is cast in five-alternative multiple-choice form, the allowable time limits being 12 and 35 minutes respectively.

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<sup>28</sup> Department of the Navy, Bureau of Naval Personnel, The Use of Navy Tests, January 1959, Personnel Research Memorandum, Pers - 152, Memo 59 - 1, (20 January 1959), 1-11.

The MECH is composed of two subtests, the first being tool knowledge which consists of 50 items, each requiring the testee to select from pictures of four alternatives the one which is most closely associated with a depicted tool or object, and the second being mechanical comprehension which likewise consists of 50 items, each requiring the testee to select from one of three answers the one which indicates that he comprehends the mechanical principle illustrated in one or more drawings. The total time limit for the Mechanical Test is 35 minutes.

The CLER is composed of 240 pairs of five-to nine digit numbers requiring the testee to indicate whether the pairs of numbers are the same or different. The Clerical Test is a measure of the ability to observe quickly and accurately and has a time limit of only 10 minutes.

Each of the tests comprising the basic battery is scored with a mean of 50 and a standard deviation of 10. They have all undergone extensive validation in terms of the prediction of performance in the Navy's technical training schools, and are revised periodically to permit the incorporation of technical improvements so that the classification of enlisted personnel may be accomplished with increased precision and accuracy.

One additional function of the basic test battery should be noted. Up until August of 1957, the Navy operated Recruit Preparatory Training schools at each of its three Naval Training Centers, the purpose of which was to provide pre-training instruction to those recruits possessing reading abilities below the fifth grade level. In August of 1957, the Navy ordered the closing of the Recruit Preparatory Training schools, as well as the Recruit Training Command for men at Bainbridge, Maryland, and permitted the immediate separa-

tion of recruits with minimum intellectual capabilities and those failing to meet the minimum reading requirements.

As a measure of these limited abilities, the Classification Department administers three additional tests to recruits who obtain a score below 36 on the GCT ( $1\frac{1}{2}$  sigmas below the mean). These tests are the Non-Verbal Classification Test (NVCT), which provides an estimate of intellectual ability for recruits with limited educational attainments, the Literacy Test (LIT), which contains items pertaining to word recognition and reading comprehension, and the U. S. Armed Forces Institute Test (USAFI), which supplies an additional measure of reading ability. Passing grades have been established on these tests such that a recruit who does not fail any one of them is automatically assigned to training. To ascertain the serviceability of recruits who fail one or more of these three additional tests, referral is made to the Recruit Evaluation or Psychiatric Unit for an evaluation of intellectual and personality limitations. The Recruit Evaluation Unit has followed the procedure of recommending for discharge all such failures unless the individual is almost completely free of personality pathology, is extremely well motivated for service, and possesses no severely handicapping intellectual or specific learning deficiencies. The Line Officers have invariably accepted the Recruit Evaluation Unit recommendations in toto.

#### Physical Profiling

The basis of the military physical classification system is the PULHES profile. Each of these six letters is an abbreviation for a dimension of the physical makeup of the individual. P represents the general physical condi-

tion, U designates the upper extremities, L stands for lower extremities, H for hearing, E for vision, and S for psychiatric. Each of these parameters is graded on a four-point scale where 1 represents complete normality, 2 and 3 signify relative abnormality, and 4 designates unacceptability. For example, an individual with a PULHES rating of 111213 is completely normal in all dimensions except for hearing, where mild loss is indicated, and for psychiatric, where considerable limitation is noted.

The initial physical profile is assigned at the Armed Forces Examining Station, but is frequently changed or modified, particularly at the training center where more intensive examinations and closer scrutiny of the recruit is possible. Many billets or assignments in military service require specific physical profiles, and an applicant may not be acceptable for certain positions, such as flying or submarines, etc., even though he meets the minimum physical standards for enlistment.

Only those recruits who are graded as 4 in any one of the PULHES categories are regarded as failing to meet the medical standards for military service. Should a particular physical limitation not have been detected at the time of enlistment, or if it develops subsequent to enlistment, such as by injury, etc., the recruit is separated from service after his case has been reviewed by a medical survey board. Those recruits who meet the medical standards, but only minimally so, may be considered as constituting a detriment to their associates, or may be considered as possessing symptoms which would be exacerbated by continued service. Such individuals may be discharged administratively because of unsuitability for service. The latter is frequently the case with psychiatric discharges.

The psychiatric or S dimension of the PULHES profile is composed of three aspects. One is personality per se--that aspect of the psychiatric evaluation which deals specifically with neuropsychiatric disturbances. Another is intellectual capacity, and the third is character, under which is subsumed such variables as motivation, morale, and performance. Although these three aspects of the psychiatric dimension are not evaluated separately, the overall S rating represents a composite of these aspects, any one of which might be responsible for a specific rating.

It is the Psychiatric or Recruit Evaluation Unit's function to appraise each new recruit and to assign to each a rating within the psychiatric or S dimension. A rating of 4, and separation from service by a board of medical survey, is only assigned to those recruits who manifest a frank psychosis, a severe chronic psychoneurosis, or marked mental deficiency. Rarely is such a rating made at the training center. There are probably two major reasons for this. In the first place, individuals possessing such severe pathology are usually easily detectable and do not pass the physical examination at the Armed Forces Examining Station. Secondly, as pointed out in Chapter I, it is not characteristic of the young recruit entering the Navy today to be old enough to have developed such an incapacitating condition as a frank psychosis or a severe, chronic neurosis. Such attempts at conflict resolution are much more typical of the older serviceman. Therefore, almost all Psychiatric Unit discharges are released from service for character and behavior disorders, given a PULHES S rating of 3, and discharged administratively. In other words, their continuation in service is predicted to result in an exacerbation of their symptoms or in a marked lowering of the serviceman's efficiency. It is impor-

tant to note that such individuals are not discharged on the basis of any specific symptomatology, but on the basis of a lowered functioning resulting from the psychiatric abnormality. Table 10 shows the number of recruits comprising each diagnostic category among discharges for the year 1958. The table includes only those recruits discharged as unsuitable from the U. S. Naval Training Center, Great Lakes.

Table 10

Diagnoses of Recruits Discharged from U. S. Naval Training Center,  
Great Lakes during 1958

Diagnosis number	Diagnosis	No. cases	Per cent
3160	Psychogenic Gastrointestinal Reaction	1	0.1
3174	Psychogenic Musculoskeletal Reaction	1	0.1
3179	Psychogenic Reactions Affecting Other Systems	1	0.1
3200	Schizoid Personality	63	4.7
3203	Inadequate Personality	346	26.0
3204	Antisocial Personality	5	0.4
3205	Asocial Personality	1	0.1
3210	Emotional Instability Reaction	496	37.3
3211	Passive-dependency Reaction	37	2.8
3212	Passive-aggressive Reaction	76	5.7
3213	Aggressive Reaction	24	1.8
3215	Immaturity with Symptomatic Habit Reaction, Enuresis	236	17.8
3215	Immaturity with Symptomatic Habit Reaction, Somnambulism	27	2.0
3215	Immaturity with Symptomatic Habit Reaction, Stuttering or Stammering	11	0.8
3270	Specific Learning Defect	4	0.3
	Total	1329	100.0



### Psychiatric Assessment Procedures

Within 24 hours after his arrival at the training center the newly inducted recruit completes a psychiatric screening questionnaire, entitled Standard Medical Screening Form A, which is composed of 25 social history questions and 70 yes-no items pertaining to psychiatric symptomatology (Appendix I). On the following day the recruit undergoes a medical examination, part of which involves a psychiatric interview. This assessment is of necessity brief, never exceeding three minutes and usually being completed in from one to two minutes. The daily screening workload may vary from a minimum of 25 or 30 recruits to a maximum of 500 or 600 recruits during some of the peak receipt periods of the summer months. The Standard Medical Screening Form A aids the clinician in directing his interview and in arriving at a decision regarding the recruit's potential adjustment to the naval service.

If the examining psychologist or psychiatrist judges the recruit to be essentially free of emotional pathology and as possessing adequate functional potential, a designation of full duty is made. If, on the other hand, the examiner elicits indications of personality disturbance or suspects that the recruit will be a detriment to the efficiency of the naval service, a designation of trial duty or recall is made. Depending upon seasonal fluctuations in the quality of the recruits received for training, trial duty or recall rates generally vary from 15 to 35 per cent. Occasionally, but only rarely, a recruit presents such severe symptomatology during the initial screening interview that direct admission to the Psychiatric Unit or to the U. S. Naval Hospital is necessitated.

Recruits labeled as full duty are not reexamined by the staff of the Psy-

chiatric Unit unless their performance and behavior in training are suspect by line officers or unless they are specifically referred for examination by medical dispensaries, chaplains, the classification department, or other agencies. Recruits who, on the basis of the initial screening examination, are labeled as trial duty are reexamined usually during the third or fourth week of training for the purpose of more accurately evaluating their adjustment potential. At the time of this first trial duty interview, the clinician has available, in addition to the Standard Medical Screening Form A, a company commander's report which furnishes a description of the recruit's actual military and classroom training performance. During this examination the clinician may make the judgment that the initial screening interview suspicions of poor adjustment potential are not confirmed, and thereupon restore the recruit to a full duty status. Such recruits complete their nine weeks of training without further psychiatric unit examination unless subsequently referred because of training difficulties or for a special screening interview for submarine service, officer candidacy, or for underwater demolition duty, etc.

Should the clinician, at the time of the first trial duty interview, make the decision that the recruit's actual or potential adjustment to the naval service is markedly limited, the recruit may be presented for separation to an Aptitude Board. According to the directives of the Bureau of Medicine and Surgery and the Bureau of Naval Personnel, the Aptitude Board is composed of three medical and two line officers whose function is to consider evidence from the psychiatric examination and from the recruit's record of his training performance for the purpose of arriving at a decision as to whether or not he should be retained in service. Since the recommendations of the members of the

Psychiatric Unit are held in high esteem by line officers, 99 per cent of the recruits recommended for service separation are actually discharged. Such recruits receive either an honorable discharge or a general discharge under honorable conditions for reasons of unsuitability to the naval service. Aptitude Board discharge rates vary from two or three per cent to seven or eight per cent of the total recruit population depending upon seasonal fluctuations in the calibre of recruit receipts and upon the available manpower pool.

Frequently, at the conclusion of the first trial duty interview, the clinician continues to remain in doubt as to the serviceability of the recalled recruit, and continues the period of trial duty until the sixth or seventh week of training, at which time a further reexamination occurs. A return to a full duty status or recommendation for separation through the Aptitude Board ensues. Usually no more than 15 to 25 per cent of the recruits originally placed in a trial duty status are subjected to a second trial duty examination. A schematic representation of these assessment procedures is shown in Figure 1.

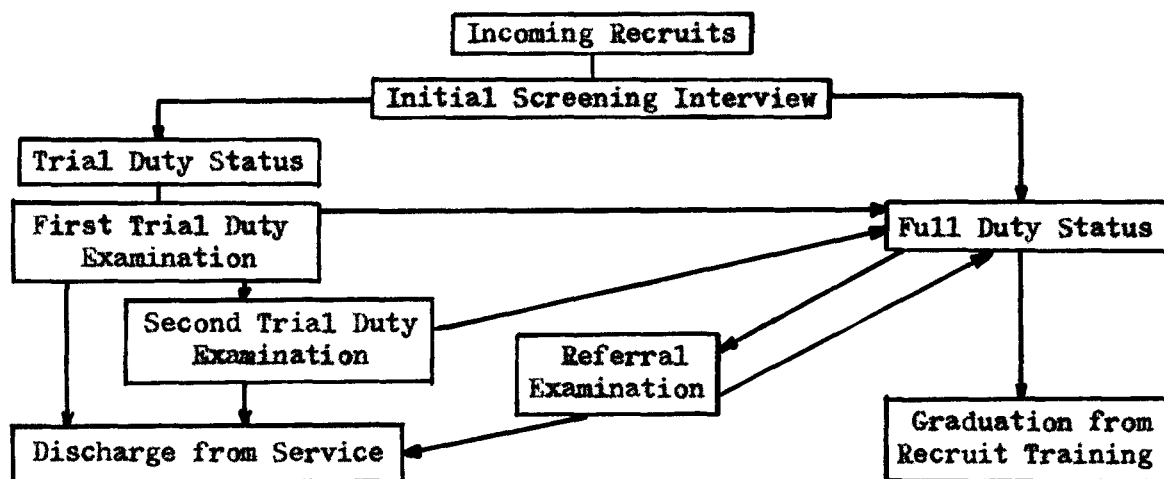


Figure 1

From time to time during training, additional information may be sought by the psychologist or psychiatrist to aid him in his evaluation of a particular recruit's service suitability. Objective tests, projective techniques, and special medical examinations are frequently administered. Social service facilities are available and frequently utilized for obtaining historical information relative to a recruit's preservice adjustment and performance through his school, family, legal authorities, and the like.

In closing this brief discussion of the procedures utilized in the psychiatric assessment program, it need be emphasized that the quality of recruits received for training and the size of the Psychiatric Unit professional staff have a great effect upon the time which can be allotted to any specific element of the screening procedure. By and large, the number of professional clinicians available, in relation to the total recruit input, has a marked effect upon the number of recruits that can be subjected to followup examinations, while the quality of the recruits enlisted alters the special examinations and tests utilized during any particular phase of the evaluation process.

#### Assumptions Underlying Psychiatric Assessment

Raines et al.<sup>29</sup> enumerate three fundamental assumptions underlying neuropsychiatric selection. They are: "...that adjustment exists on a continuum ranging from poor to good, that trained psychiatrists are able to place a man in his position on this continuum, and that from this placement valid predictions can be made concerning the man's future psychiatric behavior in the Naval

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<sup>29</sup>G. N. Raines et al., "Psychiatric Selection for Military Service", J. Amer. med. Ass., CLVI (1954), 817-821.

service. Repeated researches raise these hypotheses from the level of logical assumption to that of demonstrated fact."

There is no argument with these assumptions as such. Neuropsychiatric selection does indeed rest upon these fundamental principles. The neuropsychiatric screening program, however, has evolved into an assessment procedure which assumes a great deal more than the three statements quoted above. Furthermore, it is this author's opinion, as indicated in the introduction, that the studies cited in support of these assumptions lack the control and adequate experimental design necessary to justify the "demonstrated fact" conclusion drawn by Raines and his associates. The writings of Glass et al.<sup>30</sup> would further support this criticism.

The fact that over the last several years psychiatrists and psychologists have only been able to identify correctly, at the time of the initial screening interview, about 70 per cent of those recruits subsequently discharged during training as psychiatrically unsuitable, is not considered to be evidence that psychiatrists are able to place a man in his position on the adjustment continuum. The fact that psychiatric attrition today is exceedingly high during the first six months following completion of recruit training is hardly a demonstration of valid predictions having been made concerning the man's future psychiatric behavior in the naval service. Parenthetically, it should be added that by far the greatest number of men, representing psychiatric screening failures because of their psychiatric attrition shortly after completion of re-

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<sup>30</sup>A. J. Glass et al., "Psychiatric Prediction and Military Effectiveness", U. S. arm. for. med. J., VII (October 1956), 1427-1443, VII (November 1956), 1575-1588, VIII (March 1957), 346-357.

cruit training, are diagnosed as character and behavior disorders. The complexity of the problem of identifying the character and behavior disorders, in comparison to the psychoses and psychoneuroses, as pointed out by Wilkins<sup>31</sup>, is at least in part responsible for the screening errors contributing to the current questionable validity of the psychiatric assessment.

The assumptions underlying neuropsychiatric selection as outlined by Raines et al. have obviously been derived on the basis of World War II experiences. It is doubtful that these authors have defined adjustment in terms of both performance and emotional variables, although in another paper by Hunt<sup>32</sup> there is an allusion to the performance criterion. "... In psychiatric selection there is the further assumption that the selection procedure not only aids efficient performance of the task in question, but also protects the individual from the consequences of failure, consequences which may be severe for the emotionally maladjusted." Contrary to the practical emphasis during World War II upon neuropsychiatric screening as a process for the detection of recruits with emotional and intellectual deficits per se, selection in the psychiatric units today includes an evaluation of the total functioning potential of the individual, including his motivation, attitudes, and special abilities, as well as an assessment of the more limited psychological dimensions of adjustment. It is probable that this shift in emphasis has resulted from the

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<sup>31</sup>W. L. Wilkins, "The Identification of a Character and Behavior Disorder", Paper read at 1960 Annual Convention, American Psychological Association, September 7, Chicago, Illinois.

<sup>32</sup>W. A. Hunt, "A Rationale for Psychiatric Selection", Amer. Psychologist, X (May 1955), 199.

major role which motivation is currently playing in determining the efficiency of the service.

Despite this emphasis upon psychiatric predictions reflecting the total functioning potential of the individual, studies investigating the validity of the initial psychiatric PULHES S factor in predicting strictly performance criteria have been disheartening. Gorham et al.<sup>33</sup> report: "Most studies on psychiatric prediction have used as their criteria later in-service performance measures such as pass-fail classifications in training schools. These studies have generally failed to show positive relationships between psychiatric predictions and these criterion measures."

Implied in the naval neuropsychiatric assessment program, as it is practiced today, is the assumption that psychiatrists and psychologists are better able to predict a recruit's adjustment to the demands of the naval service than are interviewers with considerably less technical training. There is no known evidence to support this contention. It seems plausible to this author that a First Class or Chief Hospitalman who has attended neuropsychiatric technician's school and who possesses more than a nodding acquaintance with the naval service, or an experienced junior line officer who is given a few fundamentals of abnormal psychology, would predict a recruit's future service adjustment as accurately as would a trained psychologist or psychiatrist. Such an hypothesis is researchable.

Another implication of this assumption is that psychiatric screening would

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<sup>33</sup>W. A. Gorham et al., "A Research Study of the Prediction of Adaptability to the Navy", Psychological Research Associates, PRA Report 56-9 (Washington, 1956), 8.

be a far less valuable procedure were the staff members of the psychiatric facility to interview only those recruits specifically referred by their company commanders for evaluation. It is plausible to this author that a psychiatric assessment program conducted on a strictly referral basis, and entailing substantial indoctrination and instructive discussions with all naval station personnel associated with recruit training, might be as valid, and therefore more efficient, as the individual brief psychiatric examination of every new recruit.

In Chapter I evidence was presented which, although supporting the validity of the initial psychiatric interview in naval selection, demonstrates the equal validity of actuarial techniques and casts doubt upon the unique value of initial interview screening as presently practiced. In the light of these findings the unique contribution of the clinical examination need be reaffirmed through other approaches if the assumptions outlined above are to remain tenable. One such approach has been advocated by deGroot<sup>34</sup> who argues that the question should not be the relative efficiency of actuarial and clinical methods, but whether or not the clinician, utilizing the actuarial material, is able to improve prediction significantly. Although no such controlled studies have been conducted in the naval service, there is some evidence to indicate that the clinician is able to improve prediction significantly through the use of such aids.

Implied in the assumption of a continuum of adjustment, however untenable

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<sup>34</sup>A. D. deGroot, "From Clinical to Statistical Prediction", Paper read at Western Psychological Association Meeting, San Jose, California in April 1960.



the concept may be, is the notion of a cutting point or score below which the retention of personnel can reasonably be expected to constitute an economically costly venture. In terms of the psychiatric variable, the extent of this cost can be conceptualized as being related to the manpower needs of the service and the availability of personnel for meeting them. If the manpower needs are great and if the number of youth available is small, then logically the psychiatric attrition rate must be diminished and vice versa. (Unfortunately, cost accounting criteria have not as yet been adequately formulated, although research is being pursued in this area.) The implication of such a conceptualization is that psychiatric standards should be flexible to meet the shifting needs of the service. What is practiced, on the other hand, is almost the exact opposite. The clinician rigidly adheres to some preconceived notion of an absolute psychiatric standard for acceptance or rejection, not perhaps by intent, but because of the lack of communication to him of the service's needs. It is plausible, in this author's opinion, that some reporting system from the Bureau of Naval Personnel which would be instituted for keeping the psychiatric units informed of personnel needs could be instrumental in placing the practice of psychiatric assessment on a more firm and theoretically sound basis.

Many of the relationships between elements contained in psychiatric assessment are not linear in nature, so that as one approaches the extreme in one variable, a point of rapidly diminishing returns is manifested in the other variable. For example, if trial duty rate is plotted against accuracy of prediction after discharge, or if psychiatric discharge rate in recruit training is plotted against subsequent psychiatric attrition, the relationships are markedly curvilinear. Knowledge of such relationships serves as a warning to

those overzealous clinicians who are of the belief, for example, that a slight increase in the proportion of recruits discharged in recruit training would result in a marked decrease in subsequent attrition. This is true for certain points on the scale, but certainly not for all.

In concluding this brief resume of some of the concepts and assumptions underlying selection, it might be well to indicate that the Congress of the United States has specifically established the military services as organizations for the defense of the country, not as social welfare agencies<sup>35</sup>. Therefore, the expense of any procedures instituted by the services for the betterment of their personnel must not exceed the contribution which such individuals can make in terms of an improved performance, or be justified on the basis of correcting liabilities incurred by the individual as a result of his military duties. Naturally, any expense involved always bears a relationship to manpower availability. For newly recruited youths, the establishment of expensive and long-term psychotherapeutic endeavors, the costly medical correction of physical handicaps, or the financially burdening instruction of basic reading and writing skills cannot be assumed as responsibilities of the military except in the case of manpower shortages.

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<sup>35</sup>See W. A. Hunt, Amer. Psychologist, X, 203-204.

## CHAPTER III

### THE EXPERIMENTAL QUESTIONNAIRE

#### Other Assessment Procedures

Before discussing the format of the experimental inventory and the rationale underlying the selection of the inventory items, a consideration should be given to the validity and utilitarian value of other assessment procedures. Such a review should serve as a justification for this author's opinion that the psychiatric questionnaire is a profitable area for research investigation.

Because of the limited Psychiatric Unit professional staffs at the training centers, which confines the number of recruits able to be given thorough psychiatric examinations to only a small percentage of the total personnel in training, the procedure used to select that portion must be the most efficient possible. Efficiency is defined both in terms of the validity of the instrument employed and in terms of the time and number of personnel required for its implementation.

To this author's knowledge, there are four assessment procedures, in addition to the psychiatric screening questionnaire, which are worthy of consideration for this selection. The first two, namely the initial rapid clinical examination and the reliance upon referrals from company commanders and other recruit training agencies, have been discussed in the first two chapters. The limitations of the initial psychiatric examination have been noted.

The conducting of psychiatric screening through the procedure of examining only recruits referred from other agencies because of adjustmental difficulties in training has recently come under severe criticism by Wittson and Hunt. In discussing the trial duty concept, they state: "... It is not a sufficient criterion for many types of genuine and advanced personality disorders where further psychiatric criteria are necessary in addition to the 'Job sample' criterion offered by trial duty. Such a limited performance evaluation is no substitute for medical evaluation in a neuropsychiatric assessment program. The immature recruit who acts out easily is recognized by the company commander and referred for evaluation. However, in many cases the less spectacular individual with a serious emotional disturbance will remain undetected and be allowed to graduate from recruit training."<sup>36</sup>

Such unqualified criticism of the referral procedure is not considered to be entirely justified, for this author found that 75 per cent of the records of recruits discharged by the Aptitude Board during 1958 contained definitely unfavorable company commander reports. This finding could suggest that company commanders are attuned to much disqualifying emotional pathology. While this fact alone is hardly sufficient evidence for contradicting the opinion of Wittson and Hunt, when coupled with the fact that the incidence of serious emotional disturbances in the form of psychoses and psychoneuroses is minimal today, such a screening procedure would seem to have some merit. Nevertheless, four years ago, during the planning stages of this project,

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<sup>36</sup>C. L. Wittson and W. A. Hunt, "Critique of Neuropsychiatric Assessment of Naval Recruits", Enclosure (2) of the Report of the Neuropsychiatric Consultants to the Surgeon General (1 June 1960), p. 6.

there seemed to be less reason to place credence in the referral method of recruit assessment.

The use of projective techniques in the selection of personnel for followup psychiatric examinations has generally been non-rewarding. Although Abt reported during World War II on the practical use of the Group Rorschach Test for the screening of Marine Corps recruits and found that it lead "...to the identification of over 86 per cent of those neuropsychiatrically unfit, when combined in a test battery with a psychometric test and a pencil and paper personality inventory",<sup>37</sup> the results achieved were hardly better than those already reported for the initial screening interview during those years.

Much more recently, Molish, in reporting on the use of the Rorschach test in military psychology and psychiatry, states, "The current status of the Rorschach test as applied to the problems of psychiatric selection and screening of military personnel, in the light of the research which has been reviewed in this paper, is regarded of limited adequacy.... It is doubtful that the Rorschach test alone could ever be utilized without limitations, as a screening and selection instrument for men inducted into the Armed Forces."<sup>38</sup>

As a possible easily administered technique for the screening of

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<sup>37</sup>L. E. Abt, "The Efficiency of the Group Rorschach Test in the Psychiatric Screening of Marine Corps Recruits", J. Psychol., XXIII (1947), 216.

<sup>38</sup>H. B. Molish, "The Rorschach Test in Military Psychology and Psychiatry", Amer. J. Orthopsychiat., XXVI (October 1956), 815.

naval personnel, Molish, Lyon, and Briggs report on the use of the Blacky Pictures. Although from this study the authors conclude "...that a projective test such as the Blacky Pictures can easily differentiate between groups of normal healthy young men and those who have demonstrated their inability to adjust to the demands of military service and yet whose primary symptomatology did not consist of overt psychotic or neurotic behavior",<sup>39</sup> no figures are presented to demonstrate the predictive validity of the instrument.

Some years ago an adaptation of Murray's Thematic Apperception Test for use with Navy personnel, resulted in the construction of the Navy-TAT. This test was used by Foster and Carnaghan in the prediction of submarine school success. The authors conclude: "These results thus suggest that an objectively scored TAT might have limited usefulness in prediction of social adjustment and success in submarine school. The findings of this study, however, require cross-validation before hypothesized relationships can be accepted. Also, there is some question as to their practical usefulness in view of the limited frequency of occurrence of even all the discriminating themes combined."<sup>40</sup>

Benton and his associates have been working for several years on the

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<sup>39</sup>H. B. Molish, B. Lyon, and D. I. Briggs, "Character Structure of Adjusted and Maladjusted Naval Recruits as Measured by the Blacky Pictures", *Amer. J. Orthopsychiat.*, XXIV (January 1954), 174.

<sup>40</sup>R. J. Foster and J. G. Carnaghan, "Prediction of Submarine School Success Through the Use of Selected Themes in the Navy Thematic Apperception Test", Medical Research Laboratory, XIV, Report No. 263, New London Connecticut (May 1955), 10.

development of sentence completion tests,<sup>41,42</sup> and in 1958 they reported on the results of their studies with a form, entitled SUI Sentence Completions. The authors conclude: "It is believed that the 20 items which yielded discriminating response patterns can form the basis of a new instrument designed to assess the aptitude of enlisted men for Naval Service."<sup>43</sup> To this author's knowledge, no studies have been conducted to demonstrate the efficiency of the instrument in the selection of recruits for followup psychiatric examinations. Obviously this should not be interpreted as a criticism of the test, since the use of criteria subsequent to recruit training is by far a better demonstration of the test's validity than the use of short-range recruit training criteria. On the other hand, the authors report that some of the individual items "...discriminated the groups at the .05 level or better".<sup>44</sup> What this means in terms of the overall predictive validity of the test is difficult to ascertain.

In Chapter I the predictions of adjustment to recruit training through

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<sup>41</sup>A. L. Benton, C. D. Windle, and E. Erdice, "Some Characteristics of the SUI Sentence Completion Tests", Department of Psychology, State University of Iowa, Contract Nonr 311(00), Project NR 151-075, Office of Naval Research (October 1956).

<sup>42</sup>A. L. Benton, C. D. Windle, and E. Erdice, "A Review of Sentence Completion Techniques", Department of Psychology, State University of Iowa, Contract Nonr 311(00), Project NR 151-075, Office of Naval Research (February 1957).

<sup>43</sup>A. L. Benton and H. P. Bechtoldt, "A New Aptitude-for-Service Test (Multiple Choice Sentence Completions)", Department of Psychology, State University of Iowa, Contract Nonr 311(00), Project NR 151-075, Office of Naval Research (March 1958), 6-7.

<sup>44</sup>Ibid., 6.

the use of the Draw A Person test was reported. These results, while valid, failed to discriminate the criterion groups as well as the scored Standard Medical Screening Form A.

Aside from the study of Benton and Bechtoldt, the use of projective techniques for recruit assessment has been found to be of little value. It is this author's opinion that the reasons for this are best indicated by Molish when he states, "... All neurotic conflicts reflected in test findings are not necessarily liabilities in making an adjustment in the Armed Forces."<sup>45</sup> In other words, adaptation to the military is accountable in terms of a greater number of variables than simply the existence of neurotic conflicts. Another obvious limitation of projective techniques is the time usually required for their interpretation and the number of highly skilled personnel needed for their analysis.

Within the last ten years a number of valuable studies have appeared which deal with the use of sociometric devices in the prediction of military performance and adjustment. The findings from these studies have generally been quite encouraging. Studies with Navy female recruits, Navy male recruits, and Air Force enlisted personnel have been reported. In a study of the prediction of the separation of Air Force Trainees, Force and Meyer conclude, "... Peer ratings as described are sufficiently predictive of misbehavior to be useful in preliminary screening of airmen for selective placement in areas of less stress and for less dissipation of investment in case of

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<sup>45</sup>Molish, "The Rorschach Test in Military Psychology and Psychiatry", p. 815.



subsequent misbehavior.... Further development and use of the peer rating are indicated."<sup>46</sup> The work of Rigby et al. confirms this conclusion:

The present study investigated the relevance of peer relations within groups of women recruits to performance in recruit training. The sociometric questionnaire used in this study was designed specifically for women recruits, and contained items eliciting judgments of military performance and items dealing with social compatibility. Sociometric scores derived from this instrument were based on item-by-item identification of women who were accepted more frequently than would be expected by chance, women who were rejected by a significantly large number of their peers, and women who were neither chosen nor rejected more frequently than would be expected from a chance distribution of nominations. All items discriminated the extreme groups at beyond the .01 level of confidence with the exception of one somewhat ambiguously worded item which discriminated at the .05 level only. Items were weighted roughly in proportion to their power to discriminate the extreme criterion groups; weighted individual item scores were summed for each recruit to arrive at her total sociometric score.<sup>47</sup>

French, who administered sociometric tests to 16 companies of recruits at the U. S. Naval Training Center, Great Lakes in 1949, summarizes his study with the following statements:

1. Status within the company is in general related negatively and significantly to Sick Bay attendance and disciplinary offenses. A similar relationship seems to hold for neuropsychiatric cases, but they are too few to afford an adequate test.

2. Within the Sick Bay group no significant status differentiation appears between different diagnostic categories.

3. Sick Bay cases tend most consistently to be less acceptable as liberty companions (interpreted as representing a close, personal relationship) but are equally acceptable as leaders (interpreted as

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<sup>46</sup>R. C. Force and J. K. Meyer, "Prediction of Separation of Air Force Trainees", Unpublished paper (Lackland Air Force Base, Texas, no date), p. 6.

<sup>47</sup>M. K. Rigby et al., "The Application of Sociometric Technique to Women Recruits. I. Prediction of Individual Success or Failure in Recruit Training", Department of Psychology, St. Louis University, Contract N7onr-40802 (NR 151-092), Office of Naval Research (June 1957), 15-16.

representing a less personal, group-defined role). Disciplinary offenders tend to be less acceptable in all situations, but more consistently as mission companions and leaders.

4. Status as a liberty companion relates significantly to Sick Bay attendance as early as the first week of training. Relationships of disciplinary offenses to status do not appear until the second week or later.

5. Committing a disciplinary offense appears in itself to affect group opinion, but this is not true of going to Sick Bay. In both cases other aspects of the deviants' behavior affect acceptance by the group.<sup>48</sup>

Of the four types of assessment procedures thus far discussed, the peer nomination technique, in terms of its predictive validity, would seem to offer the most promise for further development.

However, there are certain limitations in the use of peer nominations which, in this author's opinion, render it considerably less valuable as a screening device than reports of its validity would indicate. In the first place, as compared with personality questionnaires, the reduction of the scoring to an automatic mechanical procedure is difficult. Secondly, the often times large percentage of members of male recruit training companies set back in training for reasons of illness or performance deficiencies contributes to group instabilities and can result in large numbers of men not being evaluated simply because of administrative complexities. As a third limitation, group identities are generally not well formed until after the second week of training, with the result that predictions made prior to that time are of questionable value. Obviously, no use can be made of the peer nomination technique prior to the beginning of training, while adaptability or personality questionnaires can be administered at the recruiting office and, if achieving acceptable validity, can be used to restrict the enlistment of recruits with a low adjust-

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<sup>48</sup>R. L. French, "Sociometric Status and Individual Adjustment Among Naval Recruits", J. abnorm. soc. Psychol., XLVI (1951), 71-72.

ment potential. As a fourth limitation, a recruit's sociometric score or rating within a specific company has meaning only in terms of that company and cannot be regarded as reflecting his adjustment in terms of the entire recruit population. In other words, because of marked differences in the calibre of personnel which are noted to occur between companies, it is theoretically possible for a recruit, if his company were changed, to obtain an entirely different sociometric score. Primarily because of the need to develop selection procedures which could possibly be utilized at the recruiting stations, attention was focused for this investigation upon the development of a more valid screening questionnaire.

#### Selection of Inventory Items

During World War II personality inventories were found to be extremely valid selection devices. An excellent review of the findings of military psychologists with personality inventories during that period is supplied by Ellis and Conrad<sup>49</sup>. Because of the marked differences (age, motivation, group heterogeneity, etc.) in the military population today as compared to World War II, a review of the content of World War II inventories would not be applicable to the present investigation. Furthermore, and for the same reasons, it would be unwarranted to assume that questionnaires applied to present-day military populations could achieve the same degree of discrimination as those developed during World War II. Nevertheless, the suggestions of Ellis and Conrad for the development of other questionnaires deserve quotation:

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<sup>49</sup>A. Ellis and H. S. Conrad, "The Validity of Personality Inventories in Military Practice", Psychol. Bull., XLV (September 1948), 385-426.

1. Personality questionnaires should be especially designed for the group to whom they are applied, and should be validated against dependable external criteria. Criterion-contamination should be guarded against; and criterion-overlap, if it occurs, should be taken into account in evaluating the findings.

2. Special attention should be given to persuading or inducing respondents to answer the inventory-items as truthfully as they can.

3. Personality inventories may possibly be more effective when used with relatively uneducated and less intelligent groups, than with groups that are more sophisticated.

4. The users of personality inventories should realize that only limited and specialized demands may be made on the inventory technique; and that broad and incisive personality diagnosis is still the specialty of the trained clinician employing subtler and more comprehensive psychological techniques.<sup>50</sup>

The construction of a questionnaire to predict specific criteria may follow several different approaches. Already existing inventories, if it is reasonable to assume that they bear some relationship to the criteria, may simply be appropriated and their predictive validity measured. From the factor analytic standpoint there are a number of inventories which have already undergone considerable analysis and which could serve as a starting point for this investigation.

However, there are several objections to proceeding in this manner. In the first place, time limitations prevent the lengthy administration of several inventories. It was the considered opinion of the Psychiatric Unit professional staff that a single testing session not longer than 45 minutes or an hour was optimal for securing reliable results from youths of this age group. Secondly, and more important, the goal of the investigation was to derive a questionnaire which was a global measure of adaptation to recruit training--the prediction of a criterion which contained both adjustment and performance variables. Personality inventories alone have generally not been found to be ef-

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<sup>50</sup>Ibid., 421.

ficacious for the measurement of such heterogeneous criteria. Studies with the Personal Inventory<sup>51</sup> and the Cornell Selectee Index<sup>52</sup> provide such evidence. It is the contention of this author that performance on a specific job, such as the satisfactory completion of recruit training, cannot be predicted from measures of personality alone. Personality variables may be important in predicting grossly inadequate performance, but other variables, such as motivation for the service and specific abilities, need be employed in order to differentiate variations in acceptable performance. This is in keeping with the first suggestion of Ellis and Conrad.

The procedure favored by this author for the construction of the experimental questionnaire was one involving an analysis of the specific characteristics of the criteria to be predicted, the reliance upon clinical experience and insights gained through working with naval screening procedures over a considerable period of time, and the utilization of measures previously found to be related to satisfactory adjustment and performance in training.

Based upon the above procedures, 12 areas were considered to be of importance for the selection of items to comprise the experimental inventory. These areas were labeled: (1) identifying information, (2) peer relationships, (3) non-conforming behavior, (4) bodily complaints and preoccupation, (5) family relationships and stability, (6) authority-figure relationships, (7) motivation for service, (8) pre-service achievements, (9) emotional instability and immaturity, (10) moral responsibility, (11) work attitudes and goals, and (12)

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<sup>51</sup>Ibid., 411-413.

<sup>52</sup>B. Lyon, H. B. Molish, and D. L. Briggs, "The Cornell Index", U. S. arm. for. med. J., IV (1953), 977-985.

specific abilities. The specific questions derived as measures of these areas are listed in Appendix I.

Questions designed to measure a wide range of interests and attitudes were excluded from this study, not because they were considered to be unimportant, but simply because they would have increased the experimental inventory to an unmanageable length. For similar reasons, a more lengthy questionnaire, measuring a greater number of variables for each of the 12 dimensions under consideration, was considered to be inadvisable.

Two studies conducted independently at the U. S. Naval Training Center, Great Lakes by this author in 1953<sup>53</sup> and at the U. S. Naval Training Center, Bainbridge by Lyon in 1954<sup>54</sup> formed the basis for including many of the above 12 areas. Some of the questions derived as measures of these areas are identical to those comprising the Standard Medical Screening Form A and had previously been found to discriminate criteria relating to recruit adjustment and performance.

Most of the items included as identifying information are of a demographic variety and bear little relationship to the remaining 11 areas of adjustment. Age at enlistment was considered, by far, the most important variable in this category. Because so many studies have demonstrated its importance in discriminating a wide range of criteria, and because a sizeable proportion of new en-

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<sup>53</sup>J. A. Plag, "A Brief Validation Study of the Standard Medical Screening Form A and a Proposed Screening Technique", Unpublished Master's Thesis (Bradley University, Peoria, Illinois, 1953), 1-127.

<sup>54</sup>W. B. Lyon, "Adjustment to Navy Life: The Value of Sociological and Background Factors in the Psychiatric Screening of Naval Personnel", Unpublished report (Bainbridge, Maryland, 1954), 1-90.

listees are 17 years of age, it was considered advisable to refine this measure and to differentiate between recruits who were under  $17\frac{1}{2}$  years of age and those between  $17\frac{1}{2}$  and 18 years of age. King<sup>55</sup>, in reporting on variables affecting submarine school attrition, indicates that a significantly higher proportion of men dropped from the training program come from the 17 year old age group. Lyon<sup>56</sup> reports that 17 year old recruits comprised only 22.9 per cent of the normal population studied between April 1952 and August 1953, while of the recruits discharged as unsuitable during that period, 42.5 per cent were under 18 years of age.

Questions relating to prior military service were based upon Lyon's findings<sup>57</sup> that naval reservists adjust better to training than recruits with no prior military service, although previous data tabulated at Great Lakes<sup>58</sup> revealed no such differences. Cline et al.<sup>59</sup>, in describing the characteristics of fighters and non-fighters in the Army in Korea summarize their findings as regards race and religion with the following statements: "Of the native-born whites in this sample, 67 per cent were fighters. Of all the ethnic minority groups (except Negroes) such as Japanese, Puerto Rican, etc., 57 per cent were

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<sup>55</sup>B. T. King, "Predicting Submarine School Attrition from the Minnesota Multiphasic Personality Inventory", U. S. Navy Medical Research Laboratory, XVIII, Report No. 313, New London, Connecticut (August 1959), 1-25.

<sup>56</sup>Lyon, p. 68.

<sup>57</sup>Ibid., p. 71.

<sup>58</sup>Plag, p. 61.

<sup>59</sup>V. Cline et al., "The Characteristics of Fighters and Non-fighters: III. An Analysis of Clinical Interview and Life History Data", The George Washington University Human Resources Research Office, Department of the Army, Fort Ord, California (October 1954), i.

fighters; and of the Negroes, only 21 per cent were fighters. When the religious preferences of the native-born white groups are compared, no differences appear between sects or with those having no affiliation. When the Negroes, who are mostly non-fighters and largely Protestant, are added to the sample, then the Protestants have a lesser proportion of fighters than do the Catholics." Lyon<sup>60</sup> also reports that religious affiliation and ethnic group, as well as size of family and geographical residence account for adjustmental differences. Questions pertaining to marital status, although not differentiating the large percentage of single recruits, were included under the assumption that married recruits possess fewer adjustmental difficulties than those who have been divorced or separated.

Military service, particularly at the training level, is characterized by a lack of privacy, living in close physical proximity to others, and spending little time either alone or with individuals outside of one's training unit. It is assumed that under such stressful circumstances, a history of difficulties in interpersonal relationships results in a disruption in the activities of the training group and in a magnification of individual adjustmental hardships. Plazak, in discussing factors related to the psychiatric discharge of midshipmen at the United States Naval Academy, points out the importance of this variable when he states, "... The ability to establish a successful masculine relationship with both peers and authority figures seemed to be the most important criterion of successful adjustment."<sup>61</sup> In reporting on the predictive

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<sup>60</sup>Lyon, pp. 73, 78, 80, 82.

<sup>61</sup>D. J. Plazak, "Dynamic Factors in Psychiatric Discharges of Midshipmen", U. S. arm. for. med. J., VIII (March 1957), 419.



validity of the Minnesota Multiphasic Personality Inventory for submarine school attrition, King<sup>62</sup> found that items measuring interpersonal relationships were highly significant. Likewise, Lyon<sup>63</sup>, in reporting on the significance of items taken from several naval screening inventories, and Plag<sup>64</sup>, in investigating the significance of items comprising the Standard Medical Screening Form A, indicate that a majority of questions pertaining to interpersonal relationships evidence significance in differentiating adaptability criteria.

Conformity, adherence to inflexible standards of behavior, and strict discipline are perhaps the most important ingredients of the recruit training program. It is not far-fetched to assume, therefore, that a preservice history of non-conforming behavior will bear a direct relationship to recruit training adaptation. Conformity to school regulations is an experience shared by all enlistees and is an excellent common basis from which to predict military performance. Flyer, in a study of educational level and Air Force adaptability, makes the following inferences: ". . . Discharges for unsuitability are often associated with AWOL and this may be related to truancy and poor attendance in high school. Belligerency in the high school environment may be related to insubordination in service; similarly with poor social relationships, lack of motivation to perform, and low learning ability. The school and service environments possess many factors in common; behavior may generalize from one to

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<sup>62</sup>King, pp. 21-22.

<sup>63</sup>W. B. Lyon, "A Proposed 33-Item Bainbridge Screening Aid", Unpublished report (Bainbridge, Maryland, 1953), 1-6.

<sup>64</sup>Plag, pp. 63-64.

the other environment."<sup>65</sup> Danielson and Clark<sup>66</sup>, in devising a personality inventory for Army induction screening, found that a scale for delinquency was a valuable discriminating instrument. In comparing the characteristics of inductees who experience immediate psychiatric breakdown in the Army with those who breakdown later during their service careers, Hamburg, Baskin, and Tucker<sup>67</sup> indicate that school and work record are highly valuable differentiating variables. Gunderson, Ballard, and Huges<sup>68</sup>, who conducted a three-year followup survey of the military records of 20,000 recruits graduated from training in San Diego in 1954, found a significant relationship between variables of pre-service non-conformity and disciplinary offenses later in the serviceman's career. Both Plag<sup>69</sup> and Lyon<sup>70</sup> found that infrequent or no church attendance was significantly and positively correlated with unsuitability during recruit training.

Somatic complaints are symptoms presented by almost every poorly adapting military group regardless of the criterion of adaptability utilized. Although

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<sup>65</sup>E. S. Flyer, "Educational Level and Air Force Adaptability Criteria", Unpublished report (Lackland Air Force Base, Texas, May 1960), 4.

<sup>66</sup>J. R. Danielson and J. H. Clark, "A Personality Inventory of Induction Screening", J. clin. Psychol., X (1954), 137-143.

<sup>67</sup>D. A. Hamburg, T. G. Baskin, and A. C. Tucker, "Prediction of Immediate Psychiatric Breakdown in Military Service", U. S. arm. for. med. J., V (May 1954), 628.

<sup>68</sup>E. K. Gunderson, E. B. Ballard, and P. S. Huges, "The Relationship of Delinquency Potential Scale Scores of Naval Recruits to Later Military Performance", Unpublished report (Camp Elliot, San Diego, California, 1959), 21.

<sup>69</sup>Plag, p. 61.

<sup>70</sup>Lyon, 1954, p. 74.

the internalization and somatization of emotional conflicts occurs with greater frequency among individuals generally older and of higher average intellect than naval recruits, such symptomatology characterizes many of the unsuitable enlistees according to Plag<sup>71</sup> and Lyon<sup>72</sup>. Cline et al., in their analysis of Army fighters and non-fighters, state, ". . . Comparisons of histories showed that the fighters were of better health than the non-fighters. In general physical ability the fighters were also superior. They much less often had the feeling of 'being tired all the time'. They also stopped wetting the bed earlier than did the non-fighters."<sup>73</sup> In describing the characteristics of a group of unsuitable enlisted seamen recruited through the U. S. Navy Recruiting Station in Nashville, Tennessee, Goodspeed, Buckingham, and Evans<sup>74</sup> indicate that a large percentage possessed hypochondriacal symptomatology. Likewise, in a study of the value of the Cornell Selectee Index, Lyon, Molish, and Briggs<sup>75</sup> found that certain of the neurocirculatory, psychosomatic, hypochondriacal, and gastrointestinal items occurred significantly more frequently among trial duty than among full duty recruits. No doubt the tremendous success of psychiatric screening devices employed during World War II was attributable in part to the emphasis upon somatic variables which were frequent-

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<sup>71</sup>Plag, p. 63.

<sup>72</sup>Lyon, 1953, pp. 4-6.

<sup>73</sup>Cline et al., p. 9.

<sup>74</sup>W. K. Goodspeed, W. B. Buckingham, and O. N. Evans, "The Unsuitable Enlisted Seaman", U. S. arm. for. med. J., VI (February 1955), 246.

<sup>75</sup>W. B. Lyon, H. B. Molish, and D. L. Briggs, "The Cornell Index", U. S. arm. for. med. J., IV (July 1953), 977-985.

ly directly related to, although sometimes contaminated with, the criteria which they predicted.

The importance of a recruit's family relationships and stability as indicators of adjustment and performance have been studied by Lyon, Plag, Plazak, Cline, Hamburg, Baskin, and Tucker, etc. in their reports quoted heretofore. In these studies the effectively performing youth tend to describe their home life as being frictionless, harmonious, and stable, with the incidence of parental death or divorce being minimal. Their father was the family disciplinarian, was an easy object with which to identify, and was frequently described as permissive, warm, and interested in his son's activities and achievements. Recruits or draftees whose adjustment is minimal are more frequently the products of broken homes and attribute to their mothers the role of the family disciplinarian. Such findings constitute the framework within which the questions in this category were formulated.

The rationale for the inclusion of items covering the area of authority-figure relationships is very similar to that proposed for the area of non-conformity, and is in keeping with the importance attributed to family stability. In view of the absolute subservience of the newly inducted recruit to his military superiors, it is not difficult to generalize a history of difficulty with authority figures in civilian life to those in the military environment.

Few questionnaires developed for use in other military situations have attempted a straightforward approach to assessing motivation for service. As pointed out earlier, the motivational problem for the military today is of paramount importance. With the questions selected as measures of this area, the attempt was made, on the one hand, to ascertain the degree of purposeful,

planned activity which preceded the recruit's decision to enlist and, on the other, to furnish a measure of the extent to which his decision was prompted merely by civilian problems and for which his enlistment was an escape. It is certainly not uncommon for the 17 year old youth to enlist in the naval service simply in reaction to unmanageable home, school, and social problems. At times this may represent a realistic solution of his adolescent conflicts and strivings, while, at other times, it is simply representative of an impulsive, acting out, and irrational attempt at conflict resolution. Another facet of the problem is reflected in those items which attempt to assess the extent to which the youth's enlistment was prompted or decided by others for him.

Probably no other single measure for predicting adaptation to the military environment is more important than educational achievement. All writings and previous investigations have emphasized the value of this variable. Two quotations should suffice as demonstrations of this point. Lyon emphasizes its importance with the following statement: "Education is the most important single factor differentiating borderline and unsuitable recruits from normal recruits."<sup>76</sup> Flyer, in dealing with Air Force attrition, states the following: "The marked relationships between educational level attained prior to service and discharge and separation status are shown in Table 4. Among the airmen on active duty, 62 per cent were high school graduates, while among the discharges for unsuitability and separations for non-advancement, only 20 per cent had completed high school. Less than 4 per cent of the accession group who were high school graduates were discharged or separated; among the airmen with eight

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<sup>76</sup>Lyon, 1954, p. 67.

or less years of education, the attrition rate was over 30 per cent."<sup>77</sup> The reason for educational level being an excellent predictor is the extent to which this measure embraces such a wide variety of other adjustment indices. Intelligence, conformity, persistence, adequate authority-figure relationships, and lack of incapacitating emotional pathology are all indirectly reflected in high school graduation.

Sports participation and membership in clubs and other social groups, as well as educational attainment, form the basis for inquiry into preservice achievements. The following quotation from Cline et al., as regards the Doer Syndrome, is appropriate:

It is in this area that the greatest number of differences between the fighters and non-fighters is obtained. The striking finding which presents itself here is that in general fighters are 'doers' and non-fighters are 'non-doers'. Whereas the fighters participated in many types of activities, recreation or hobbies, such as working in a backyard garden, playing poker, grinding valves on the family car, or any one of a multitude of things, the non-fighters were in general non-participants. About the only things the non-fighters participated in more than did the fighters were rather passive and aesthetic activities such as going to movies, cooking, and art work. It would appear from the data collected that the fighters have engaged in all kinds of experiences and have undertaken all sorts of ventures. They are used to taking the initiative, planning activities, and experiencing success. The non-fighters apparently have lived in a somewhat different world as regards these various types of experiences. This might well explain why they are unable to assume the initiative in combat and why they are paralyzed under stress and in an enemy attack. They have much less often participated in activities of any kind where they could achieve solutions and ego satisfactions which go with initiating and completing tasks and activities.

. . . As civilians the fighters tended to be joiners of community organizations and clubs more than did the non-fighters. For the fighters, the strength of family-kinship ties was greater and the amount of interaction between the family and other relatives was significantly higher than for the non-fighters. The fighters went out more evenings a week for recreation and visiting purposes. They found it easier to join clubs,

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<sup>77</sup>Flyer, p. 2.

make the team and do what they wanted to in school. In general, their social proficiency was much higher in school than the non-fighters. . . ."78

Likewise, Gunderson, in describing the poorly adjusted recruit states: "He disliked school, failed one or more grades, probably was expelled at least once, usually for fighting, truancy, or misbehavior in class. He was never an officer in his class, did not belong to clubs or the Boy Scouts, and did not attend sports events. If he held a regular job (which is unlikely) he probably had trouble with his boss and did not stick with the job more than a short time, etc."79

Because of the high incidence of character and behavior disorders among those recruits separated from the naval service as unsuitable, the number of questions derived as a measure of this area was correspondingly large. Force and Meyer, in their delineation of variables related to the separation of Air Force trainees, indicate that personality test items with high validity, among others, were ". . . those sampling certain areas of maturation and control, such as crying, enuresis, undependability, and handling of aggression"80. Plag81, in his study of differentiating responses to the Standard Medical Screening Form A, found that items pertaining to difficulties in handling hostility, sleep disturbances, and enuresis were pertinent. Immaturity, depend-

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78Cline et al., pp. 12-13.

79E. K. Gunderson, "Rehabilitation of Naval Offenders", An address presented at the Annual Meetings of the American Psychological Association, 6 September 1960, Chicago, Illinois.

80Force and Meyer, p. 3.

81Plag, p. 63.

ency, effeminacy, enuresis, and somnambulism characterized the majority of the psychiatric descriptions given to the discharged recruits who had entered the Navy through the Nashville, Tennessee Recruiting station, according to Goodspeed, Buckingham, and Evans<sup>82</sup>. Although supported by these studies, as well as others, the majority of the items comprising the emotional instability and immaturity area were derived directly from a review of the symptomatology described in the clinical records of recruits discharged from training at Great Lakes over a period of several years.

There is little precedence for including items pertaining to moral responsibility and work attitudes and goals in military psychiatric screening inventories. No doubt, the major limitation to posing questions of this type is the obvious intent implied by them. It is extremely difficult to phrase such questions in a manner which will not imply which response is the acceptable one. Nevertheless, on an exploratory basis, items of this type were included in order to ascertain their applicability to the criteria and to judge the possible future utilitarian value of other similar lines of questioning. As regards the area of moral responsibility, the assumption was made that an overly rigid adherence to moral standards, as well as loose, immoral activity, would be equally diagnostic of unsuitability and poor performance.

The rationale underlying the selection of items pertaining to work attitudes and goals is very similar to that already described for service motivation. The inherent assumption is that recruits who possess standards and training which dictate planning, purposeful goal-directed behavior, and strivings for

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<sup>82</sup>Goodspeed, Buckingham, and Evans, p. 246.



accomplishment adjust better to a recruit training routine than do those members of lower socio-economic groups where such activities are given relatively less importance. In commenting on the socio-economic differences between fighters and non-fighters, Cline et al. remark: "When asked about future occupational goals, fighters often indicated responsible sorts of positions, such as managerial, own business, run a farm, and professional work; whereas the non-fighters implied that they didn't know what they were going to do or said, 'well, maybe I'll go back to the old job', which was usually an unskilled one. . . . However, the general results do suggest that fighters tended to belong to the 'middle class' syndrome, while the non-fighters belong to the 'lower class' group."<sup>83</sup>

As described in Chapter II, the primary function of the basic battery tests is the job classification of enlisted personnel. Many studies, too numerous to describe here, have demonstrated the validity of these instruments (GCT, ARI, MECH, and CLER). The fact that these test scores correlate highly with intelligence has been known for sometime, and it is because of this relationship, in addition to their easy availability, that they were included as predictor variables in this investigation.

#### Format of the Experimental Questionnaire

Within the last 10 or 15 years considerable controversy has been noted in the literature as regards the merits of forced-choice vs. the traditional yes-no type of questionnaire or rating item. The proponents of the forced-choice technique indicate that this method provides a means of reducing faking, ambi-

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<sup>83</sup>Cline et al., p. 11.

guity, and facade effects. Through a procedure of equating items for social acceptability and preference, paired alternatives are constructed such that the derived instrument possesses greater validity. Cronbach, on the other hand, points out some of the defects of the forced-choice method, as noted in the following quotation: ". . . It requires more time to obtain an equal number of responses. It is sometimes resisted by subjects who object to its 'Have you stopped beating you wife?' character. And it may reduce the validity with which the test predicts the external criteria...."<sup>84</sup>

Although there are merits to both approaches, it was the considered opinion of this author that the questionable increased validity which might result from the forced-choice approach would not compensate for the additional labor required, particularly in a study which has been designed primarily as an exploratory investigation. Secondly, much of the item content pertains to demographic variables or information about the recruit which is highly objective. The casting of this type of data into a forced-choice framework is hard-necessary nor desirable. Thirdly, because of the fear of reprimand, the purposeful falsification of personality questionnaires and inventories in the military is considerably less than in civilian settings. Therefore, the need to equate items in terms of social acceptability or desirability is considerably lessened. Fourthly, psychological sophistication, a characteristic of many tested populations which renders questionnaires of the yes-no variety less valid, is considerably less pronounced among 17 and 18 year old youths and among a predominately non-college population such as enlists in the naval

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<sup>84</sup> L. J. Cronbach, Essentials of Psychological Testing, 2nd ed. (New York, 1960), p. 451.

service. Finally, the factor analysis of questionnaire items and the eventual identification of the parameters of adaptation characteristic of a recruit training situation is exceedingly more difficult and complicated when the forced-choice technique is employed.

Justification for this stand has recently appeared in an article by Levonian et al., where many of the pitfalls of the forced-choice technique are enumerated. As a result of their factorization of the Edwards Personal Preference Schedule, the following criticisms were offered:

The third and perhaps most serious difficulty lies with the use of forced-choice items. The basic form of the PPS item is one that encourages low reliability of response. The S must choose which of two statements seems more descriptive of himself, yet the choice is made more difficult by equating the statements for social desirability. Sometimes the choice is difficult because two statements seem about equally applicable. At other times the choice is difficult because the two statements seem about equally inapplicable. The test situation tends to maximize the number of difficult, and hence unreliable, choices for the S. Even for a conscientious respondent, it is difficult to be accurate and consistent under such circumstances. Less careful individuals easily develop a negative attitude toward the test situation, which promotes carelessness, further reducing the reliability of the response.

The PPS has adopted this forced-choice form for the purpose of avoiding respondent tendency to present a good picture of himself. Whereas this is a laudable objective, it does not seem to have been attained without excessive cost, if at all. Item form should make it as easy as possible for the respondent to express himself and his position as exactly as possible, truthfully or not. Whether or not the individual is answering truthfully, or giving himself the benefit of the doubt, should be determined by other methods and this information used in evaluating the test results. Attempts to force truthfulness by special item forms seem likely to succeed principally in reducing item reliability and validity to the point where the test has questionable utility.<sup>85</sup>

Some authors, in their design of questionnaires, have included a ? category as a third alternative between the yes-no dichotomy. While this may

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<sup>85</sup>E. Levonian et al., "A Statistical Evaluation of Edwards Personal Preference Schedule", J. appl. Psychol., XLIII (1959), 358-359.

facilitate the answering of respondents whose characteristic behavior is not adequately described by either of the extreme categories, it also invites many testees to conceal their true response. Furthermore, the use of a third, doubtful category hinders the rapid intercorrelation of items for the factor analysis.

The actual format of the experimental inventory, as it was presented to the newly enlisted recruits, is shown in Appendix I. The questionnaire was named the Recruit Personal History Inventory. The ordering of the items was done in such a fashion that the questionnaire could be printed in booklet form with pages of varying width--similar to the Kuder Preference Record. Responses could then be recorded on I.B.M. answer sheets which would allow for machine tabulations. Although the lack of research funds prevented the realization of the booklet form of presentation, the items were kept in their original order of gradually increasing length.

Aside from the above mechanical considerations, an attempt was made to alternate questions whose appropriate answers were in the affirmative with those in the negative as frequently as possible throughout the inventory. Such a procedure served the purpose of interrupting response sets. Although the mechanical structure of the experimental inventory prevented much distance being placed between identical questions, seven of the 195 items were repeated throughout the course of the questionnaire in order to provide a measure of internal consistency.

Preparatory to the actual administration of the Recruit Personal History Inventory to the experimental sample, several test administrations were conducted in order to eliminate at least some of the items to which recruits seldom or

never respond differentially. These test sessions also were used to ascertain any difficulties which the recruits might experience in comprehending the content of the items. As a result, the wording of some of the items was changed.

## CHAPTER IV

### THE EXPERIMENTAL PROCEDURE

#### Introduction

The experimental procedure has been divided into two parts. The first pertains to the validation of the Recruit Personal History Inventory, based upon the determination of items significantly related to the criterion variables by the use of non-parametric techniques, and the establishment of the factors which these items represent. By means of these techniques a revised inventory, called the Personal History Record, has been developed through the utilization of those items significantly related to the criteria. Although the initial design called for the Personal History Record to be composed of only those items possessing the greatest factorial loadings, the limited number of items representing the derived factors prohibited such a design.

The second part describes the methodology utilized in a partial cross-validation. Essentially it consists of a comparison of the Personal History Record, used as an objectively scored test, with a clinical evaluation using the questionnaire as an adjunct, to predict those recruits who are judged during training as unsuitable and discharged from the naval service.

#### Administration of the Experimental Inventory

The Recruit Personal History Inventory was administered to all enlistees upon their arrival at the U. S. Naval Training Center, Great Lakes during the

period of 8 June 1957 through 27 December 1957. Under current scheduling the Standard Medical Screening Form A is administered during the first day of in-processing. Scheduling peculiarities prevented the administration of the Recruit Personal History Inventory at exactly this same time, but did allow for its administration at some time during the three days of in-processing. Furthermore, the time allotted for the administration, though invariably in the early evening, was not the same for each session. Sometimes test administration occurred during the first in-processing day and at times on the second. These slight variations were not considered to have any significant effect upon the inventory item responses. The important fact regarding the time of the inventory administration is that it occurred prior to the reduction of the tested population into the criterion categories, and at approximately the same time during in-processing that the revised screening instrument would be administered. Contrary to some validation studies, which attempt prediction, the inventory results were not affected by the attitudinal sets which would have undoubtedly influenced the inventory responses had subjects been cognizant of their success status in recruit training.

Usually test responses are significantly altered by marked variations in administration procedures. Since the psychiatric screening questionnaire administration at Great Lakes is proctored by relatively untrained personnel, it was deemed advisable that it be rigidly standardized. Therefore, all directions and questionnaire items were recorded, and the taped recording utilized during each testing session. To obtain clarity, proper voice intonations, and a generally superior recording, the services of a professional radio announcer were obtained. In addition to providing a standardized procedure, it is believed

that the taped recording of items facilitated comprehension by those recruits with reading problems, and hence provided answers with greater reliability.

### Selection of the Sample

It has traditionally been a fact that there exist marked seasonal fluctuations in the calibre of recruits received for training. Assuming the General Classification Test score to be a valid measure of the calibre of recruit personnel, it can be noticed, by reference to Table 11, that higher calibre enlistees are received for training during the summer months, with the lowest calibre recruits entering training during the winter season. Generally, high school graduates who have just completed their formal education enlist during the sum-

Table 11<sup>a</sup>

Average Monthly GCT Scores of Recruits Received for Training during 1956 and the First Quarter of 1957

Month	Mean GCT	Month	Mean GCT
Jan. 1956	52.63 <sup>b</sup>	Sept. 1956	51.21
February	44.51	October	50.65
March	48.67 <sup>b</sup>	November	49.99
April	47.92	December	47.22
May	49.08		
June	52.68	Jan. 1957	49.23
July	52.00	February	49.68
August	51.40	March	49.72

<sup>a</sup>Data supplied by the Classification Department, Administrative Command, U. S. Naval Training Center, Great Lakes, Illinois.

<sup>b</sup>Data for January and March of 1956 are not in line with averages generally representing this period for the given year because during these months draftees were received for training. Draftees generally possess GCT scores which are higher than voluntary enlistees.



mer, while youths experiencing school and work adjustmental problems, i. e. having been fired from a job or expelled from school, are more in evidence during the winter. The important fact as regards the experimental design is that no screening instrument could be adequately validated on the basis of recruit receipts for any one or two month period alone. It was therefore considered necessary to accumulate data over at least a six-month period so that the high calibre summer receipt as well as the low calibre winter recruit would be represented. The assumption was made that there was no significant difference in the calibre of recruit material received for training during the fall and early winter months as compared with the late winter and spring months.

Administrative complexities prohibited samples of recruits being tested for, say, one week out of every month throughout the six-month period. A sizeable percentage of recruits do not complete training uninterrupted. Many are transferred from one training company to another as a result of hospitalizations, disciplinary problems, and special training procedures. To obtain the criterion measure on these recruits is extremely difficult without blanket procedures being applied to all subjects. Hence, in following the procedure of continually collecting data on all enlistees for the period of 8 June 1957 through 27 December 1957, approximately 19,000 recruits completed the Recruit Personal History Inventory.

In selecting the sample to be used in the statistical analysis, two conditions had to be considered. The sample had to be sufficiently large to enable an analyzable number of cases to comprise each of the criterion categories, some of which were known to be as small as only two or three per cent of the population. In other words, if 1000 cases comprised the sample, some of the

criteria would contain as few as 20 or 30 cases--far too few for adequate analysis by non-parametric techniques. On the other hand, high-speed computing machinery for the rapid handling of large quantities of data was not initially available and prohibited the use of the entire tested population as the experimental sample. As a compromise, it was deemed advisable to select one-third of the tested population as the sample to be analyzed. This sample was selected randomly by including every third case within each of the criterion categories.

#### Changes in Sample and Experimental Procedures

Unfortunately, changes in the experimental procedure, following the collection of data for the first several months, were necessitated by changes in the population of recruits received for training. It was considered advisable to divide the sample into two more homogeneous subgroups and to analyze statistically each group independently. The first subsample was labeled phase I and included one-third of the recruits entering training during the period of 8 June 1957 through 31 August 1957. The second subsample comprised one-third of the recruit receipts for the period from 1 September 1957 through 27 December 1957 and was labeled phase II.

The reasons for this change in the design were three-fold. First, and of prime importance, was the fact that the Recruit Training Command of the U. S. Naval Training Center at Bainbridge, Maryland was closed on 31 August 1957 as a result of Department of Defense economy measures. Effective 1 September 1957, many of the recruits from the eastern seaboard, who previously had undergone training at the Bainbridge station, were enlisted for duty at Great Lakes. This change represented the imposing of a geographical redistribution which

theoretically could produce a significant variation in the responses given to the questions comprising the Recruit Personal History Inventory.

Furthermore, it had been the opinion of several members of the Psychiatric Unit staff, as well as several recruiting officers, that midwestern recruits generally were more apt to adapt satisfactorily to the demands of the naval service than those coming from the eastern seaboard. This opinion was based upon the supposition that urban recruits, which form a higher percentage of receipts from the East, have generally not experienced the more self-sufficing aspects of living which are characteristic of the higher percentage of farm youths from the Midwest, and which contribute to better Navy adjustment. Although purely speculative, this subjective impression posed an hypothesis which was believed to be worthy of investigation. While controlling for seasonal fluctuations, a comparison of recruits from the Midwest and the East would be possible within the subsample of phase II. As redesigned, the experimental procedure employed in phase II called for the inclusion of a recruit's service number (representing geographical location)<sup>86</sup> as a predictor variable.

Secondly, and also of great importance, was the fact that as of 1 September 1957, intellectual requirements for entrance and retention in the Navy were changed. As of that date, recruits who received AFQT scores lower than mental group 3 no longer were accepted for induction. This change resulted in the elimination of Recruit Preparatory Training and the early discharge of recruits with GCT scores less than 36 if they possessed reading difficulties and/or poor

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<sup>86</sup>Recruiting stations throughout the country are assigned blocks of service numbers by the Bureau of Naval Personnel. Knowing these, one can immediately determine the geographical origin of the recruit.

personality organization<sup>87</sup>. Since it is known that many of the items on the Recruit Personal History Inventory are significantly correlated with AFQT and GCT scores, the elimination of most of this low GCT group would naturally produce a significant variation in inventory item responses.

It was problematical to predict the quality of recruit material to be received during the fall of 1957. As mentioned previously, the calibre of recruits received during this period of the year is usually poorer than that received during the summer months. However, during the year 1957, with the changes in intellectual standards, it would logically be concluded that the quality of recruit receipts would be better than in previous years. Nevertheless, it was possible that there would be a significant difference between this group and the summer group. In other words, it was predicted that during the fall there would be an increase in the percentage of recruits comprising the AFQT group 3.

With this expectation, a shift in the standard of acceptable performance was anticipated. The ratings of military performance by company commanders, as well as the judgment of unsuitable performance and severity of symptomatology by members of the Recruit Evaluation Unit, are all made, to some extent, on a comparative basis. Unfortunately, an absolute standard in these matters is almost impossible to achieve, with the result that shifts in the quality of recruit material are probably accompanied by shifts in the interpretation of the meaning of unsuitable performance. Assuming this to be the case, a recruit rated as only fair by his company commander during the summer, might well be

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<sup>87</sup> See Chapter II, In-processing Procedures.

rated as average were he to have entered training during the fall or winter months.

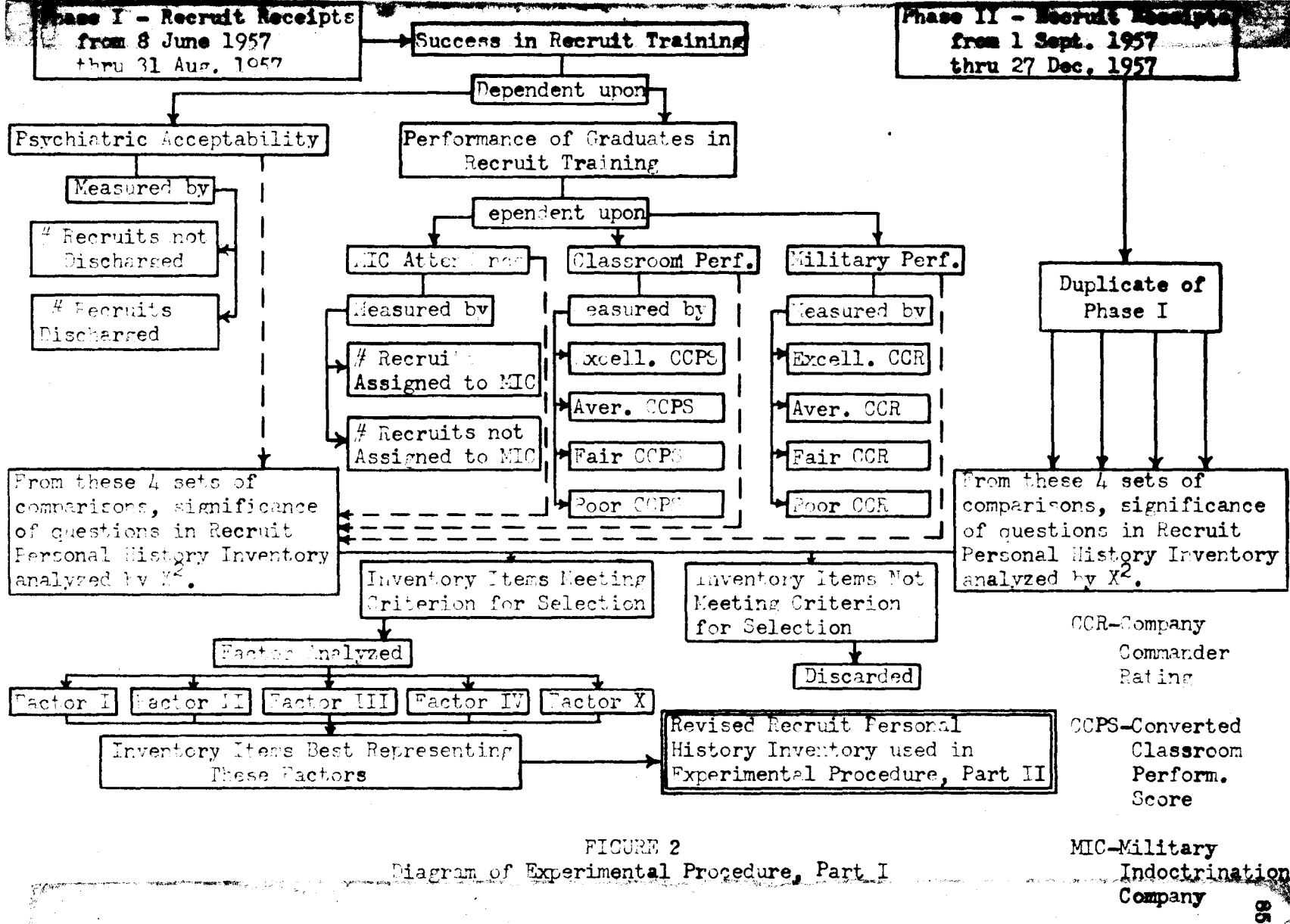
To summarize, the entire experimental sample was reduced to two subsamples, labeled as phase I and phase II. The purpose of this division was to accumulate evidence in support of the following three hypotheses: (1) Enlistees entering the Navy from the eastern seaboard are not as successful in their completion of recruit training as are youths recruited from the Midwest; (2) There is no significant difference in the validity of items comprising the Recruit Personal History Inventory between the subsamples of phases I and II; (3) A shift in the calibre of recruit receipts is accompanied by a shift in the standard of successful performance in recruit training.

#### The Criterion Variables

The criterion variables utilized in both phases of the investigation are identical. Essentially they embrace two distinct aspects of adjustment, namely, completion of recruit training and discharge from service. Those recruits who succeed in graduating from training have been further subdivided into two categories. Assignment to the Military Indoctrination Company occurs for a small percentage of recruits who later graduate from training. The remaining group completes training without requiring specialized military instruction. This latter group was rated on their military performance and on their classroom or scholastic achievement. Figure 2 depicts these categorizations and their interrelationships. Each criterion is described in detail below.

#### Psychiatric Unacceptability

A recruit is considered to be psychiatrically acceptable for service if he



succeeds in graduating from recruit training. Those recruits who, on the basis of a clinical examination and/or poor performance in training, are deemed to be unsuitable for naval service by the examining psychologist or psychiatrist, and so adjudged by the Naval Aptitude Board, are discharged. Such recruits comprise the psychiatrically unacceptable or discharge category.

To this group has been added a small number of recruits who have been discharged from service for disciplinary reasons. The rationale for this merger of discharged cases is two-fold. In the first place, the discipline-discharged group contains too few a number of cases to justify separate consideration in terms of the criterion variables. Secondly, recruits constituting disciplinary discharges almost always possess emotional, intellectual, and motivational handicaps not unlike those of the more circumscribed psychiatrically unacceptable group. For example, a recruit who is classified by the psychiatric unit as an aggressive personality, and who could justifiably be discharged as psychiatrically unacceptable, may, because of a violation of naval regulations, receive a disciplinary discharge. Or, as a case even more clearly in point, a homosexual, because he engages in such activities in service, is usually discharged disciplinarily rather than psychiatrically.

In passing, it should be pointed out that not all recruits discharged from service were included under the psychiatrically unacceptable criterion. Recruits discharged for minority reasons, by reason of physical disqualification, and for economically dependent reasons, were not included in any of the criterion groups because the reason for their service separation was not influenced by psychiatric or training performance variables. Also,

in phase II, that group of recruits discharged as classification test failures was eliminated from consideration because for this group some of the predictor variables (GCT, etc.) were synonymous with the criterion of discharge.

The criterion of psychiatric unacceptability, defined as discharge from service, is clearly measurable. The subjective judgment of no single individual is involved in determining which cases meet this criterion, nor is any subjective judgment involved on the part of the investigator. The assignment of cases to this category may therefore be accomplished unequivocally.

#### Military Performance

The sample within this category is composed of recruits who did not attend the Military Indoctrination Company and who graduated from training.

The military performance criterion involves the judgment of company commanders as to the quality of a recruit's strictly military performance. The instructions for making these judgments were promulgated in a Recruit Training Command directive (Appendix II), a copy of which was mailed to each company commander along with the evaluation forms at a time when the company was near completion of its training.

As defined in the directive, military performance includes military bearing, military drill, acceptance of discipline, cleanliness, and the ability to get along with other men. Consideration was given to having a rating made for recruits on each of these variables comprising the military performance criterion. Because of the probability of the rating of each of these variables being highly intercorrelated, and because of the prohibitive time required for such multiple ratings, it was believed advisable to limit



the evaluation to a single judgment.

Guilford<sup>88</sup> has presented rules which are favorable to effective graphic ratings. In keeping with these procedures, company commanders were presented with a continuum divided into three major categories--above average, below average, and average. Each of these three categories was assigned equal length on the military performance continuum. The below average category was subdivided into two equal parts--fair and poor.<sup>89</sup> The term excellent was applied to the above average category. The terms excellent, average, fair, and poor, as well as the descriptions of these categories, were chosen after extensive discussions with recruit training personnel and staff. They represent terminology most frequently utilized in naval parlance.

It should be pointed out that number of demerits, appearances at various aptitude boards, battalion and regimental commander interviews, and other seemingly objective measures of military performance were considered to be of little value in assessing an individual recruit because of the marked variation among company commanders in the use of these disciplinary techniques.

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<sup>88</sup>J. P. Guilford, *Psychometric Methods*, 2nd ed. (New York, 1954), pp. 267-268.

<sup>89</sup>At the time this investigation was originated, another research project, calling for a finer discrimination of recruits in the below average category, was in the formative stage. The Recruit Training Command at Great Lakes had expressed a definite concern over the training problems created by the marginal recruit (those who possess GCT scores below 40 and experience adjustmental or performance problems during training) and had requested the various special evaluation units--Recruit Evaluation Unit, Recruit Preparatory Training Unit, and Classification Unit--to embark on research designed to identify more accurately at the time of induction such personnel risks. As of 1 September 1957, the problem of the marginal recruit was all but eliminated with the disqualification, at induction, of personnel scoring lower than group 3 on the AFQT.

The company commander ratings, as herein described, furnish a global impression of a recruit's record without attention being directed toward any isolated and perhaps deviant single infraction during the course of training.

Acceptable validity was attributed to the company commanders' ratings of military performance. Company commanders are frequently called upon to evaluate recruits under their jurisdiction. Those recruits which are regularly interviewed by the Recruit Evaluation Unit, as well as those appearing before line aptitude boards, have all been rated by their company commanders as regards the characteristics called for in this investigation. The Recruit Training Command staff, as well as the staff members of the Recruit Evaluation Unit always place considerable credence in such appraisals.

#### Reliability of Company Commander Ratings

Early in the data collecting process the commanders of ten companies were required to compile a second set of ratings on recruits who had already been given the customary military performance rating. A period of three to five days elapsed between the first and second ratings. On both occasions the ratings were made according to the same instructions (See Appendix II).

A breakdown of the number and percentage of identical ratings for each individual company is shown in Table 12. Of the 570 dual ratings which were compared, 457 or 80.18% were identical. Of the ratings which were different, only two were changed by two categories, while the remainder changed by one. For this data, a chi-square value was computed from a 16-celled table and found to be 687.35, producing a coefficient of contingency of .739. The maximum possible coefficient of contingency for a four-by-four table is .886.

Table 12

Number and Percentage of Identical Company Commander  
Ratings

Company number	Number of ratings identical	Number of ratings different	Total	Percentage identical
471	62	3	65	95.38
472	53	1	54	98.15
457	41	12	53	77.36
459	48	7	55	87.27
458	38	15	53	71.70
460	36	15	51	70.59
455	32	12	44	72.73
470	53	11	64	82.81
475	55	15	70	78.57
469	39	22	61	63.93
Total	457	113	570	80.18

As an approximation to the Pearson  $r$ , the ratio of the obtained value to the maximum possible yielded a value of .853. Such a correlation was considered to represent acceptable reliability, and the utilization of company commander ratings as indicators of recruits' military performance was considered justifiable.

#### Military Indoctrination Company

A small, yet problematical number of recruits who are considered to be psychiatrically acceptable for service, perform so poorly during the course of training that they require a period of specialized instruction in order to meet military standards acceptably. Such recruits are assigned to the Military Indoctrination Company. Following this specialized instruction, which

in most cases lasts for two weeks, such individuals are returned to regular companies to complete their course of training. Most of these recruits do graduate from training, but some may, because of subsequent poor performance, be admitted to the Recruit Evaluation Unit for service separation even after satisfactory completion of the Military Indoctrination Company program.

The company commander's rating of the performance of such individuals, following their assignment to the Military Indoctrination Company, cannot be accepted as representative of their military performance in its entirety. It is difficult to ascertain how such individuals should be rated unless they are considered as a class unto themselves. Such is the manner in which they were considered in the present investigation. Another rationale for considering this group as an entity is the fact that different criteria might be established which would not only serve to identify them early in training, but which could also provide some basis for predicting the chance of their successful completion of this specialized military instruction.

The Military Indoctrination Company criterion is defined as containing subjects which at some time during their course of training were given special military instruction but were later graduated from training. Recruits who were at some time during their training assigned to the Military Indoctrination Company, but later separated from service, have been included with other cases labeled as psychiatrically unacceptable.

#### Classroom Performance

Classroom performance may be defined as the achievements of the recruit in acquiring knowledge about the Navy--its history, purpose, and mode of opera-

tion--through lectures, books, and demonstrations. It is measured in this investigation by the grades a recruit receives on tests designed to ascertain primarily the quantity of knowledge, usually in the form of factual information which he has assimilated during training.

There are two reasons for differentiating the criteria of military and classroom performance. Probably abilities at least somewhat different from those related to strictly military performance are involved. Word facility, the ability to deal with abstract concepts, reasoning, and the like, undoubtedly bear a greater relationship to classroom achievement than to strictly military performance. Secondly, and perhaps as a result of the aforementioned, judgments made by naval personnel of the overall performance of recruits are usually divided into these two categories, with generally a greater emphasis being placed on military performance than on classroom performance. Nevertheless, there are certain standards which must be maintained as regards a recruit's classroom accomplishments. The empirical evidence in support of the independence of these two categories is discussed in the following section.

During the course of training, recruits, on the average, are given six weekly tests, each based upon subjects taught in the classroom for a particular period. Weekly tests are relatively standard, are scored according to the number of correct items which are answered from the total given, are generally composed of forty items, and usually have their maximum score expressed as 4.0. A failing grade is any score less than 2.0.<sup>90</sup>

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<sup>90</sup>In December 1958 the failing grade was changed to any score less than 2.5. Since this variation represents only a change in the cut-off score, it does not affect the nature of the interval measurements employed, nor does it invalidate weekly test grades as measures of the criterion.

At the completion of training each recruit is given a final examination--RFAT (Recruit Final Achievement Test)--which includes all classroom topics studied during training. The RFAT is fairly standard; the score obtained represents the number of correct responses to 150 items; and a failing score is one of 60 or less.<sup>91</sup>

Both weekly test scores and RFAT score were used in determining a recruit's classroom performance. Arbitrarily, RFAT score and average weekly test grade were each designated as contributing equally to the composite measure of classroom performance (hereafter referred to as CCPS--converted classroom performance score). In other words, to obtain a measure representative of a recruit's classroom performance (CCPS), his converted average weekly test grade was averaged with his RFAT score. These conversions are represented in Table 14<sup>92</sup> of Appendix II. A change of .01 grade points in average weekly test score is equivalent to a change of .26 points in RFAT score.

In order that responses on the Recruit Personal History Inventory might be validated in terms of classroom performance, and in a manner similar to the military performance criterion, the CCPS values were divided into four

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<sup>91</sup>In December 1958, the failing grade was changed to any score less than 75.

<sup>92</sup>The conversions portrayed in Table of Appendix II were determined in the following manner. A subsample of ten companies, composed of 551 recruits was drawn from the sample under investigation. The average RFAT score for this group was 100.80, with a standard deviation of 11.44. For the same group, 3,349 weekly test grades were averaged to obtain a mean of 2.93 and a standard deviation of .44. In establishing the conversion table, the mean of 2.9 for weekly test scores was regarded as the equivalent of a mean RFAT score of 100. The other converted values were determined through the use of standard deviation increments. It is obvious that such converted values are gross approximations at best, yet are regarded as valid indicators of classroom performance.

groups--poor, fair, average, and excellent. The range of scores in each group, as shown in Table 13, was determined by equating percentages of cases in each category with those obtained from a subsample of military performance ratings.

Table 13

## Definition of Classroom Performance Categories

Category	CCPS range
Poor	60 through 82
Fair	83 through 92
Average	93 through 106
Excellent	107 through 130

Table 14 shows the percentage of cases within each military performance category as they were obtained from a subsample of 435 cases. In another subsample of 899 cases, the mean CCPS was found to be 99.45 and the standard deviation to be 8.52, with the distribution of scores being slightly skewed in the direction of poor performance. From this larger subsample, the delineation of the CCPS categories of excellent, average, fair and poor was made to include the same proportions of the area under the distribution curve as were found for each category in the subsample of military performance. Although it was not necessary for the CCPS categories to be defined in this manner, such a delineation does have the advantage of allowing for the com-

Table 14  
Distribution of Cases Within Each Military  
Performance Category

Category	Number of cases	Percentages
Poor	12	2.8
Fair	73	16.8
Average	257	59.1
Excellent	93	21.3
Total	435	100.0

parison of classroom and military performance in fairly standardized and equivalent units. Furthermore, the category divisions, as herein defined, were judged by recruit training personnel as generally constituting the ranges implied by the terms describing the categories. Although the later statistical treatment of the data does not require that the categories be defined so as to guarantee a normal or even a symmetrical distribution, it can be noted from Table 14 that an approximate equivalent number of cases fall above the average category as below it.

#### Independence of the Criterion Variables

Each of the four criteria provides an index of adaptability to training. The use of all four should be justified by a demonstration of their relative experimental independence, for it would hardly be efficacious to utilize four measures which were highly intercorrelated. However, some of the



measures employed permit comparison while others do not.

Since performance records, as used in this investigation, were not available for recruits discharged psychiatrically, it was impossible to determine the correlation existing between this criterion and the other three. It is known, however, that this criterion contains elements of both performance and adjustment, for a recruit may be granted a psychiatric discharge because of personality, intellectual, or reading handicaps and/or poor military and classroom performance. At least the measure used to establish psychiatric unacceptability, namely discharge from service, is qualitatively different from that used to describe classroom or military performance.

The same rationale is applicable to the Military Indoctrination Company criterion. By definition, recruits assigned to the Military Indoctrination Company are ones whose military performance was initially unacceptable. In this sense, adaptability to training for this group is synonymous with the military performance criterion. However, it would not be justifiable to merge this group with those recruits who completed training without interruption and place them on the poorly performing end of the military performance continuum, since upon graduation their military performance was obviously greatly improved. Because of the measurement employed for this criterion, no comparisons were possible with the other indices of adaptation.

The measures of classroom and military performance might be expected to correlate highly. Deviations in human traits or abilities tend to go together, so that a recruit who performs well militarily might also be expected to perform well scholastically. In addition to this possible inherent, basic relationship, there exists the question of the degree to which

the company commander is able to ignore classroom performance when evaluating a recruit militarily. In other words, at the time the company commander makes his judgment of recruits' military performance, he is at least aware of the deviant classroom performers. Does not contamination of the military evaluation occur with at least a partial knowledge of classroom performance? To answer this question and to determine the necessity of employing both performance measures, a subsample of records was compared on the basis of these two criteria.

The measure of military performance consists of the company commanders' ratings of recruits along the four-category continuum. Although the criterion of classroom performance to be used in the determination of significant items on the Recruit Personal History Inventory is a similar four-category continuum, the actual CCPS for each recruit was available for analysis.

For comparison, two methods of analysis were utilized. A coefficient of contingency was calculated as a measure of the degree of relationship between the segmented variable of military performance and the segmented variable of classroom performance. A quadriserial coefficient of correlation was calculated to measure this same relationship, but between the continuous variable of classroom performance (CCPS) and the segmented variable of military performance.

Jaspen<sup>93</sup> has developed formulae for triserial correlation, quadriserial correlation, quintiserial correlation, etc., based upon the assumptions underlying serial correlation generally. These formulae are useful for determining

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<sup>93</sup> Nathan Jaspen, "Serial Correlation", Psychometrika, XI (March 1946), 23-30.

correlation in situations where one variable is continuously measured and the other is segmented into three, four, five, etc. categories, but basically continuous and normally distributed. Such would be the case with the present data.

The subsample studied consisted of 435 records of ten companies picked at random from the first 17 companies which had completed training since the collection of data began. Obviously, this is not a random sample in terms of all the data collected in the entire investigation. It was considered important to determine the relationship between the aforementioned criterion variables as soon as possible, so that time-saving changes in the experimental design could be made reasonably soon in the course of the data gathering if the results so warranted.

Table 15 shows the number of cases comprising the criterion categories for

Table 15

Distribution of Subsample Cases within Military and Classroom  
Performance Criteria

Military Performance	Classroom performance				
	Poor	Fair	Average	Excellent	Total
Poor	1	3	7	1	12
Fair	1	16	43	13	73
Average	2	45	158	52	257
Excellent	0	9	52	32	93
Total	4	73	260	98	435

each variable. From this table a chi-square value was calculated and found to be 22.6. The corresponding coefficient of contingency between the two variables was +.222 in a four by four table where the maximum possible coefficient is .866. The obtained chi-square value is significant at slightly less than the .01 level of confidence. The ratio of the obtained coefficient to the maximum coefficient is +.256 which more nearly approximates a Pearson  $r$ .

Table 16 depicts the data collected for the determination of the quadriserial correlation, utilizing the following formula of Jaspens:

$$r_{\text{quad}} = \frac{Z_a Y_a + (Z_b - Z_a) Y_b + (Z_c - Z_b) Y_c - Z_c Y_d}{\sigma_y \left[ \frac{Z_a^2}{a} + \frac{(Z_b - Z_a)^2}{b} + \frac{(Z_c - Z_b)^2}{c} + \frac{Z_c^2}{d} \right]} \quad ^{94}$$

Table 16

Data Utilized in the Computation of the Quadriserial Correlation  
between Classroom and Military Performance

Military performance	Number of cases	Sum Y	Sum Y <sup>2</sup>	Mean	Proportion of cases
Poor	12	1141	109581	95.08	.027
Fair	73	7145	702905	97.88	.168
Average	257	25760	2593230	100.23	.591
Excellent	93	9613	989739	103.37	.214
Total	435	43659	4395455	100.36	1.000

<sup>94</sup>Ibid., 29.

where  $y$  is the continuous variable;  $x$  is the continuous segmented variable, normally distributed;  $r$  is the coefficient of correlation (linear) between  $x$  and  $y$ ;  $\sigma_y$  is the standard deviation of the continuous variable;  $a$ ,  $b$ ,  $c$ , and  $d$  represent the proportion of cases in the respective segments of the  $x$  distribution;  $z_a$ ,  $z_b$ , and  $z_c$  represent the ordinates of the unit normal curve, assuming a unit normal distribution, at the point separating the area above the left boundary of each segment; and  $\bar{y}_a$ ,  $\bar{y}_b$ ,  $\bar{y}_c$ , and  $\bar{y}_d$  represent the mean of the  $y$ 's in the respective segments.

The obtained correlation was  $+.351$ . Jaspen states, "Formulas for the standard error of serial correlation in general have not yet been developed."<sup>95</sup>

The results indicate that there does exist a significant positive relationship between classroom and military performance. However, this relationship is small as evidenced by the high coefficient of alienation ( $k = .936$ ) which is obtained if  $+.351$  is accepted as representing the true relationship between the two criterion measures. Only 12.34 per cent of the variance in one of the criteria is associated, by way of prediction, with the other variable. The inclusion of both performance measures in the investigation would seem to be justified.

#### Statistical Analysis

The purpose of analyzing the relationship of the predictor variables to the criteria is to cull out for factoring only those inventory items and/or test scores which bear a significant relationship to success in recruit training. Before selecting items, some test of their significance must be made.

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<sup>95</sup>Ibid.

There are certain attributes of the predictor and criterion variables which limit the types of statistical manipulations which can be applied. In the first place, the inventory items and test scores yield dichotomous measures. Secondly, the criterion categories allow for measurement on a classificatory or ordinal basis only. That is, the psychiatric unacceptability criterion and the Military Indoctrination Company criteria permit a case to be placed in only one of two categories. The military performance criterion and the classroom performance criterion allow for a greater-than, less-than type of judgment on the basis of four categories each.

The chi-square test was chosen to determine the significance of the differences between the independent groupings. For each item in the Recruit Personal History Inventory and for each of the five categorizations of each of the four classification test scores, four chi-square tests of significance were made for each phase of the investigation. The arrangement of the data for the calculation of these chi-square values is shown in Table 17.

For the psychiatric unacceptability criterion, comparisons between the number of yes and no answers for those cases comprising the discharge group and the non-discharge group were made for each item. Therefore, a four-fold table was utilized for the chi-square computation. Likewise, a four-fold table was utilized in making the comparison between the number of yes and no answers for those cases comprising the Military Indoctrination Company criterion. In the case of military and classroom performance, comparisons were made between the number of yes and no answers for the subjects assigned to the four categories (poor, fair, average, and excellent) under each criterion. Thus, an eight-fold table was utilized for these chi-square computations.

Table 17

Arrangement of Data for Calculation of Chi-square Values  
for Each Predictor Variable

Psychiatric Unacceptability

Item number	Classification		Discharge	Non discharge	Marginal totals	Results
	Yes	$f_o$	B	C	A	$(f_o-f_e)^2$
		$f_e$				
	No	$f_o$				Chi-square
		$f_e$				
Sum observed						Probability

Military Indoctrination Company

Item number	Classification		M. I. C.	Non M. I. C.	Marginal totals	Results
	Yes	$f_o$	F	D	C	$(f_o-f_e)^2$
		$f_e$				
	No	$f_o$				Chi-square
		$f_e$				
Sum observed						Probability

Table 17 (continued)

Arrangement of Data for Calculation of Chi-square Values  
for Each Predictor Variable

Military Performance

Item number	Classification		Poor	Fair	Average	Excellent	Marginal totals	Results
	Yes	$f_o$	K	J	I	H	D	$(f_o-f_e)^2$
		$f_e$						
	No	$f_o$						Chi-square
		$f_e$						
Sum observed								Probability

Classroom Performance

Item number	Classification		Poor	Fair	Average	Excellent	Marginal totals	Results
	Yes	$f_o$	Q	P	N	M	D	$(f_o-f_e)^2$
		$f_e$						
	No	$f_o$						Chi-square
		$f_e$						
Sum observed								Probability



An explanation of Table 17 would seem to be in order. The  $f_0$  and  $f_E$  symbols under the classification column represent observed frequencies and expected frequencies respectively. In each diagram the rows are summed to yield the total number of cases answering yes to a particular item and the total number of cases answering no. Likewise, in each diagram, the columns are summed to yield the total number of cases comprising a particular category within the criterion.

Since the cases comprising the military performance criterion are the exact same cases comprising the classroom performance criterion, the row totals for the yes and no dichotomies will be identical. These marginal totals under the military and classroom performance criteria constitute the cases under the Non-M.I.C. category of the Military Indoctrination Company criterion. In the same fashion, the marginal totals under the Military Indoctrination Company criterion form the cases constituting the Non-discharge category of the psychiatric unacceptability criterion<sup>96</sup>. The total number of cases in the sample is listed in the marginal totals column of the psychiatric unacceptability criterion. According to the designation given by the letters in the cells in the yes rows of each diagram, the following equalities hold:  $A = B + C$ ;  $C = D + F$ ;  $D = K + J + I + H$ ; also,  $D = M + N + P + Q$ ; but  $K \neq Q$ ;  $J \neq P$ ; etc. These same relationships, of course, apply to the no row for each item.

Chi-square values were calculated for each criterion for each of the 215 predictor variables for both phases I and II, making a total of 1720 such calculations. The formula utilized in these calculations is as follows:

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<sup>96</sup> See Figure 2 on page 85 for a schematic representation of these criterion interrelationships.

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^k \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \quad , \quad 97$$

where  $O_{ij}$  is the observed frequency in each cell;  $E_{ij}$  is the expected frequency in each cell;  $r$  is the number of rows, which is always two in this investigation; and  $k$  is the number of columns, which is two for the psychiatric unacceptability and Military Indoctrination Company criteria, and four for the military and classroom performance criteria. In those comparisons where a two-by-two table of frequencies was utilized, there was one degree of freedom. Where a two-by-four table of frequencies was utilized, the degrees of freedom were three.

#### Selection of the Significant Inventory Items

Because of practical limitations and a lack of knowledge of the results to be obtained, it was obviously impossible to set in advance the criterion which was to be used in the selection of significant inventory items for factorization. On the one hand, these practical limitations consisted of the computational time required to make the item selections, the time required for the calculation of the intercorrelations, and the number of items which could be handled for factorization by an electronic digital computer. The electronic computer used in this investigation, the ILLIAC at the University of Illinois, was capable of handling a correlation matrix of 111 by 111, although it was

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<sup>97</sup>Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York, 1956), p. 104.

certainly not expected that this large a number of inventory items would be determined to be significant. On the other hand, a sufficient number of items would need to be selected if factorial design were to be utilized.

One method of controlling the number of items to be selected could consist of lowering or elevating the level of confidence to be used in defining significance for each item and each criterion. Regardless of the significance level selected, it was necessary to choose a method for equating the various criterion categories. One approach consists in selecting for factoring any item which is significant, at a certain designated level, in a certain number of criterion categories. For example, any item might be chosen which is significant in any two of the four criteria. Another approach consists in selecting for factoring items whose summed chi-square value--from the addition of the item chi-square value within each criterion--meets a certain arbitrarily selected cut-off score. The disadvantage to such a selection method lies in the rather arduous task of converting all chi-square values to a common base. Such a procedure would be necessary because of differences in the degrees of freedom required in the original calculations. The greater degree of accuracy rendered by this method will perhaps not be considered to be of sufficient value to justify the increased work and time necessary for its application.

As a framework within which to establish a selection criterion, three other concepts bear explanation. Regardless of the obtained results, it would seem reasonable to place greater emphasis upon the psychiatric unacceptability criterion, in contrast to the other criteria, because it is more directly applicable to the general mission of the psychiatric facility. Secondly, all inventory items meeting the selection criterion must be internally consistent.

It is possible that an item might yield significant chi-square values in several criteria, but directionally give conflicting results, such that a positive answer in one criteria would indicate success in training and in another, point toward failure. Finally, no item should be selected for factoring if the split in the yes-no answers is extremely one-sided. Such one-sided splits tend to yield chi-square values which may be falsely inflated.

### Inter-item Correlations and the Factor Analysis

The two correlations which are possible of utilization with dichotomous data are the phi-coefficient and the tetrachoric  $r$ . The assumptions underlying the use of the tetrachoric  $r$  are that the data are continuously variable, normally distributed, and linearly related, while with the phi-coefficient the assumption is that the two distributions are really dichotomous and represent a distinct division in the two classes.

The variables measured by the items comprising the Recruit Personal History Inventory are a mixture of continuously measured-normally distributed, continuously measured-non-normally distributed, and point distributed data, not to mention questionable linearity. The usual resolution adopted in dealing with data of this type is to resort to the phi-coefficient in order to avoid defending the assumptions of the tetrachoric  $r$ .

However, there are other problems in using the phi-coefficient in factorial studies. If the division in the proportion of cases comprising the two classes, within even one of the distributions, is eccentric, i. e., unevenly divided, the maximum possible phi is less than one. In those distributions where the cut is markedly eccentric, the maximal size of phi is appreciably reduced, and becomes significantly less than unity. The tetrachoric  $r$  does not

impose this restriction. According to Cattell, ". . . extreme values of the tetrachoric with strongly eccentric divisions do reach + 1 and - 1 but the approach values do not climb toward these extremes as early as they should, compared with the true, product-moment values."<sup>98</sup>

One possible solution to the problem created by the limited values of phi with eccentric distributions is to employ the correction suggested by Smith and utilized by Cattell, namely the phi/phi-max correction. ". . . Smith has shown that it (the fault of the phi-coefficient)<sup>99</sup> can be at least substantially corrected by dividing each coefficient by the highest coefficient obtainable at that degree of eccentricity of the cuts on the tests."<sup>100</sup> It would seem to this author that the use of the phi-coefficient in factorial studies is even questionable under optimum conditions (because it is primarily a measure of association rather than correlation), and the additional juggling by the phi/phi-max solution yields a figure which is extremely difficult to interpret meaningfully. Nevertheless, Cattell states, "Phi divided by phi-max, i. e., by the maximum possible phi for the given eccentricity of cut, is probably the best coefficient yet in use for dichotomized data."<sup>101</sup>

Since 1952 Cattell has revised his thinking in regards to the use of phi/phi-max. In a personal communication he states, "The chief result of some

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<sup>98</sup>Raymond B. Cattell, Factor Analysis, An Introduction and Manual for the Psychologist and Social Scientist (New York, 1952), p. 326.

<sup>99</sup>Material in the parentheses is not in the original quotation.

<sup>100</sup>Cattell, p. 325.

<sup>101</sup>Ibid., 327.

years of experience, since the evaluation made in my 1952 book, is that we are not so happy with  $\phi/\phi\text{-max}$  as we were. Both this value and the tetrachoric are so much affected by sampling error that one may get a non-Gramian matrix, and there is a fifty-fifty chance that a  $\phi/\phi\text{-max}$  matrix will be unfactorable. Accordingly, for dichotomous data we are now using  $\phi$  itself, even though this lowers the loadings to some extent, and also is inclined to give us difficulty factors. After all, difficulty factors are real enough, and perhaps we should not throw them out."<sup>102</sup> It would therefore seem justifiable to exclude  $\phi/\phi\text{-max}$  from consideration as a utilisable coefficient in this investigation.

It is understood that Thurstone himself always contended that factor analysis could be undertaken with any correlational data provided the possible range of the correlation selected was from  $-1$  to  $+1$ <sup>103</sup>. Nevertheless, the  $\phi$  coefficient was utilized by Thurstone and Degan<sup>104</sup> in an analysis of Supreme Court decisions, although the data available do not allow assessment for the magnitude of the highest possible correlations.

In the present investigation then, the choice is between the  $\phi$ -coefficient and the tetrachoric  $r$ , and will depend upon the eccentricity of cut and

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<sup>102</sup>Information in a letter to the author from R. B. Cattell, Research Professor of Psychology, University of Illinois, 25 November 1958.

<sup>103</sup>Information from a personal interview of the author with W. T. Stille, Statistician, Naval Medical Research Unit Number 4, U. S. Naval Training Center, Great Lakes, Illinois, and a former student of L. L. Thurstone at the University of Chicago in 1950.

<sup>104</sup>L. L. Thurstone and J. W. Degan, "A Factorial Study of the Supreme Court", The Psychometric Laboratory of the University of Chicago, 64 (March 1951), pp. 1-7.

the normality, continuity, and linearity of the variables selected for factoring. In view of the foregoing discussion, the tetrachoric  $r$  would seem to be the correlation of choice provided its assumptions are not grossly violated.

Because of its clarity and ease of computation, Thurstone's centroid method<sup>105</sup> was selected for the factorization. The communalities were reestimated after the extraction of each factor by using the largest absolute value of the residuals in each array. Using these newly derived communalities, the factorization was repeated. In order to arrive at a meaningful interpretation of the obtained factors, rotation to simple structure was undertaken according to the method outlined by Thurstone<sup>106</sup>.

#### Construction of the Personal History Record

The experimental questionnaire has been called Recruit Personal History Inventory, while the revised inventory which was derived from it, has been labeled Personal History Record. Those items comprising the Personal History Record would be dependent upon the number of significant inventory items obtained, the number of factors isolated, and the loadings of the items within each factor. Although it is the goal of the investigation to construct the revised inventory so that it is factorially pure, it is recognized that undoubtedly some items will contain a high specific variance, which, if related to the criteria of the investigation, would make it imperative that these items be contained in the Personal History Record even though they do not describe

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<sup>105</sup>L. L. Thurstone, Multiple Factor Analysis (Chicago, 1947), pp. 149-175.

<sup>106</sup>Ibid., 194-224.

any obtained factor.

In order to carry out the cross-validated procedures described within the second part of this chapter, a scoring system has been derived for the Personal History Record. The assigning of weights to inventory items for the purpose of deriving a score having value in terms of predicting a criterion, involves lengthy and complex statistical procedures. Little is known about such weighting in terms of factorial structure. Perhaps the simplest solution to the weighting problem is to assign a + 1 value to each item with a high factor loading and then to make slight modifications in these values depending upon the significance of the item and the degree to which differences between criterion groups can be maximized. Again, the exact method of scoring will be dependent upon the factors isolated, the number of significant items obtained, and the loadings of the items within each factor.

#### Independence of the Predictor Variables

It has frequently been pointed out by critics of personality inventories that an individual's responses to particular test items are often not independent of his responses to other test items, and are related to the positioning of the items within the test. The effect of other test questions upon a particular inventory item has been termed item halo effect. Needless, to say, although inventories possessing marked item halo effects may be valid when the inventory is treated as a whole, the interpretation of each individual response as having significance by itself is open to severe criticism. This is particularly true in a factorial study where the interpretation of parameters is predicated upon the experimental independence of item responses. Thurstone states, "In planning a factorial analysis it is desirable to cover the domain



to be investigated as completely as possible with a large number of related variables, which should be experimentally independent but correlated and representative of different aspects of the domain."<sup>107</sup>

To provide evidence for the non-existence of item halo effects in a questionnaire would require endless retesting with the successive relocation of each item within the inventory. In lieu of such an impossible procedure, the following experimental design was formulated to test the hypothesis that at least one variation in the format of the experimental questionnaire would not produce significant changes in item responses. If two forms of the inventory, differing in the configural context of items, were administered to four groups of recruits in typical AB - BA fashion, the hypothesis of experimental independence would be supported if there were no significant change in the item responses by groups completing dissimilar forms, as compared to groups completing similar forms.

The two forms of the test consisted of the 195-item Recruit Personal History Inventory (hereafter referred to as the long form), which was the original experimental test, and a shorter inventory (hereafter referred to as the short form), which contained only those items which had been selected for factoring. Although the items of the short form were contained within the original 195-item Recruit Personal History Inventory, the order of the items was different and the latter contained additional filler questions. Briefly, the configural context of the two forms was entirely different.

Two experimental and two control groups were formed. Group A contained

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<sup>107</sup>Ibid., 313.

recruits who were given the short form followed in two days by the same short form. Likewise, Group B consisted of those men who were given the long form both initially and subsequently. Group C was administered the short form initially and the long form later, while Group D received the long form first and the short form secondly. The same time interval existed between inventory administrations for all groups. Although memory is destined to play an important role in the degree of response concurrence from the first to the second inventory administration, the time lapse was no different for any one group, and each was equated on the basis of intelligence variables.

The instructions for the administration of each inventory were identical with the exception of the fact that upon retesting, the following statement was made by the experimenter: This evening you men will complete another form similar to the one which you filled out two days ago. I cannot explain to you the reason why you are being asked to do this, except for the fact that it is related to a Navy research program. All inventory items on both forms were tape-recorded, and the playing of this record served to insure consistency from one administration to the next.

For each subject, the answers given to the items comprising the short form only were compared on the initial and subsequent testing. A score, called an inconsistency score, was calculated for each individual within each group, and was equal to the number of items which were answered differently on the two test administrations. In other words, if an individual possessed an inconsistency score of 8, he had responded to 8 of the short form items by changing his answers from yes to no or from no to yes, while leaving unchanged the remaining answers. For each group, a mean inconsistency score was computed and

comparisons between groups were made on the basis of group mean differences. Any mean difference, at or beyond a probability value of .05 was considered as being significant. The original hypothesis would be substantiated if the mean inconsistency scores for Groups C and D were not significantly higher than those for Groups A and B. In other words, item halo effects would be demonstrated only if the mean inconsistency scores were significantly higher for groups administered non-identical inventories.

Parenthetically, this test-retest procedure served an additional function, namely the collection of data relevant to the reliability of the inventory items. Those items which manifested the greatest inconsistency could be compared from group to group and provide information relevant to the selection of items to represent the factors elicited. Certainly those items representative of the obtained factors, and hence comprising the Personal History Record, should be ones with the greatest reliability.

#### Clinical vs. Statistical Prediction with the Personal History Record

As a check upon the validity of the Personal History Record, and in an effort to compare clinical and statistical predictions, the Personal History Record was administered to all recruits received for training during November of 1959. As described in Chapter II, the initial screening interview was conducted during the second day of in-processing, with the Personal History Record being utilized by the examiner as an adjunct. Following the initial screening interview, and without knowledge of the interviewer's prediction, the Personal History Record was mechanically scored, utilizing the values assigned to each of the inventory items. The judgments of the interviewers and the actuarial

scores both dichotomized the recruit population into trial duty and full duty groups. Those recruits given a followup examination during the course of training were ones initially labeled as trial duty by either or both of the predictive techniques. The judgments of both techniques were filed for later analysis in terms of the psychiatric unacceptability criterion.

To facilitate later statistical analyses, the daily number of recruits labeled as trial duty by the interviewer during the initial clinical examination, was matched by an equivalent number of recruits on trial duty by the actuarial assessment. Although on some days more than one interviewer conducted the psychiatric screening, the matching procedure, for the most part, made it possible to compare the predictive efficiency of each examiner with the actuarial judgment.

Two procedures were utilized for the statistical analyses. The predictions of each interviewer, as well as those of the actuarial technique, were compared with the 'outcomes' and chi squares computed as measures of the validity of the predictions. Secondly, as an estimate of the comparative validity of each technique, chi square was computed from the correct and incorrect predictions of the entire sample, adhering to the custom of accepting as significant any value yielding a probability equal to or less than .05.

The above procedure is one method by which to judge the validity of the Personal History Record. It is by no means thorough nor conclusive, however. The criterion utilized, namely graduation or discharge from recruit training, is only one index of adaptability. Likewise, such a validation procedure does not contrast the value of the Personal History Record with the presently utilized Standard Medical Screening Form A. Such comparisons will have to re-

main for later investigation.

## CHAPTER V

### RESULTS

#### Introduction

The results of the investigation are presented in two parts, namely the data pertaining to the validation of the Recruit Personal History Inventory and to the cross-validated procedures. Since space limitations prohibit the tabulation of all the collected data, the tables and graphs comprising this chapter are presented to provide answers only to the immediate problems of the investigation, i. e., the construction of a valid screening questionnaire and its effectiveness in comparison with clinical interview techniques. Likewise, the discussion of the results has been limited to these methodological problems even though, because of the voluminous nature of the data, some light is shed upon norms of adolescent behavior and the important interrelationships of adjustment variables for this age group.

#### Responses to the Inventory Items

Table 45 in Appendix III shows the number of positive answers given to each of the 215 predictor variables for recruits comprising phases I and II. In the subsample comprising phase I there were 2568 cases, while phase II contained 3627 cases. The percentages of positive answers for the two phases are remarkably similar. However, because of the large number of cases comprising each subsample, numerous significant differences exist in the percentage of

positive answers between the two phases.

From a cursory analysis it is noted that 17 items showed a percentage difference of six or more points. Seven of these items deal with formal education and all indicate a lowering of educational accomplishment both in terms of years of schooling and grade failures within phase II. An increase in the percentage of recruits who held full-time employment prior to enlistment is noted. The greatest increase in phase II occurred in the percentage of Catholics entering service. An increase is also noted in the percentage of recruits indicating that 'it is sometimes alright to tell a lie'.

As mentioned in Chapter IV, it was to be expected that the quality of recruits received for training during the second phase would be poorer than those received during phase I. Table 18 shows the number and percentage of cases falling into each of five GCT categories for phases I and II, and Table 19 portrays the number of cases responding positively to inventory items pertaining to educational achievement. The lower GCT groups as well as the lower educational groups contain a greater percentage of cases in phase II than in phase I. The exceptions occur within the highest GCT range (66-77), where the percentage in phase II is 7.4 as compared with 7.1 for phase I, and the highest educational group (over 12 years), where the percentage in phase II is 7.9 in comparison with only 5.4 for phase I. Generally speaking, these results substantiate the fact that the quality of recruits was poorer during phase II than phase I.

#### Stability of the Criterion Variables

It was pointed out in Chapter IV that one of the purposes of reducing the

Table 18

Distribution of Cases within GCT Groupings for Phases I and II

GCT score	Phase I		Phase II	
	Number of cases	Per cent	Number of cases	Per cent
22 - 35	65	2.5	104	2.9
36 - 45	443	17.3	771	21.3
46 - 55	1006	39.2	1403	38.7
56 - 65	870	33.9	1078	29.7
66 - 77	184	7.1	271	7.4
Total	2568	100.0	3627	100.0

Table 19

Distribution of Cases within Educational Groupings for Phases I and II

Grade	Phase I		Phase II	
	Number of cases	Per cent	Number of cases	Per cent
Under 8 years	48	1.8	78	2.0
8 years	99	3.7	222	5.6
9 years	185	6.9	371	9.4
10 years	249	9.3	552	14.0
11 years	259	9.7	580	14.7
12 years	1692	63.2	1825	46.4
Over 12 years	144	5.4	310	7.9
Total <sup>a</sup>	2676	100.0	3938	100.0

<sup>a</sup>The total number of cases reported in the two phases for the educational variable is the number of answers to the inventory items. The discrepancy between these figures and the total number of cases within each phase arises because some recruits answered more than one of the mutually exclusive education items. This problem is treated in more detail on pages 133 - 136.



sample to two phases was to evaluate the stability of the criterion variables. Because of the recruit calibre change from phase I to phase II, as noted above, it was speculated that the subjective evaluation given recruits by their company commanders might likewise change. To investigate this problem reference is made to Table 20 which shows the number of cases, as well as the percentages, comprising the various criterion categories for phases I and II. The percentage of cases within the discharge, M. I. C., poor, fair, and average military performance, and poor and fair classroom performance categories shows an increase in phase II over phase I. Only if the direction of these discrepancies

Table 20

Distribution of Cases Comprising the Criterion Categories for Phases I and II

Criterion	Phase I		Phase II	
	No. of cases	Per cent	No. of cases	Per cent
Discharge	160	6.2	372 <sup>a</sup>	10.2
M. I. C.	33	1.2	55	1.5
Military-poor	48	1.8	93	2.5
Military-fair	256	9.9	383	10.5
Military-average	1482	57.7	2373	65.4
Military-excellent	589	22.9	595	16.4
Classroom-poor	65	2.5	143	3.9
Classroom-fair	382	14.8	682	18.8
Classroom-average	1324	51.5	1797	49.5
Classroom-excellent	604	23.5	822	22.6
Total	2568		3627	

<sup>a</sup>This is a corrected figure which includes classification test failures. Only 128 cases were discharged through the naval aptitude board during phase II.

had been reversed or remained approximately the same could the conclusion have been drawn that the criteria shifted toward a lower standard from the summer to the fall season. It is, of course, impossible to prove that some 'sliding' of the criteria did not occur, but the experimental evidence available does not support this position.

### Significance of the Predictor Variables

Table 46 in Appendix III gives the chi-square values for each item with each of the four criterion variables for both phases of the investigation. It was surprising to find such a large number of items yielding significant chi-square values. Of the 215 items which were investigated, only eight (item numbers 1, 5, 9, 47, 49, 124, 147, and 169)<sup>108</sup> showed chi-square values which were not significant at or beyond the five per cent level of confidence for any of the criteria in either of the two phases of the investigation.

Of the 1720 chi-square computations, it would be expected by chance that 86 of them would yield probability values of .05 or less. Actually, 778, or over 45 per cent of the chi-square computations yielded values which were significant at or beyond the five per cent level of confidence. Brozek and Tiede<sup>109</sup> report a short method for determining whether the number of significant items is sufficiently great to indicate a non-chance occurrence without resorting to the hopelessly arduous task of utilizing the binomial expansion. Their approximation formula involves the calculation of a critical ratio from the

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<sup>108</sup> See Appendix I for the items comprising the Recruit Personal History Inventory.

<sup>109</sup> J. Brozek and K. Tiede, "Reliable and Questionable Significance in a Series of Statistical Tests", Psychol. Bull., XLIX (1952), 339-341.

mean,  $m = Np$ , and the standard deviation,  $G = Npq$ . Using this formulation, the obtained critical ratio is  $76.89^{110}$  and the probability value is infinitesimally small. Therefore, it may be concluded that, as a whole, the predictor variables differentiate better than chance between those cases comprising each of the criterion groupings.

Table 21 shows the number of significant chi-square values within each of the criterion groupings for each phase of the investigation. The Military Indoctrination Company criterion yielded the fewest number of significant chi-square values. Applying the Brozek-Tiede formulation to the data for the M.I.C. criterion in phase I, a critical ratio of 5.70 and a probability value less than .0000001 are obtained. It may therefore be concluded that the predictor

Table 21

Number of Significant<sup>a</sup> Items within Each Criterion for Phases I and II

Phase	Discharge	M. I. C.	Military	Classroom	Total
I	140	29	88	120	377
II	125	42	125	109	401
Total	265	71	213	229	778

<sup>a</sup>At a probability value of .05.

<sup>110</sup>C. R. =  $n - m/G$ , where  $n$  = number of significant chi-square computations obtained,  $m = Np$ ,  $G = Npq$ ,  $N$  = the total number of significance tests computed,  $p$  = the level of significance, and  $q = 1.00 - p$ .

variables differentiate better than chance even between those cases comprising the M. I. C. criterion where the number of significant chi-square computations is the smallest. Although the M. I. C. criterion was originally questioned as lacking differentiation, the obtained results would support the conclusion that recruits who are assigned to M. I. C. are distinctly different from recruits not so assigned.

### Effects of Sample Size

It can be noted, by reference to Table 21 that there are rather marked discrepancies in the number of significant chi-square values for all criteria between phases I and II. This problem is discussed at greater length in the following section. The question posed here is whether sample-size restrictions could be at least somewhat responsible for these significant chi-square discrepancies.

Although the overall number of cases comprising the sample is large, the number of cases representing some of the criterion categories is relatively small. This is particularly the case with the M. I. C. criterion, where in phase I the number of cases was only 33 and in phase II it was 55. If discrepancies in the number of significant chi-square values were related to sample size, a greater number of such discrepancies should be noted between phases I and II for the M. I. C. criterion. Table 22 reports the percentage of agreements in the significant--non-significant chi-square comparisons for phases I and II, such that the discrepancies between the M. I. C. criterion and the other criteria may be noted.

For the M. I. C. comparisons of significant--non-significant chi-square

Table 22

Distribution of Items Constituting Significant--Non-significant Dichotomy Groupings between Phases I and II for MIC and Other Criteria

Groupings	MIC comparisons		Other criteria compar.	
	Number	Per cent	Number	Per cent
Phases I and II - Both significant	9	4.2	263	40.8
Phases I and II - Neither significant	153	71.2	200	31.0
Phase I - significant Phase II - not significant	20	9.3	85	13.2
Phase I - not significant Phase II - significant	33	15.3	97	15.0
Total	215	100.0	645	100.0

values between phases I and II, 75.4 per cent resulted in agreement, while only 71.8 per cent of the other criteria comparisons showed agreement between phases I and II. This observation would support the conclusion that the discrepancies in the significant--non-significant chi-square values between phases I and II are not attributable to restrictions in subsample size.

#### Item Significance Discrepancies between Phases I and II

The selection of the items to be used in the factorization posed a problem because, on even cursory examination, it was obvious that there was a marked discrepancy in the significance of the items in the two phases of the investigation .

There were 860 chi-square computations (215 for each of the four criteria) for each phase. At the five per cent level of confidence, it would be expected that 43 of the chi-square computations would vary in significance between phases I and II. If no more than 43 differences resulted between the two phases, one could make the conclusion that the entire sample was drawn from the same population.

Of the 860 chi-square comparisons, 272 yielded significant results in both phase I and phase II (Table 22). Non-significant results in both phases for each criterion were obtained on 353 occasions. Of the 860 comparisons, 105 yielded significant chi-squares in phase I, but not in phase II, while 130 chi-squares were significant in phase II but not in phase I. This comparison of the significant--non-significant items in the two phases results in far too many dissimilarities to conclude that the two samples were drawn from the same population.

It has already been pointed out that these significant--non-significant discrepancies could not have arisen because of restrictions in the subsample size within some of the criterion categories, nor from instabilities of the criterion variables. It must be concluded, therefore, that not only do differences exist between phases I and II in terms of the calibre of recruit personnel received for training, but there also exist marked differences between the two phases in the significance with which the predictor variables differentiate successful and unsuccessful recruit training adjustment.

#### Selection of Inventory Items

The afore-mentioned dissimilarities in the significant--non-significant

items between phases I and II posed a problem in the selection of inventory items for the factorization. Were it possible to demonstrate empirically the seasonal stability of recruit populations from year to year, and were further intraseasonal samples devoid of significant--non-significant item dissimilarities, it might not be presumptuous to speculate about the advisability of designing several screening questionnaires, each applicable to a specific season's enlistees. Without these assurances, and because of the prohibitive labor involved, the development of such multiple techniques was considered unwise. By choosing only those items which were found to be significant in both phases of the investigation, a single questionnaire, valid for every season, could be constructed.

The geographical differences in home location for recruits comprising the phase II subsample was another variable worthy of consideration for determining item selection. A discussion of these differences is contained within the section of this chapter entitled Comparison of Eastern and Midwestern Recruits. Assuming that future recruit receipts will have the same general geographical distribution as those contained in the subsample of phase II, should not the item selections be made from that phase? Perhaps this question could be answered affirmatively were it not for the seasonal variations between the two phases. Because shifts in the calibre of recruit receipts between the summer and fall seasons have been observed year after year, and because subjectively there was no indication of a difference in training problems with the advent of recruit receipts from the East, it was considered important not to ignore the results of phase I in the selection of inventory items for factoring.

In keeping with the preceding discussion, equal weight was assigned to

significant items in phases I and II. However, because of the importance of the psychiatric unacceptability or discharge criterion as regards the general mission of the psychiatric facility, additional weight, for selection purposes, was assigned those items which were significant as regards this differentiation. A weight of two was assigned to any item which was significant at or beyond the five per cent level of confidence for the discharge criterion. Any item within any of the remaining three criteria was assigned a weight of one for each criterion within which it yielded significance at or beyond the five per cent level of confidence. Because each item was evaluated against four criteria for each phase of the investigation, the total possible weight which an item could obtain was ten. One further stipulation was made. An item was not selected, even though it met the above criteria, unless at least one of its chi-square values was significant at or beyond the one per cent confidence level. The purpose of this additional item-selection criterion was to guarantee a high level of significance for the items selected. Four items (numbers 12, 98, 100, and 113) yielded chi-square values not significant at or beyond the one per cent confidence level, although they did meet the other selection criteria.

Arbitrarily, any significant item which obtained a weighted value of four or more was selected for the factorization. This guaranteed the inclusion of those items which were only significant as regards the psychiatric unacceptability criterion for both phases. Furthermore, the selection weight of four had the effect of reducing the number of significant items to a workable quantity. The electronic digital computer available for the factorization would permit no more than 111 variables to be utilized. The items which met this selection criterion are labeled in Table 46 of Appendix III. Actually, the 119 selected



items were reduced to only 92 items for factorization by combining into single items the segmented predictor variables comprising educational achievement and classification test scores, and by eliminating duplicated items included within the experimental inventory only for reliability purposes. This is discussed at greater length in the section of this chapter entitled Data Preparation for Factorization.

There were two additional problems encountered in the selection of inventory items. The first concerned the direction-consistency of significant items, both between criteria and within a single criterion. An item might yield significant chi-square values for both the military and classroom performance criteria, but give directionally conflicting results. For example, item 171 (Did you play football, basketball, baseball, or wrestle on a school team?) yielded the obtained and expected frequencies shown in Table 23. As is evident from this table, militarily poor, fair, and average recruits answered this question affirmatively less often than would be expected by chance, while recruits who were poor, fair, and average in their classroom work answered the question affirmatively more often than would be expected by chance. A significant question which yields such directionally inconsistent results would be of no value as a screening adjunct, because in the military situation a positive answer would indicate one thing, while in the classroom situation, it would indicate the exact opposite.

Directional inconsistencies also occurred within a single criterion for some items. An example is shown in Table 24 for item 165 (If you saw an auto accident would you give your name as a witness?). In this case, fair and excellent recruits answer the question positively more often than would be expect-

Table 23

Item 171, Phase II: Obtained and Expected Frequencies for Calculation of Chi-square Values within Military and Classroom Performance Criteria

Category	Poor	Fair	Average	Excellent	Total	Chi-square
<u>Military</u>						
Yes - observed	48	232	1502	425	2207	
Yes - expected	59.6	245.4	1520.7	381.3	2207	
No - observed	45	151	871	170	1237	
No - expected	33.4	137.6	852.3	213.7	1237	22.86
Total	93	383	2373	595	3444	
<u>Classroom</u>						
Yes - observed	93	459	1178	476	2207	
Yes - expected	91.6	437.0	1151.6	526.8	2207	
No - observed	50	223	619	346	1237	
No - expected	51.4	245.0	645.4	295.2	1237	18.42
Total	143	682	1797	822	3444	

Table 24

Item 165, Phase II: Obtained and Expected Frequencies for Calculation of Chi-square Value within Military Performance Criterion

Category	Poor	Fair	Average	Excellent	Total	Chi-square
Yes - observed	67	334	1988	539	2928	
Yes - expected	79.1	325.6	2017.5	505.9	2928	
No - observed	26	49	385	56	516	
No - expected	13.9	57.4	355.5	89.1	516	31.13
Total	93	383	2373	595	3444	

ed by chance, while poor and average recruits respond positively less often than would be expected by chance. Such items likewise could not be utilized because positive answers are not unique in their meaningfulness. Of the 215 predictor variables, 16 were eliminated because they yielded results which were directionally inconsistent. They are labeled in Table 46 of Appendix III.

Another problem encountered in the selection of inventory items pertains to the sometimes distortedly high chi-square values obtained for items where observed and expected frequencies were very low. Guilford<sup>111</sup> indicates that a chi-square value should be interpreted with extreme caution if any of the expected cell frequencies is less than five. In this investigation, significant items with expected frequencies less than five were reevaluated before selection, by combining categories within a specific criterion where possible, or by combining the samples from phases I and II where both samples initially yielded significant values. Several items were eliminated because it could not be demonstrated that the significant chi-square values obtained did not arise as a result of the low expected frequencies. These items, which are labeled in Table 46 of Appendix III, are numbers 20, 60, 77, 90, and 133. Another advantage of eliminating items with expected frequencies less than five is that their correlations with other items for the purpose of factorization tend to produce distorted values because of the extreme eccentricity of cut utilized with dichotomous data.

It is interesting to note that despite the qualitative differences between

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<sup>111</sup>J. P. Guilford, Fundamental Statistics in Psychology and Education, 2nd ed. (New York, 1935), p. 279.

phases I and II, all selected inventory items showed significance at or beyond the five per cent confidence level in at least one criterion category in both phases, despite the fact that it would theoretically be possible for an item to be selected for factoring simply by meeting the selection criteria in all criterion categories within one phase alone.

### Reliability of the Experimental Inventory

Seven of the 195 items comprising the Recruit Personal History Inventory were repeated during the course of the questionnaire in order to obtain some measure of the reliability of the inventory. By number, the following items were identical: 21 and 26, 57 and 79, 106 and 135, 147 and 169, 158 and 178, 166 and 192, and 181 and 164<sup>112</sup>. Phi-coefficients were computed for each of these pairs and are reported in Table 25. Because of the ease with which counts

Table 25

Phi-coefficients between Like Items in the  
Recruit Personal History Inventory

Like items	Chi-square	Phi-coefficient
21 and 26	3102.5398	.925
57 and 79	2966.6844	.904
106 and 135	2796.0754	.878
147 and 169	2807.6200	.880
158 and 178	3321.5800	.957
166 and 192	3167.9000	.935
181 and 164	2621.7455	.850

<sup>112</sup>Numbered items comprising Recruit Personal History Inventory are shown in Appendix I.

could be obtained from I. B. M. cards, the data reported here is taken from the subsample of 3627 records comprising phase II.

It is probable that, in part, these high reliability coefficients reflect the fact that the like-items appear close together within the inventory. Although some relationship may exist between the phi-coefficient and the number of items separating the repeated questions, the values obtained are not due entirely to this variable.

Another approach to the problem of reliability consists in measuring the degree to which responses to certain of the inventory items are internally consistent. Internal consistency, as the term is applied here, is of two types, i. e. mutually inclusive items and mutually exclusive items. Mutually inclusive items are those in which the responses to one item of a pair should be included within the responses to the other item. Take, for example, the items numbered 88 (Have you ever held three or more full-time jobs?) and 45 (Have you ever held a full-time job?). Any recruit giving a positive answer to item 88 should also give a positive answer to item 45. Six such mutually inclusive pairs of items are listed in Table 26 and the percentage of agreement is reported. The percentages obtained, except that reported for the two items dealing with enuresis (74.3 %) are generally satisfactory and reflect acceptable reliability.

Mutually exclusive items are those in which the responses to one item of a pair should preclude responses to the other item. Take, for example, the items numbered 27 (Did you fail two or more grades in school?) and 74 (Did you fail just one grade in school?). A positive answer to either one of these items should result in a negative response being given to the other. Inconsistency

Table 26

Percentage of Agreement between  
Mutually Inclusive Items

Item pairs	Number of yes responses to first item	Number of yes responses reflected in second item	Per cent agreement
72 and 52	50	40	80.0
88 and 45	604	594	98.3
101 and 39	222	212	95.4
122 and 61	718	682	94.9
129 and 95	78	57	74.3
194 and 192	208	198	95.1

is reflected both in the percentage of positive answers to the second item in the pair for recruits giving positive answers to the first item, and the percentage of positive answers to the first item in the pair for recruits giving positive answers to the second item. Six such mutually exclusive pairs of items are listed in Table 27 as well as the percentage of agreement in terms of each item within the pair.

With the exception of item 42 (Do you seldom or never go to church?) and item 75 (Do you attend church fairly regularly?), all of the mutually exclusive items reported in Table 27 reflect acceptable reliability. Apparently those questions pertaining to regularity in church attendance are misleading in terms of their implication. On the other hand, those items pertaining to identification of religious belief are not delusive or ambiguous.

Six questions within the experimental inventory pertain to years of formal education. These questions, which are numbered 143, 59, 157, 158, 146, and 36,

Table 27  
Percentage of Agreement between  
Mutually Exclusive Items

Item pairs	Number of yes responses to first item	Number of yes responses reflected in second item	Per cent agreement
27 and 74	448	31	93.0
74 and 27	1003	31	96.9
42 and 75	1308	302	76.9
75 and 42	2390	302	87.3
13 and 16	734	3	99.5
16 and 13	157	3	98.0
3 and 4	36	2	94.4
4 and 3	1332	2	99.8
3 and 5	36	1	97.2
5 and 3	2125	1	99.9
4 and 5	1332	1	99.9
5 and 4	2125	1	99.9

are worded such that the responses to them should be mutually exclusive.

Table 28 reports the number of cases answering more than one question positively as well as the percentage of agreement for each school year. These results indicate that there is greater 'reliability' among recruits who completed a greater number of years of schooling than among those individuals whose schooling was limited. In other words, perceived ambiguity in the wording of the questions pertaining to educational achievement would seem to be greater among the less well endowed recruits. Generally, the percentages of agreement ob-

Table 28

## Agreement between Mutually Exclusive Items Reflecting Educational Achievement

Years of schooling	Less than 8 (143) <sup>a</sup>	8 (59)	9 (157)	10 (158)	11 (146)
8	22 (71.7) <sup>b</sup> (90.0) <sup>c</sup>				
9	10 (87.1) (97.3)	39 (82.4) (89.4)			
10	15 (80.7) (97.2)	19 (91.4) (96.4)	27 (92.7) (94.9)		
11	13 (83.3) (97.7)	24 (89.1) (95.8)	39 (89.4) (93.2)	93 (82.7) (83.9)	
12 <sup>d</sup>	21 (73.0) (99.0)	18 (91.8) (99.1)	9 (97.5) (99.5)	7 (98.7) (99.8)	30 (94.8) (98.5)
Number of Positive responses	78	222	371	539	580

<sup>a</sup>The number in parentheses in the stubhead is the number of the inventory item.

<sup>b</sup>The first number in parentheses in each cell represents the percentage of the column totals not contained in each row, and thus represents the percentage of agreement.

<sup>c</sup>The second number in parenthesis in each cell represents the percentage of the row totals not contained in each column, and thus represents the percentage of agreement.

<sup>d</sup>The total number of positive responses is 2135.



tained in comparing items pertaining to educational achievement, do not reflect acceptable reliability.

In addition to the obvious function of ascertaining stability of item responses, from one setting to another, the reported reliability figures serve the purpose of raising doubts as to the advisability of utilizing these inventory questions with low reliabilities for representing the factorial structure of the domain under investigation. Furthermore, the low reliabilities for some significant items make necessary their rewording to decrease ambiguity in the revised questionnaire. The consistency of test-retest responses, as another measure of inventory reliability, is discussed in the section entitled Independence of the Predictor Variables.

### The Original Hypotheses

The original twelve hypotheses predicted that questions designed to measure these psychological areas would yield significant differences between the criterion categories. In appendix I (page 211) the inventory items are listed according to the areas which they were designed to measure, and those items which were finally selected for factoring are labeled. None of the original hypotheses failed to produce some items which met the selection criterion for factoring. In Table 29 are listed the number of questions representing each hypothesis and the number and percentage of items from each category which were finally selected. Obviously, a comparison of the percentage of selected items in each area has meaning only in terms of the formulated questions and does not necessarily reflect the discrimination value of the psychological area.

The area of identifying information is relatively unproductive in terms of yielding significant items. The one exception to this is those questions

pertaining to age. These questions could have, with some justification, been included as measures of area I (emotional instability and immaturity). In terms of the criteria utilized to select questions as measures of recruit training adaptability, questions pertaining to marital status, religious affiliation, racial heritage, home location in terms of both geographical location and urban-rural location, and the possession of siblings, are relatively unproductive for eliciting predictive data. This is not to deny the value which such questions may possess in terms of specific aspects of success in recruit training, as may readily be seen by reference to Table 46 in Appendix III.

Table 29

## Distribution of Selected Items among Postulated Psychological Areas

Psychological area	Number of items	Number selected	Per cent selected
A. Identifying information	17	2	11.7
B. Peer relationships	11	5	45.4
C. Non-conforming behavior	19	16	84.2
D. Bodily complaints and preoccupation	20	12	60.0
E. Family relationships and stability	18	7	38.8
F. Authority figure relationships	11	6	54.5
G. Motivation for service	11	7	63.6
H. Pre-service achievements	23	15	65.2
I. Emotional instability and immaturity	35	20	57.1
J. Moral responsibility	18	5	27.7
K. Work attitudes and goals	12	9	75.0
L. Specific abilities	20	15	75.0

The psychological area labeled as moral responsibility also yielded a small percentage of significant items. There are probably several reasons for this. In the first place there was no literature available from which items

could be selected or which would give an indication of the feasibility of including such questions. Secondly, many of the questions purporting to measure moral responsibility are extremely obvious in their intent. It is difficult to compose questions in this area which yield the needed variability in subjects' responses.

The remaining ten categories were significantly productive in terms of the relatively high percentage of items which were found to bear a relationship to the criteria. Insofar as the assumption of relatedness of question to area is granted, it may be concluded that success in recruit training can be measured by pre-enlistment variables pertaining to these ten areas of psychological behavior.

Of the 215 variables used in the experimental questionnaire, only nine of the items (numbers 27, 36, 54, 59, 61, 91, 99, 122, and 202) were found to be significant at or beyond the five per cent level of confidence for all criteria in both phases of the investigation. These nine items pertain to four general areas, namely, age, school adjustment, arithmetical ability, and home adjustment. Recruits under 18 years of age, and particularly those younger than  $17\frac{1}{2}$  years, consistently experience more difficulty in every facet of recruit training than do their older peers. School adjustment, as measured by years of formal education, failing grades, and interest in school activities, is by far the most significant single indicator of a recruit's ability to meet training demands. Such highly significant items could form the basis of an investigation of selection criteria for use at recruiting offices.

### Comparison of Eastern and Midwestern Recruits

As pointed out in Chapter IV, phase II contained recruits from the eastern seaboard as well as from the Midwest. It was hypothesized that midwestern recruits are more successful in training than are those from the East. Table 30 depicts this comparison within the various criterion categories for a subsample

Table 30

Comparison of a Subsample of Eastern and Midwestern Recruits  
in Each of the Criterion Variables

Criterion	Per cent <sup>a</sup> East	Per cent <sup>a</sup> Midwest	Total <sup>b</sup> cases	$\chi^2$	Prob. Value
Psychiatric unacceptability	3.5	2.8	2317	1.129	.29
Military Indoctrination Co.	1.5	1.6	2243	.053	.82
Military Performance			2206	5.981	.13
Poor	3.5	2.2	63		
Fair	10.1	12.5	250		
Average	70.0	68.8	1530		
Excellent	16.4	16.5	363		
Classroom Performance			2205	2.900	.40
Poor	3.7	3.7	81		
Fair	21.5	18.7	443		
Average	50.6	53.0	1143		
Excellent	24.2	24.6	538		

<sup>a</sup>The percentage of cases within each group. There were 1144 cases comprising the recruits from the East and 1173 cases comprising the group from the Midwest.

<sup>b</sup>The sum of the East and Midwest groups.

of recruits from each geographical area. The results do not confirm the hypothesis since there are no differences significant at or beyond the five per cent

level of confidence between the two groups.

In order to ascertain whether or not there was a calibre difference between the eastern and midwestern recruits, the two groups were compared on the basis of GCT score and years of formal education. The difference in GCT score was significant at the .005 level of confidence, with the eastern recruits possessing lower scores than the recruits from the Midwest. Furthermore, it was found that recruits from the Midwest had completed a significantly greater number of years of formal education than recruits received from the East. This difference was significant at the .003 level of confidence. Apparently these significant calibre differences in recruit receipts from the two geographical areas were not sufficient to be manifested as differences in training performance. However, the mere fact that these differences did exist led to the possibility that at least some of the differences in significant items between phases I and II could be attributed to these geographical variations.

Comparisons were therefore made between eastern and midwestern recruits for those inventory items which showed the most marked shifts in terms of percentage of positive responses between phases I and II. Arbitrarily these comparisons were made on those items which showed a difference of six or more percentage points. The items investigated (refer to Table 45 in Appendix III) were numbers 4, 5, 11, 18, 27, 36, 41, 45, 62, 74, 91, 93, 99, 100, 130, 146, and 171. The direction and significance of the differences between the two geographical groups on these seventeen items are depicted in Table 31. At the five per cent level of confidence, no more than one item should manifest a significant difference between the two groups were it to be claimed that both samples came from the same population. Actually, it was found that eight of the

17 items manifested differences which were significant beyond the five per cent level of confidence. Note should be taken of items 100 and 146 where the obtained frequencies of positive responses, as compared with expected frequencies, for recruits from the East, were directionally inconsistent with the percentage shifts from phase I to phase II.

Table 31

Directional and Significance Differences between Eastern and Midwestern Recruits on Inventory Items Displaying the Greatest Percentage Shifts from Phase I to Phase II

Item number	Direction change <sup>a</sup>	Eastern recruits <sup>b</sup>	Significance <sup>c</sup>
4	Increase	Increase	Less than .001
5	Decrease	Decrease	Less than .001
11	Decrease	Decrease	Less than .001
18	Increase	Increase	Less than .001
27	Increase	Increase	Less than .001
36	Decrease	Decrease	.50
41	Increase	Increase	.10
45	Increase	Increase	.13
62	Increase	Increase	Less than .001
74	Increase	Increase	.14
91	Increase	Increase	.57
93	Increase	Increase	.80
99	Increase	Increase	.85
100	Decrease	Increase	Less than .001
130	Decrease	Increase	.80
146	Increase	Decrease	.02
171	Decrease	Decrease	.59

<sup>a</sup>Direction change of positive answers for the entire sample between phases I and II.

<sup>b</sup>Direction of the difference of observed frequencies for eastern recruits in comparison with midwestern recruits.

<sup>c</sup>Significance in terms of the probability value from a four-celled chi-square table.

The markedly significant differences found on items 4, 5, and 11, confirm the obvious fact that men recruited from the East come from more urban areas where it would be more likely that a higher percentage of Catholics would live. The significant difference on item 18 may result from the positive correlation of homesickness with educational and intellectual limitations, or it may simply bear a relationship to actual physical distance from home. The significant differences on items 36 and 146 simply support those statements already made as regards the more limited years of formal education for recruits from the East. The significant differences on items 62 and 100 are difficult to interpret without being excessively speculative.

The conclusions to be drawn from this data are that recruits from the East differ significantly from midwestern recruits as regards their responses to at least some of the experimental inventory items, and that it is probable that the differences in significant inventory items between phases I and II, which are discussed under the heading Item Significance Discrepancies Between Phases I and II of this chapter, are in part attributable to these geographical variations. The fact that not all of the marked shifts from phase I to phase II in percentage of positive inventory item responses can be attributable to the population of eastern recruits, verifies statements made in this chapter under the heading Selection of Inventory Items, as regards the importance of using the samples of both phases for the selection of questions for factoring.

#### Recording and Computational Errors

In any problem which deals with a large subject sample, errors are certain to be encountered in the transposition of raw data into analyzable form. This

is particularly true in the present problem because of the similarity of data recorded and the monotonous nature of the recording task.

The data for the sample comprising the first phase of the investigation were all recorded on 13 by 13 inch cards, similar to McBee key-punch cards. Each contained 252 holes punched near the perimeter of the card such that a punch could be used to extend the hole to the outer edge for signifying positive inventory item responses. Since this recording process was executed by not entirely dependable recruits, all of the 2568 records comprising this phase were checked by dependable corpsmen and by the author, with corrections being made where errors were found to exist. With assurance it can be stated that recording errors for this phase were negligible.

Statistical counts of the number of recruits comprising the various criterion categories and of the number of responses to the predictor variables were made, for phase I, by placing groups of cards on a metallic rod, which allowed those punched to the perimeter to be separated from cards with negative responses to the predictor variables. Spot checks of counts made in this manner indicated that errors never exceeded two per cent of the recorded values.

In order to facilitate item tabulations, the data for the sample comprising the second phase of the investigation were all recorded on standard I.B.M. punch cards. Approximately ten keypunch operators were utilized in the card-punching operation. It immediately became apparent that operators varied tremendously in the number of errors committed. On initial inspection the percentage of errors was too sizeable. For example, in one subsample, 60 per cent of the cards contained errors. These errors were not easily correctable for they were not infrequently compounded. For example, each position in the



first four rows of each card was used for recording, with a positive inventory item response resulting in a punch being made and a negative response yielding no punch. In recording 195 yes and no answers, a miscount of any number of yes or no answers in succession would almost always lead to errors in the remaining responses. The idiosyncracies of each operator were quickly ascertained and spot checks were made in those areas where he most frequently made errors. Usually this amounted to verifying a quarter to a half of the responses on each card. Frequently it was necessary to repunch entire cards. Satisfied that the majority of the errors were detected by this spot check method, and that few if any compounded errors finally existed in the cards, a subsample of 100 records were selected for item-by-item verification. Only five of the 100 cards contained any errors. Within these five cards there were 13 errors. Including all predictor and criterion variables, each card contained 217 entries. Thirteen errors in 21700 entries resulted in an error rate that was infinitesimally small.

Statistical counts for phase II were made by an I.B.M. card sorter. Periodic checks of card counts revealed that errors never exceeded one per cent. All the computations, including the 1720 chi-square operations and the 4186 inter-item correlations, were made on a Monroe desk calculator. Periodic checks of these calculations were made and errors were found to be practically non-existent.

#### Independence of the Predictor Variables

As explained in Chapter IV, two forms of the Recruit Personal History Inventory were administered and readministered to four groups of recruits for

the purpose of testing the hypothesis of experimental independence as regards the inventory items. The first form consisted of the 195-item experimental inventory, and the second form, composed only of the significant questions, numbered 101 items. Group A, which contained recruits who were given the short form twice, numbered 83 subjects; Group B, which was administered the long form both initially and subsequently, numbered 108 recruits; Group C, which received the short form initially and the long form later, contained 100 subjects; while Group D, which received the long form first and the short form secondly, numbered 88 subjects.

Although it was assumed that chance factors would operate to equate the four groups in terms of the intellectual or GCT variable, during the analysis of the data it became apparent that there existed a probable difference in inconsistency scores which was dependent upon GCT level. To investigate this relationship, each of the four groups was subdivided into approximate quartiles on the basis of the inconsistency score, and a mean GCT was computed for each quartile. These results are reported in Table 32. From an inspection of these results, it is obvious that GCT is negatively correlated with inconsistency score and that memory of previous responses, which it is assumed is positively correlated with GCT score, plays a large role in influencing test-retest reliability. Such a finding makes it mandatory that no significant difference exist between each of the four groups as regards their mean GCT score.

An inspection of Table 33 reveals that not only was there a difference between groups in terms of mean GCT score, but also a difference in terms of standard deviation. The difference in the mean GCT score for Groups A and C (the largest inter-group difference) yielded a critical ratio of 3.79 and a

Table 32

Mean GCT Scores of Quartile Subgroups for Each  
Experimental and Control Group used for the  
Determination of the Independence of  
Predictor Variables

Group	N	Inconsistency score	Mean GCT score
A	18	10 plus	41.61
A	14	7 - 9	50.98
A	30	4 - 6	52.70
A	21	0 - 3	54.00
B	17	10 plus	51.12
B	33	6 - 9	51.82
B	31	3 - 5	51.94
B	27	0 - 2	58.70
C	20	12 plus	51.95
C	25	8 - 11	53.72
C	30	5 - 7	56.80
C	25	0 - 4	59.84
D	23	7 plus	52.39
D	13	5 - 6	54.62
D	26	3 - 4	55.31
D	26	0 - 2	55.73
Total	379		53.65

Table 33

Mean and Standard Deviation Values of GCT Scores for Experimental and Control  
Groups used for the Determination of the Independence of Predictor Variables

Statistic	Group A	Group B	Group C	Group D
Mean	50.33	53.46	55.82	54.57
Sigma	13.96	10.08	8.59	6.74

probability value less than .01.

Before analyzing differences in inconsistency scores between the four groups, subjects were equated on the basis of the GCT variable by selecting appropriate cases from each of the original four groups without regard for the inconsistency score possessed by each examinee. The statistics of the GCT scores for each revised or reconstituted group are reported in Table 34. The mean GCT and sigma differences between groups were thus small enough to be insignificant.

Table 34

GCT Score Statistics for Revised Experimental and Control Groups used for the Determination of the Independence of Predictor Variables

Statistic	Group A	Group B	Group C	Group D
Sum X	3735	3735	3742	3738
N	70	70	70	70
Mean	53.36	53.36	53.46	53.40
Sum $X^2$	202931	202695	203535	203146
Sigma	7.21	6.97	7.07	7.10

Mean inconsistency scores for each of the groups are reported, with other relevant statistics, in Table 35. Table 36 shows the significance of the differences between the group mean inconsistency scores. Significant differences were obtained between Groups A and C, and B and C in the direction of greater inconsistency for the group which completed dissimilar inventories. On the

Table 35

**Inconsistency Score Statistics for Experimental and Control Groups used for the Determination of the Independence of Predictor Variables**

Statistic	Group A	Group B	Group C	Group D
Sum X	414	421	544	321
N	70	70	70	70
Mean	5.91	6.01	7.77	4.59
Sum $X^2$	3784	3922	5708	2281
Sigma	4.37	4.46	4.60	3.40
Sigma of M	.53	.54	.55	.41

Table 36

**Critical Ratio and Probability Values for the Significance of the Difference between Mean Inconsistency Scores for Experimental and Control Groups used for Determination of the Independence of Predictor Variables**

Group	Group B	Group C	Group D
A	.13 ( .05)	2.42 (.02)	1.97 (.05)
B		2.29 (.03)	2.09 (.05)
C			4.61 ( .01)

other hand, significant differences were obtained between Groups A and D, and B and D in the direction of less inconsistency for the group which completed dissimilar inventories.

Since both of the experimental groups (Groups C and D) failed to manifest an increase in inconsistency score, the differences obtained must be due to the effects of order or other uncontrolled variables. This would be suggested by the difference between Group C (7.77) and Group D (4.59). The original hypothesis is supported, and the existence of item halo effects cannot be claimed. However, since the evidence presented here is not unequivocal, additional studies need be undertaken to clarify the existence of experimental independence.

As an indication of the test-retest reliability of the Recruit Personal History Inventory, Table 47 in Appendix III shows the percentage of recruits in each group who changed their answers on retest. The greatest amount of change was noted to occur on items numbered 18, 42, 43, 44, 68, 91, 112, 140, 145, 174, 181, 182, 186, 188, 189, and 195. With the exception of the above-mentioned questions, the percentage of recruits who changed their responses on reexamination was small. In terms of test-retest reliability, the results are considered favorable since the number of answer changes, for the most part, were not significant.

#### Data Preparation for Factorization

One hundred and nineteen items comprising the original experimental inventory met the selection criteria for inclusion in the factorization. This number was reduced because many of the items were measures of different segments of

the same variable or were duplicates of other items included for reliability purposes.

Items numbered 26, 79, 166, and 178 are duplicates of items numbered 21, 57, 192, and 158 respectively, were included within the original inventory only for reliability purposes, and were not included for the purpose of factorization.

Items numbered 27 (Did you fail two or more grades in school?) and 74 (Did you fail just one grade in school?) actually represent segments of a failure continuum and were therefore combined into a single variable designated school failure.

A number of items measure two aspects of single continua. In such cases the item used to represent the continuum was the one where the split in the distribution occurred as close to the middle as possible. Item 72 (Have you been fired from two or more jobs?) formed a segment of item 52 (Have you ever been fired from a job?); item 75 (Do you attend church fairly regularly?) was measured by item 42 (Do you seldom or never go to church?). Item 101 (Have you been expelled from school more than once?) represents a segment of item 39 (Were you ever expelled from school?); item 122 (Are you closer to your 17th birthday than your 18th) was dropped in favor of item 61 (Were you 17 years old on your last birthday?); item 129 (Have you wet the bed at all since you were 14 years old?) was eliminated in favor of item 95 (Have you wet the bed since you were 8 or 9 years old?); and item 194 (Have you been arrested more than once for reasons other than traffic violations?) was better measured by item 192 (Have you ever been arrested for reasons other than traffic violations?).

Items numbered 36, 59, 66, 143, 146, 157, and 158 all inquire into years of formal education. They were substituted by a single educational variable

such that the split in the distribution was placed between the 11th and 12th grades. The yes value included those recruits with schooling of 11 grades or less and comprised 42 per cent of the sample.

Items numbered 196, 197, 198, 199, and 200 all represent segments along the General Classification Test continuum which formed a single variable for the factorization. The split in the distribution was placed between item 197 and 198 such that the yes value included those recruits with scores below 46 and comprised 24 per cent of the sample. Similarly, items numbered 201, 202, 203, 204, and 205 formed the Arithmetic variable with the split in the distribution being placed between items 202 and 203, such that the yes value included those recruits with scores below 46 and comprised 29 per cent of the sample. Items numbered 206, 207, 208, 209, and 210 formed the Mechanical Ability continuum with the split in the distribution being placed between items 207 and 208, such that the yes value included those recruits with scores below 46 and comprised 28 per cent of the sample. Also, items numbered 211, 212, 213, 214, and 215 comprised the Clerical Aptitude continuum with the split in the distribution being placed between items 212 and 213 such that the yes value included those recruits with scores below 46 and contained 44 per cent of the sample.

As reconstructed, the number of each item preparatory to factorization is listed in Table 48 of Appendix III along with the original number of the item as it appeared in the Recruit Personal History Inventory.

In June of 1958 psychiatric unit policy, at the direction of the Psychiatric Branch of the Bureau of Medicine and Surgery, was revised as regards the retention within the service of recruits manifesting marked stammering and stuttering. Prior to that date such recruits were retained within the service



provided they possessed sufficient assets over and above their speech impediments. Subsequently it was strongly urged that such youths be discharged. It was hypothesized that this change in psychiatric standards would in the future render item 15 (Do you stutter or stammer?) a significant predictor variable. It was therefore included within the factorization even though it did not initially meet the selection criterion.

As mentioned previously, the data for the sample comprising the first phase of the investigation was recorded on McBee-like key-punch cards, while the data for the second phase were recorded on standard I.B.M. punch cards. Ideally the interitem correlations, preparatory to factorization, should be calculated from the entire sample of 6195 cases comprising the total of the two phases. Since the task of making item counts for the 4186 interitem correlations is an arduous one, the use of non-machine methods would have significantly increased the time required for the derivation of the data. Time requirements necessitated only the use of the data of phase II which was recorded on I.B.M. cards.

This procedure is not objectionable provided it could be demonstrated that there were no significant differences in the interitem correlations between phases I and II. The mere fact that there were differences between the two phases as regards significant items does not preclude a lack of difference correlationally and hence factorially.

To test the assumption that the differences in the interitem correlations between phases I and II were insignificant, the correlations of several variables were calculated for both phase I and phase II, together with the statistics required for their comparisons. These are depicted in Table 37.

Table 37

Data Pertaining to the Significance of the Differences in the Correlations Between Phases I and II for Selected Experimental Inventory Items

Item comparisons	Phase I		Phase II		<u>d<sub>r</sub></u>	C.R.
	<u>r<sub>t</sub></u>	<u>r<sub>t</sub></u>	<u>r<sub>t</sub></u>	<u>r<sub>t</sub></u>		
151 - 140	.25	.067	.33	.049	.083	.963
151 - 132	.24	.072	.20	.055	.091	.439
151 - 31	-.18	.054	-.08	.098	.112	.892
151 - 18	.31	.060	.30	.046	.076	.131
140 - 132	.14	.049	.17	.038	.062	.483
140 - 31	-.18	.037	-.18	.029	.047	.000
140 - 18	.06	.042	.11	.033	.053	.943
132 - 31	-.14	.040	-.10	.033	.051	.748
132 - 18	.12	.046	.08	.036	.059	.677
31 - 18	-.04	.035	-.02	.028	.045	.444

As any elementary statistics text points out, the standard error of a tetrachoric correlation is usually large despite a large N. Hence, differences between correlations must be great in order to conclude that a significant difference between them exists. The following, from McNemar<sup>113</sup>, is the formula used for the calculation of the standard error of a tetrachoric correlation;

$$\sigma_{r_t} = \frac{\sqrt{pq p' q'}}{z_x z_y \sqrt{N}} \sqrt{(1 - r^2) \left[ 1 - \left( \frac{\sin^{-1} r}{90^\circ} \right)^2 \right]}$$

<sup>113</sup>Q. McNemar, Psychological Statistics, 2nd ed. (New York, 1955), p. 200.

where  $p$  and  $q$  represent the proportion of cases in each segment of one of the dichotomized variables,  $p'$  designates, as does  $q'$ , the proportion of cases in each segment of the other dichotomized variable, and  $z_x$  and  $z_y$  stand for the ordinates in the normal curve at the points of division of the two variables.

According to Guilford<sup>114</sup>, the standard error of the difference between correlations is calculated by the formula:

$$\sigma_{r_{12} - r_{34}} = \sqrt{\sigma_{r_{12}}^2 + \sigma_{r_{34}}^2 - 2 r_{r_{12}r_{34}} \sigma_{r_{12}} \sigma_{r_{34}}}$$

where  $\sigma_{r_{12}}$  equals the standard error of  $r_{12}$ ,  $\sigma_{r_{34}}$  equals the standard error of  $r_{34}$ , and  $r_{r_{12}r_{34}}$  equals the correlation between samples of  $r_{12}$  and  $r_{34}$ . Since we are dealing with totally different samples, the correlation between  $r_{12}$  and  $r_{34}$  may be assumed to be zero.

Reference to Table 37 shows that of the ten correlation comparisons, none is significantly different even near the .05 level of confidence. On the basis of this limited evidence, the assumption of no significant difference between phases I and II as regards the interitem correlations is supported, and the use of the data of phase II as representative of the data of the entire sample for the calculation of the interitem correlations and the carrying out of the factor analysis would seem to be justified.

#### The Interitem Correlations

As pointed out in Chapter IV in the section entitled Selection of Significant Inventory Items and the Factor Analysis, the correlation of choice is the

<sup>114</sup>Guilford, p. 223.

tetrachoric  $r$ , provided the assumptions are not grossly violated. "The tetrachoric  $r$  requires that both X and Y be continuously variable, normally distributed, and linearly related."<sup>115</sup> The following discussion, without going into a lengthy item-by-item description, attempts to point out the probable underlying nature of some of the variables in question.

In the first place, there is very little doubt as to the continuous nature and the normality of the distributions of GCT, ARI, MECH, and CLER test scores. These tests have been devised such that the distribution of obtained scores does meet these criteria.

Reference to Table 19 clearly indicates that the distribution of formal education is skewed, with the median being shifted in the direction of high school graduation.

Since it is probable, particularly during the winter months, that the calibre of the Navy enlistees is below the calibre of youth in the nation as a whole, it is not unlikely that the variables represented by items numbered 39 (Were you ever expelled from school?), 52 (Have you ever been fired from a job?), 192 (Have you ever been arrested for reasons other than traffic violations?), and school grade failures, show a skewing of the distributions in the direction of the less desirable trait.

Items numbered 88 (Have you held three or more full-time jobs?), 63 (Were there five or more children in your family?), and 186 (Did you belong to any clubs or organizations outside of school - YMCA, CYO, Junior Achievement, 4-H, etc.?) probably have underlying distributions which are discrete, truncated,

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<sup>115</sup>Ibid., p. 332.

and skewed in the direction of the greater number of units for each variable.

Items number 25 (Do you have life insurance?) is no doubt a truly dichotomized variable, while item 61 which deals with age, is obviously truncated, since no recruits under 17 years of age enter the service.

The remaining items which for the most part require a subjective judgment in terms of degrees of affirmation and negation, more than likely are continuously distributed. "If a continuum is granted, the general law of unimodal distribution approaching normality in psychological traits may be cited in defense of the other requirement."<sup>116</sup>

It has been pointed out that some of the variables to be used in the factorization probably do not meet the assumptions required for the use of the tetrachoric  $r$ . The limitations of interpretation and analysis resulting from these somewhat faulty assumptions are judged to be less than those resulting from the use of the phi-coefficient and are not considered as posing serious objections to the validity of the results obtained.

The method used to estimate the 4186 tetrachoric correlations was based upon cosine-pi tables and correction graphs for non-median dichotomization by Perry, Kettner, Hertzka, and Bouvier<sup>117</sup>. This method required only the following operations after the counts in each four-celled table were obtained: (a) the multiplication of the frequencies in the like-cells, (b) the multiplication of the frequencies in the unlike-cells, (c) the division of the larger product

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<sup>116</sup>Ibid., p. 333.

<sup>117</sup>N. C. Perry et al., "Estimating the Tetrachoric Correlation Coefficient via I. A Cosine-pi Table and II. Correction Graphs for Nonmedian Dichotomization", Studies of Aptitudes of High-level Personnel, No. 2 (University of Southern California, Los Angeles, 1953).

by the smaller and designation of the proper sign dependent upon which cross-product was larger, (d) reference to the cosine-pi table to obtain the correlation, and (e) reference to the correction graphs to obtain the corrected tetrachoric correlation dependent upon the proportion of cases in each segment of each distribution. This method of obtaining the coefficients was more satisfactory than the use of the Thurstone<sup>118</sup> tables because of the ease with which those correlations could be determined where the split in the distributions was markedly one-sided.

The interitem tetrachoric correlations obtained for the 92 variables are given in Table 49 of Appendix IV.

### The Factor Analysis

Because of the virtual impossibility of factoring a 92 by 92 matrix by hand, the factorization was carried out on an electronic digital computer--the ILLIAC at the University of Illinois. By the method described in Chapter IV, twenty centroid factors were extracted. The projections of the test (i. e. item) vectors on the arbitrary orthogonal reference vectors are shown in the centroid factor matrix in Table 50 of Appendix IV. These 20 factors account for 98.96 per cent of the variance in the correlation matrix.

The 20th factor residuals are sufficiently small to indicate the completeness of the factorization. Only 79 (1.9 per cent) of the residuals are higher than .10, while five (.11 per cent) of them are .20 or higher.

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<sup>118</sup>L. Chesire, M. Saffir, and L. L. Thurstone, Computing Diagrams for the Tetrachoric Correlation Coefficient, (Chicago, 1933).

### Rotation to Simple Structure

Because of the enormous task of making rotations in a centroid factor matrix of this size, the initial adjustments to simple structure were made analytically by Oblimax, the ILLIAC program for automatic rotation to simple structure. The Oblimax solution was not entirely satisfactory. This finding was not surprising in view of a recent comparative study by Gocka<sup>119</sup> of some analytic methods of rotation where it was found that analytic methods gave results that only approximated graphical solutions. In the present study, therefore, and in order to meet the criteria for simple structure as given by Thurstone, the final rotations were made graphically. A complete set of the final plots is presented in Appendix IV (page 241). These, as well as all of the graphical rotations were made by plotting against each other, two at a time, the columns of each successively rotated factor matrix. The oblique factor matrix is given in Table 51 in Appendix IV.

Most of the diagrams in Appendix IV show a concentration of points at or near the origin with a grouping, in most cases, of at least several points along the two axes. Many of the factors are defined by a minimal number of inventory items, making the interpretation of most of the factors extremely difficult. The fact that many of the factors contain items with few high loadings suggests that the selected inventory items do not tend to be unique or "pure", but represent several parameters.

The projections of the items on the oblique reference vectors are listed in Table 52 of Appendix IV. The initial orthogonal centroid is related to the

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<sup>119</sup>E. F. Gocka, A Comparison of Some Analytic Methods of Rotation in Factor Analysis (University of Washington, Seattle, February 1959).

oblique simple structure solution by a transformation matrix which is presented in Table 38. The cosines of the oblique reference vectors, as well as the correlations between the obtained factors, are shown in Tables 39 and 40 respectively.

### Interpretation of the Factors

The following discussion involves the identification of those inventory items possessing high loadings in each factor, the definition of each factor, and a consideration of the reasonableness of the findings. In order to provide a clearer picture of the simple structure, all loadings less than .30 have been omitted. There are several reasons for this. In the first place, items with loadings less than .30 offer little in the way of a satisfactory definition of the factor because they contribute so little to the variance of the factor, particularly when they appear alone or with only a few other items which possess low loadings. Secondly, the chances of deriving uninterpretable factors is increased. Occasionally, when items with less than .30 loadings are used for interpretation, combinations of positive and negative attributes, in terms of service adaptation, occur as representative of the same pole of the factor. This produces a situation in which the factor has little utilitarian value for predicting adequate naval adjustment. In the following discussion, the number identifying each item represents its number in the original factor matrix.

### Factor A

This factor contains no items with loadings above +.29. It is considered to be a residual factor and is therefore uninterpretable.



Table 38

FINAL TRANSFORMATION MATRIX<sup>a</sup>

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
I	+08	-11	+01	+09	+02	+12	+07	+07	+08	+16	+08	+00	+06	+06	+06	+01	+02	+04	+11	+13
II	-03	-18	-05	+16	+05	+32	-02	+00	+09	-11	+03	-13	-02	+11	+16	-06	-12	-12	+04	-19
III	-01	-14	-16	-34	-18	-10	-06	+12	-04	+02	-18	+19	+13	+02	+05	+04	+00	+11	+03	-41
IV	-00	-38	+01	-16	+27	-13	+26	-06	+04	+08	-03	-24	+08	+18	+04	-11	-06	-15	+22	-24
V	-09	-31	-09	+34	-10	-05	-19	-17	+01	+05	-11	+05	-01	+22	+04	-17	+21	+05	-43	-02
VI	-14	+05	+24	-06	-10	+31	+01	-12	+08	+20	+26	+02	+09	-25	-07	+26	+13	+04	-24	-31
VII	+12	+47	-09	-25	+02	+23	-28	-36	+29	+21	+44	-27	-04	+16	+31	+06	+00	+01	-10	+30
VIII	+03	+10	-30	+13	-10	-10	+34	+05	+12	-13	-03	-18	+31	+15	+19	+05	-48	+15	-24	-20
IX	+10	+16	+34	+45	+11	-29	-24	+25	-32	+35	+06	+06	-19	+03	+08	+06	-02	+14	+11	-32
X	+40	-20	+19	-33	-31	+41	-13	-10	-10	+35	-09	+13	-22	-22	+12	-24	-15	-10	-31	+08
XI	+29	+20	-06	-26	+26	+44	+18	-25	-28	-35	-03	+27	+32	+35	+10	-04	+18	+02	-06	-06
XII	+34	+32	-20	+10	-11	+10	+28	+35	+01	+23	-02	-08	-47	+19	-55	-42	+39	+05	+13	-15
XIII	-37	+20	+16	-19	+33	+10	+09	+31	-09	+39	-19	-25	-08	+37	-10	-10	+13	-19	-17	+20
XIV	-23	-10	+33	-24	-29	-05	-40	-07	-21	-21	+46	-11	-16	+36	-19	-07	-14	+45	-19	+26
XV	+05	-20	+43	-02	-09	-15	-19	-04	+30	-42	-34	-11	-26	+14	+19	+20	+30	+04	-22	-23
XVI	+25	+21	+05	+15	+17	+30	-12	-05	+11	-20	-38	+05	+38	-17	-40	-31	-17	+10	+18	-22
XVII	+13	+11	+16	+12	-34	+13	-45	-29	+10	+06	+07	+44	+23	+41	-33	+52	-33	-38	+17	+19
XVIII	-56	+27	+24	+18	-15	+22	+11	-17	+17	-04	-26	+08	-11	+18	+36	-20	-11	-03	+43	-27
XIX	+00	-10	-45	-23	+21	+07	+18	-52	+07	-15	-11	+11	-30	+26	-14	+32	-32	+68	+06	+20
XX	+02	-15	+08	-15	-51	+22	+18	-25	-69	-02	-27	-62	-23	+00	-01	+28	+32	+17	+36	+03

<sup>a</sup>Decimal points have been omitted for all entries.

Table 39

COSINES OF THE OBLIQUE REFERENCE VECTORS<sup>a</sup>

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
B	+03																		
C	-23	-03																	
D	-10	+10	+11																
E	-04	+16	-27	+06															
F	+22	+26	+03	-31	-13														
G	-03	-01	-53	-09	+31	+03													
H	-03	+08	+13	+31	+20	-44	+18												
I	-09	+15	-13	+14	+26	-06	-11	-06											
J	+02	+19	+10	+06	-02	+04	-04	+35	-12										
K	-01	+18	+01	-12	-05	-06	-34	-07	+07	+23									
L	+19	+09	-03	+14	+09	+04	-32	-09	+28	-09	+02								
M	+06	+09	-15	+07	+24	+11	-01	-09	+17	-27	+01	+34							
N	-18	+13	-01	-09	+05	+08	-09	-25	-01	-14	+05	+00	-09						
O	-31	-12	+11	-05	+03	-03	+05	-20	+14	-08	+03	-17	+12	-08					
P	-08	-13	+06	-12	-24	-11	-23	-48	-06	-16	+16	+08	+09	+13	+09				
Q	+06	-01	+22	-03	-03	+02	+12	+28	-29	+09	-15	-32	-40	-08	-08	-20			
R	-04	-09	-26	-19	-03	-08	+10	-30	-20	-31	+06	-16	-32	+13	-09	+09	-12		
S	-10	+19	-03	+15	-02	+05	+25	-04	-19	-04	-27	-08	-03	+01	-13	+05	-04	-07	
T	+00	+09	-14	-30	-02	+07	-25	-29	-05	+10	+42	-06	-14	+20	-13	+19	-11	+04	-17

<sup>a</sup>Decimal points have been omitted for all entries.

Table 40

Correlations Between the Primary Factors<sup>a</sup>

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
A	100																			
B	-07	100																		
C	38	-03	100																	
D	08	-14	07	100																
E	-10	-03	-14	00	100															
F	-15	-36	-28	23	17	100														
G	24	01	69	17	-32	-27	100													
H	06	-27	-22	-02	-06	66	-25	100												
I	27	-31	31	-01	-33	07	21	21	100											
J	14	-19	24	-01	-21	-22	17	-19	36	100										
K	-03	-16	02	07	08	06	17	-09	-11	-25	100									
L	-04	-06	17	-02	-17	-04	33	04	-01	08	05	100								
M	18	-21	32	01	-39	-16	19	03	43	55	-16	-01	100							
N	28	-21	10	02	-20	-02	11	16	19	20	00	05	24	100						
O	29	-08	-09	05	-09	19	-10	41	08	03	-12	22	05	19	100					
P	01	-05	-17	08	16	47	-10	53	10	-09	-09	-05	-13	-02	12	100				
Q	01	-19	01	02	-21	-06	02	-03	36	33	01	21	50	14	11	00	100			
R	24	-27	32	12	-27	14	14	33	53	48	-19	18	62	17	28	09	40	100		
S	21	-38	05	-10	-09	12	-12	28	38	19	09	09	28	16	28	-01	28	39	100	
T	24	-20	37	24	-26	07	31	26	36	16	-29	21	38	06	28	00	15	45	26	100

<sup>a</sup>Decimal points have been omitted for all entries

## Factor B

<u>Item</u>	<u>Loading</u>
25. Did you belong to any clubs in school?	+.59
54. Were you ever elected to an office in any organization?	+.59
81. Did you belong to any clubs or organizations outside of school (YMCA, CYO, Junior Achievement, 4-H, etc.)?	+.54
82. Did you receive any awards in school or in any of the clubs to which you belonged?	+.52
22. Were you ever active in the Boy Scouts?	+.30
78. Do you have any plans for what you will do after you finish this hitch in the Navy?	+.30
84. Do you like to attend athletic events or read about them in the newspapers?	+.27

This factor possesses a sufficient number of items with high loadings, allowing for easy interpretation. Except for item number 78, all of these items deal with social activities which are outside the regular demands of daily living. Some of the questions not only imply membership in social organizations, but point to active group participation calling for leadership abilities and superior achievement. In keeping with these latter abilities is the attribute of planning and the definition of goals as portrayed by item number 78. Since the items comprising this factor reflect extracurricular activities, for the most part, it would seem reasonable to identify the factor as measuring Social Activity.

## Factor C

<u>Item</u>	<u>Loading</u>
3. Are you afraid of water?	+.45
6. Do you know how to swim?	-.44

These are the only two factored items which render an estimate of the ease or discomfort which a recruit experiences in association with water. Although these two items are at opposite ends of a continuum, defining a doublet, which well may be a factor of Familiarity with Water, the limited number of items with significant factor loadings makes such a definition highly speculative.

#### Factor D

<u>Item</u>	<u>Loading</u>
32. Did you have to quit school to go to work?	+.80
46. Did you quit school because of family problems?	+.69
91. Years of formal education - limited schooling.	+.32

These items reflect a factor of limited schooling due to external influences rather than influences within the individual himself such as limited ability. It is interesting to note that the other factored items dealing with reasons for quitting school, such as item number 39 (Did you quit school because you lost interest?) and number 43 (Did you quit school because you were failing?) have low negative loadings in this factor. Items numbered 39 and 43 would suggest that more intrinsic variables were responsible for the recruit's limited schooling. Also, the fact that these items do not possess high loadings in this factor indicates that Factor D is not merely one of limited schooling. For the sake of a better term, this factor can be identified as Limited Education Related to Extrinsic Variables.

## Factor E

<u>Item</u>	<u>Loading</u>
77. In order to make something of yourself, you must have pull. Do you agree?	+ .65
28. Do you often have trouble getting to sleep?	- .52

Because of the limited number of items with significant loadings, a definition of this factor would be unwise. However, on the basis of these two items, it may be hypothesized that this factor reflects the amount of personal involvement which an individual experiences in his relations with his environment. The positive end of the continuum reflects a carefree attitude and a lack of overt concern with self-determination, while the negative end portrays a Level of Anxiety suggestive of much personal involvement.

## Factor F

<u>Item</u>	<u>Loading</u>
91. Years of formal education - limited schooling.	+ .63
39. Did you quit school because you lost interest?	+ .62
43. Did you quit school because you were failing?	+ .54
92. Failing grades in school.	+ .53
47. Did your parents object to your quitting school?	+ .38

This factor is the antithesis of Factor D where limited schooling was due to external influences. In factor F limited schooling is related to more personal or internalized variables, which, in addition to the limited schooling, reflect failure and an inability to perform acceptably. It is interesting to note that intelligence or special abilities, such as scores on the four classification tests, are not related to this factor. As such, poor school

performance on this factor reflects a difficulty in the application of basic intellectual abilities rather than a defect in the ability itself. In contrast to Factor D, Factor F may be identified as Limited Schooling Related to Intrinsic Variables.

## Factor G

<u>Item</u>	<u>Loading</u>
10. Does talk of sex upset you?	+.53

This is the only item with a loading of .30 or higher in this factor, indicating the existence of a unique, independent parameter which probably pertains to sexual conflict. The existence of only a single item does not allow for a definition to be given to this factor.

## Factor H

<u>Item</u>	<u>Loading</u>
60. Did you have trouble getting along with teachers in school?	+.38
53. Have you often "told off" your teachers, boss, or father?	+.38
57. While working, did you often have trouble with the boss?	+.36
65. Do you often have trouble with your brother(s) and/or sister(s)?	+.33
69. If you saw someone breaking into a house, would you call the police?	-.32

These items clearly imply authority difficulty and a rebellious attitude, with disregard for social customs. Item number 12 (Were you ever expelled from school?), while possessing a loading of only +.27 in this factor, further substantiates this interpretation. On the other hand, item number 85 (Have you ever been arrested for reasons other than traffic violations?), which would be

expected to comprise this factor, also possesses a loading of only  $+ .10$ . At the negative end of the parameter, item number 69 reflects rebelliousness through passive-aggressive behavior. Authority Conflict would seem to be an appropriate label.

## Factor I

<u>Item</u>	<u>Loading</u>
90. Clerical score.	$+ .31$

Since the single item defining this factor possesses a loading of only  $.31$ , it is probably best to consider the factor as a residual and hence uninterpretable.

## Factor J

<u>Item</u>	<u>Loading</u>
59. Are you often bothered by pains in your heart or chest?	$+ .52$
19. Are you often bothered by dizziness?	$+ .43$
24. Are you often bothered by backpains?	$+ .42$
38. Do you have any physical or health problems?	$+ .31$

These items rather clearly define a somatic factor. While items numbered 17 (Are your teeth in poor condition?), 42 (Have you ever been bothered by "cold sweats"?), and 45 (Have you had any fainting spells in the last three years?) possess somewhat elevated loadings in this factor, namely  $+ .26$ ,  $+ .23$ , and  $+ .23$  respectively, items numbered 18 (Are you often troubled by headaches?) and 64 (Do you have trouble with constipation or diarrhea?), which are also clearly somatic, possess loadings of only  $+ .20$  and  $+ .21$  respectively. Nevertheless, the common denominator of these questions with significant loadings in this factor is Somatic Complaints.



## Factor K

<u>Item</u>	<u>Loading</u>
89. Mechanical score.	+.42
84. Do you like to attend athletic events or read about them in the newspapers?	+.33
87. General Classification Test score.	+.32

This factor more closely resembles the general intelligence parameter, isolated in other adjustment studies, than any of the other dimensions extracted in this investigation. It is important to point out that although this factor may be defined by intelligence, the type of intelligence implied is a practical, manually manipulative, performance variety with an emphasis toward extroverted activity, in contrast to the more introverted, verbal intelligence of the scholar or academician. Perhaps this factor may appropriately be labeled Practical Intelligence.

## Factor L

<u>Item</u>	<u>Loading</u>
44. Have you ever had a sexual experience with another man?	+.56
2. Do you stutter or stammer?	-.31

Because of the existence of only two items with significant loadings, a definition of this factor is not possible. Hypothetically, however, it would seem to be related to the Neurotic Expression of Aggression. On the one hand, the normal, masculine aggressivity has been denied, resulting in an identification of oneself with the passive, feminine role. At the other extreme, the aggression is markedly intense, but because of developmental problems, it has not been well integrated into the personality and is manifested in the form of

stuttering or stammering. Both the stutterer and the homosexual are lacking in self-confidence, possess a profound sense of personal inadequacy, and are fearful of any type of normal aggressive behavior. Although this discussion is highly speculative, it is offered as a tentative explanation of this factor.

#### Factor M

<u>Item</u>	<u>Loading</u>
40. Do your hands ever shake enough to bother you?	+ .59
2. Do you stutter or stammer?	- .37

Although both symptoms mentioned here may be considered as expressions of anxiety, Expressive Dysfunction would seem to be the common denominator of the two. It may arise from underlying tension, which at one end of the continuum is definitely channelized, while at the other end it is highly diffuse and non-specific. On the other hand, these two symptoms may represent aspects of motor disorganization, physical awkwardness, and a lack of adeptness in motor skills. Again, the limited number of items make a definite interpretation of this factor impossible.

#### Factor N

<u>Item</u>	<u>Loading</u>
62. Did you enlist in the Navy because you had nothing else to do?	+ .65
49. Did you enlist in the Navy because you were out of work?	+ .51

Both of these questions assess an individual's Motivation for Service and indicate that enlistment resulted from a dissatisfaction with existing status and conditions. The fact that items numbered 55 (Did you join the Navy primarily to make a man of yourself?) and 63 (Did you join the Navy mostly because

someone else wanted you to?) possess negligible loadings in this factor would seem to imply that Factor N deals with motivation of a specific variety, namely motivation for employment. However, because only two items possess sizeable loadings in this factor, such a specific definition is little better than a guess.

### Factor O

<u>Item</u>	<u>Loading</u>
7. Do you owe any-body any money?	+.49
83. Do you believe that the main reason for not doing the wrong thing is because you might get caught?	+.43

Item number 67 (When driving, do you sometimes speed when the cops aren't around?), although possessing a loading of only +.25, aids in the interpretation of this factor. It is hypothesized that the underlying dimension implied by these questions is the degree of Externalized Control which some recruits depend upon to guide their behavior. The individual answering these questions positively adapts poorly to the naval service because he finds difficulty in imposing restrictions upon himself. Too few a number of items, however, makes difficult a more positive definition of this dimension.

### Factor P

<u>Item</u>	<u>Loading</u>
8. Do you save money regularly?	+.49
33. Did you often play hookey from school?	+.48

As a result of a mistake in the original interitem correlations, the value reported for the correlation between items numbered 8 and 33 was +.30 instead of -.30. Because of this error it is probably best to leave this factor un-

interpreted.

#### Factor Q

<u>Item</u>	<u>Loading</u>
36. Have you ever been treated for your nerves?	+.67

This is the only item with a loading of .30 or higher in this factor, indicating the existence of a unique, independent parameter probably pertaining to psychiatric treatment. However, the existence of only a single item does not allow for a definition to be given to this factor.

#### Factor R

<u>Item</u>	<u>Loading</u>
61. Are you often bothered by nightmares or frightening dreams?	+.53
58. Have you walked in your sleep in the last three years?	+.43

Item number 30 (Do you awake frequently during the night?) with a loading of +.25 would seem to substantiate the existence of an underlying variable pertaining to Sleep Dysfunction. On the other hand, item number 28 (Do you have trouble getting to sleep?) possesses a negligible loading in this factor, possibly supporting the hypothesis that the former three items assess the existence of deep-seated emotional problems, whereas the latter pertains to more superficial or situational types of maladjustment. In any event, more items are needed to identify this factor unequivocally.

#### Factor S

<u>Item</u>	<u>Loading</u>
71. Do you believe that in order to be successful in life a man must make a lot of money?	+.47

## Factor S (continued)

<u>Item</u>	<u>Loading</u>
76. Do you think it is foolish to go to college when you could be making good money on a job?	+ .35
80. Did your parents like your brother(s) and/or sister(s) more than they liked you?	+ .30
70. Would you work hard at a low paying job just to get good experience?	- .47

Aside from question number 80, these items generally reflect work attitudes, an orientation toward material goals, and an inability to postpone gratifications in order to achieve long-range objectives. Perhaps item number 80 furnishes a partial answer to the etiology of such attitudes, namely the attempt to compensate for earlier childhood feelings of rejection through the quick attainment of material satisfactions. Nevertheless, it would seem justifiable to label this factor as Economic Orientation.

## Factor T

<u>Item</u>	<u>Loading</u>
74. Did you have difficulty in getting along with your father or stepfather?	+ .41
31. Do other people often take advantage of you?	+ .38
48. Has your father (stepfather) changed jobs often?	+ .36

Item number 35 (Do other fellows your own age often tease you?) with a loading of +.28, item number 51 (Do you have dates less often than most fellows your age?) with a loading of +.26, and item number 56 (Have you often been afraid of your father?) with a loading of +.26, further clarify the picture of a recruit who has accepted the values of either a weak or rejecting father and

has consequently experienced difficulties in interpersonal relationships, felt a lack of peer acceptance, and perceived himself as playing a passive, rejected role. The term Masculine Inadequacy would seem to be an adequate description of this factor.

Table 41 summarizes the descriptions given to the 20 factors. Some general comments concerning the results of the factorization would seem to be in order.

Table 41

Summary the Obtained Factors

Factor	Description
A	(Residual)
B	Social Activity
C	Familiarity with Water (Tenatively Interpreted)
D	Limited Education Related to Extrinsic Variables
E	Level of Anxiety (Tenatively Interpreted)
F	Limited Schooling Related to Intrinsic Variables
G	(Uninterpretable)
H	Authority Conflict
I	(Residual)
J	Somatic Complaints
K	Practical Intelligence
L	Neurotic Expression of Aggression (Tenatively Interpreted)
M	Expressive Dysfunction (Tenatively Interpreted)
N	Motivation for Service (Tenatively Interpreted)
O	Externalized Control (Tenatively Interpreted)
P	(Uninterpretable)
Q	(Uninterpretable)
R	Sleep Dysfunction (Tenatively Interpreted)
S	Economic Orientation
T	Masculine Inadequacy

In the first place, some of the factors are not clearly interpretable because of the small number of items, with significant loadings, comprising them.

Factors B (Social Activity), D (Limited Education Related to Extrinsic Variables), F (Limited Schooling Related to Intrinsic Variables), H (Authority Conflict), J (Somatic Complaints), K (Practical Intelligence), S (Economic Orientation), and T (Masculine Inadequacy) are fairly well defined and easily interpretable. Except for A and I, which would appear to constitute residuals, and Factor P, which could not be interpreted because of a computational error, the definition of the remaining factors is much more speculative.

The purpose of the exploration of the inventory by factor analytic techniques, namely to clarify the major parameters in a heretofore unmapped domain, has been achieved. The factor analysis has permitted the statement of some reasonable hypotheses concerning the basic dimensions of adaptation to recruit training. It would seem appropriate for further research to aim towards constructing new items corresponding to the speculative interpretations given to those less well defined factors for the purpose of verifying the definitions already supplied.

Because of the large number of factors extracted from the data, and because of some rather sizeable correlations between them, it may be possible to isolate more primary psychological variables through a second-order analysis. Table 40 reveals some tentative hypotheses concerning the types of second-order factors which would be expected to be elicited. Focusing attention upon those factors whose intercorrelations are equal to or greater than .50, and subsequently listing the other intercorrelations of those factors involved, the existence of three obvious clusters is revealed. These are shown in Table 42.

The interpretation of the first cluster is not unequivocally clear, but

Table 42

## Clusters and Intercorrelations of the Extracted Primary Factors

Cluster	Factors	$r^a$
I	C (Familiarity with Water) and G (Uninterpretable)	+.69
II	F (Limit. School.-Intrinsic Variables) and H (Authority Conf.)	+.66
	H (Authority Conflict) and P (Uninterpretable)	+.53
	F (Limited Schooling - Intrinsic Variables) & P (Uninterp.)	+.47
III	I (Residual) and R (Sleep Dysfunction)	+.53
	J (Somatic Complaints) and M (Expressive Dysfunction)	+.55
	M (Expressive Dysfunction) and R (Sleep Dysfunction)	+.62
	M (Expressive Dysfunction) and Q (Uninterpretable)	+.50
	I (Residual) and M (Expressive Dysfunction)	+.43
	I (Residual) and J (Somatic Complaints)	+.36
	J (Somatic Complaints) and R (Sleep Dysfunction)	+.48
	I (Residual) and Q (Uninterpretable)	+.36
	J (Somatic Complaints) and Q (Uninterpretable)	+.33
	R (Sleep Dysfunction) and Q (Uninterpretable)	+.40

<sup>a</sup>Intercorrelation of the primary factors.

the extremely high correlation existing between these two factors (Familiarity with Water and Sexual Conflict) leads to the suspicion that Factor C, originally labeled as Familiarity with Water, may in part be a measure of a phobic reaction in a specific situation. At least when it is recognized that it bears such a high relationship to Factor G, such an interpretation becomes plausible. Factor P was uninterpreted because of the computational error, but the two items comprising this factor reflect social conformity. With this interpretation in mind, the second cluster is rather clearly one of delinquency or psychopathy. The third cluster could appropriately be labeled as bodily dysfunction. Hence, there is reason to believe that a second-order factoriza-



tion would reduce the number of parameters originally isolated as well as provide factor groupings that are more definitive and therefore more easily interpreted. By reducing the number of adjustment parameters, a more workable framework could be established within which the examiner could phrase questions for the initial clinical examination and the researcher construct tests which could be weighted in a regression equation for prediction purposes.

### The Personal History Record

It was perhaps presumptuous to have anticipated that an exploratory study of this type would have resulted in the derivation of a limited number of clearly defined dimensions from which adaptability to recruit training could be predicted. Although the original design of the investigation was predicated upon this assumption, the results of the factor analysis have clearly indicated that a definition of the factor space by a fewer number of parameters is mandatory before multiple regression procedures can be applied for prediction purposes.

Owing to the practical and rather urgent need for a screening instrument more valid than the Standard Medical Screening Form A, the 92 significant variables from the Recruit Personal History Inventory were cast into a new format which was labeled Personal History Record. A copy of this form appears in Appendix I. Because of the results of the reliability studies with the Recruit Personal History Inventory and because of administrative and clerical necessities, the actual format of the Personal History Record was different than that of the Recruit Personal History Inventory. For example, those items of the Recruit Personal History Inventory which pertained to educational level, and which were found to be somewhat ambiguous, were presented in an entirely different form on the Personal History Record. The first page of the Personal History Record contains identifying information, much of which has no predictive validity, but which is required for naval record purposes. Also, on the first sheet of the Personal History Record, information is requested from the recruit for use by the clinician during the followup examination, in the event the recruit is placed on trial duty. In other words, in addition to being an

initial screening questionnaire, the Personal History Record is a Psychiatric Unit folder for documents and examination notes on recruits recommended for service separation.

Because the number of extracted factors was too large to permit weighting in a regression equation, scoring of the Personal History Record was accomplished simply through the assignment of values of +1 or -1 to those items possessing high loadings in each of the obtained factors. Then, in order to maximize the differences in the scores between the criterion groups, slight adjustments were made in these values depending upon the individual item validities. Such a system for deriving item values falls short of being ideal, but it does represent a fair approximation to the actual variance contributed by each of the items.

#### Clinical vs. Statistical Prediction with the Personal History Record

As described in Chapter IV, the Personal History Record was administered to all recruits--a total of 2429 men--who entered training during November of 1959. To obtain an estimate of the validity of the Personal History Record, both as a scored screening test and as an adjunct for the clinician during the initial psychiatric evaluation, the judgments of trial duty--full duty by both procedures were made independently and filed for later tabulation against the criterion of discharge-graduation from recruit training. Table 43 depicts the predictive validity for each clinician and the scored Personal History Record.

Although the interviewers, as a group, and the scored inventory placed a similar percentage (26.3 and 27.6 respectively) of recruits on trial duty, in terms of recruits actually discharged from service, the interviewers had

Table 43

Comparisons of the Predictive Validity of Individual Interviewers  
and the Scored Personal History Record

Screening technique	No. of recruits screened	% placed on trial duty	No. of recruits discharged	% discharged recruits on trial duty	$\chi^2$	p
Inter. A	562	31.5	23	73.9	20.24	.001
P. H. R.	562	25.6	23	56.5	11.98	.001
Inter. B	208	30.8	11	54.5	3.04	.05
P. H. R.	208	29.8	11	54.5	3.33	.05
Inter. C	252	30.6	9	88.9	14.54	.001
P. H. R.	252	28.9	9	66.7	6.48	.01
Inter. D	645	24.9	29	48.3	8.94	.001
P. H. R.	645	29.1	29	55.2	9.80	.001
Inter. E	207	25.1	8	87.5	17.33	.001
P. H. R.	207	25.1	8	75.0	11.09	.001
Inter. F	555	19.5	38	57.9	38.40	.001
P. H. R.	555	27.0	38	63.2	26.84	.001
All Inter.	2429	26.3	118	62.7	85.02	.001
All P. H. R.	2429	27.6	118	60.2	66.16	.001

correctly identified 62.7 per cent, while the scored inventory correctly identified 60.2 per cent. The accurate and inaccurate judgments of both methods were cast into a four-celled contingency table which yielded a chi-square value of 1.392 and a probability value of .25, indicating that neither of the initial assessment techniques was more valid than the other. As regards the comparisons of each individual clinician with the scored Personal History Record, it is noted that some of the clinicians predict more validly than the

actuarial technique, although these results must be interpreted with caution because of the small numbers in some of the cells.

Two aspects of this investigation require comment. In the first place, the Personal History Record used for actuarial prediction, although yielding valid results, has failed to achieve a level of predictive accuracy which would warrant its wholehearted acceptance as a valuable tool for initial psychiatric assessment. Without studies comparing the predictive validities of the Personal History Record and the Standard Medical Screening Form A, it is not possible to judge the relative merits of each instrument. Although, in terms of the procedures used for the derivation of the two instruments, the Personal History Record has been subjected to a more careful item analysis, the predictive validity reported here for this instrument hardly compares favorably with that reported for the Standard Medical Screening Form A in 1953 and 1956.

Secondly, the clinical and statistical comparisons, utilizing the Personal History Record, yield results which are little different from those reported in Chapter I for the scored Standard Medical Screening Form A. In other words, despite the lengthy experimental procedures utilized in the derivation of the Personal History Record, it has not been possible to better the clinician's judgment--at least not in terms of the discharge-graduation criterion.

## CHAPTER VI

### SUMMARY AND CONCLUSIONS

The goals of this investigation were: (1) to derive a valid psychiatric screening questionnaire for use in the initial assessment of recruits entering training in the U. S. Navy; (2) to study the predictive efficiency of an actuarial method of initial screening in relation to clinical methods which had been in use heretofore; and (3) to investigate those psychological factors, in the sense of factor analysis, which are related to the performance of recruits in basic training. It was anticipated that the number of derived factors or dimensions, predictive of successful recruit adaptation, might be such that multiple regression techniques would be applicable for the weighting of the obtained factors.

Impetus for the major study emanated from a series of investigations conducted between 1953 and 1956. These pilot studies indicated that the initial clinical psychiatric assessment, rendered all recruits at the time of their entrance into the Navy, lacked practical validity, particularly when contrasted with accuracy-of-prediction rates reported during World War II; that the reliability of the initial clinical evaluation was hardly of sufficient magnitude to merit wholehearted acceptance of the procedure as a predictor of a recruit's service adjustment; and that actuarial techniques applied at the time of this initial assessment would render at least as valid predictions.

These findings gave credence to the value of pursuing the development of more valid actuarial procedures.

Differences in the predictive validity of initial psychiatric assessment during World War II and the present time were considered to be attributable primarily to differences in recruit motivation and to marked shifts in the average age of recruits enlisting in service. Accompanying these changes were differences in the psychiatric diagnoses of recruits separated from service--shifts from the diagnoses of mental deficiency, neurologic disorder, psycho-neurosis and psychosis during World War II to diagnoses of character and behavior disorders among present-day discharged populations. Such evidence was considered to substantiate the position that the screening methodologies and psychiatric questionnaires of the World War II era are in need of overhaul and revision.

The assumptions underlying neuropsychiatric selection as it was practiced during World War II were scrutinized in the light of objective evidence gathered during the last seven years, and the conclusion was drawn that this rationale is no longer tenable. The basis of this conclusion stems from the fact that selection in the psychiatric units today is based upon an evaluation of the total functioning potential of the individual, including his motivation, attitudes, and special abilities, as well as the more limited psychological dimensions of adjustment.

The initial clinical examination, reliance upon referrals from company commanders and other recruit training personnel, the utilization of projective techniques, and the contribution of sociometric procedures have been discussed and criticized as methods of psychiatric assessment. The lack of adequate

validity of some of these alternative techniques, and the questionable utilitarian value of others, was considered as justification for the pursuit of research within the area of questionnaire development.

On the basis of studies conducted since World War II, 12 psychological areas were considered to be of importance for the selection of items to comprise an experimental inventory. These areas were labeled: (1) identifying information, (2) peer relationships, (3) non-conforming behavior, (4) bodily complaints and preoccupation, (5) family relationships and stability, (6) authority-figure relationships, (7) motivation for service, (8) pre-service achievements, (9) emotional instability and immaturity, (10) moral responsibility, (11) work attitudes and goals, and (12) specific abilities. Items selected as measures of these areas were cast into a yes-no format and the derived experimental questionnaire was named the Recruit Personal History Inventory.

The 195-item experimental questionnaire was administered to 20,000 recruits, in daily groups of less than one-hundred men, on the first day of their arrival at the U. S. Naval Training Center, Great Lakes from 8 June 1957 through 27 December 1957. To assure standardized administration and to facilitate comprehension by these recruits with reading deficiencies, all directions and questionnaire items were pre-recorded, with the same record being utilized during each testing session. Following the administration, the questionnaires were filed until the recruits were either graduated from training or discharged from service. This procedure prevented the psychiatric unit staff members from having their judgments contaminated by knowledge of questionnaire responses.

Four criteria of recruit training success were utilized in this study.



(a) The psychiatric unacceptability criterion was defined by those recruits who, on the basis of a clinical examination, with or without poor performance in training, were deemed to be unsuitable for naval service by the examining psychologist or psychiatrist, and so adjudged by a Naval Aptitude Board, resulting in their service separation. (b) The military performance continuum was defined by a recruit's military bearing, performance in military drill, acceptance of discipline, cleanliness, and ability to get along with the other men. As a measure of this performance, each company commander (a Chief or First Class Petty Officer) was instructed to rate each of his men along a continuum composed of four categories (excellent, average, fair, and poor). The reliability of the company commander ratings was determined by ascertaining the similarity of ratings made on two separate occasions for a group of 10 companies containing 570 recruits. As 80 per cent of the first and second ratings were identical, with only two of those which differed being changed by two categories, acceptable reliability was attributed to the company commander ratings. (c) The Military Indoctrination Company contained recruits whose performance during the course of training had been very marginal but not totally unacceptable. Recruits are assigned to the Military Indoctrination Company by line officers for a two week period of specialized instruction designed to improve the recruit's military performance. All recruits meeting the criterion of assignment to this company were later graduated from training. (d) The classroom performance criterion was defined as a recruit's knowledge of those subjects taught in training--the history, purpose, mode of operation, etc. of the Navy. It was measured in this investigation by a composite score derived from six weekly test grades and a recruit final achievement test score.

Depending upon this classroom score, recruits were assigned to one of four categories (excellent, average, fair, and poor). A corrected coefficient of contingency of  $+ .256$  was obtained between military and classroom performance, and although representing a significant relationship, was not considered to be of sufficient magnitude for exclusion of one or the other criterion in the study.

The sample of records utilized in the determination of the significance of the items comprising the Recruit Personal History Inventory numbered 6,195 cases. To investigate differences in the significance of the inventory items from the summer to fall seasons, the sample was divided into two phases-- phase I consisting of the recruits entering training from 8 June through 31 August and phase II extending from 1 September through 27 December. A comparison of the inventory responses and an examination of the composition of the criterion categories for recruits in the two phases indicated that (1) recruits entering the Navy during the summer possess higher GCT scores on the average, have completed more years of formal education, and are more successful in their recruit training performance; (2) there is a significant difference in the discriminatory value of inventory items depending upon fluctuations in the calibre of recruit receipts; and (3) recruits from the eastern seaboard, although possessing lower GCT scores, and having completed fewer years of formal education, are as successful in recruit training as recruits from the Midwest.

The reliability of the experimental questionnaire was ascertained by four different procedures. (1) Seven of the 195 inventory items were repeated within the questionnaire. Phi-coefficients were computed for each of these pairs and yielded correlations ranging from  $+ .85$  to  $+ .96$ . (2) Some of the inventory

items were designed to yield answers which logically should be mutually inclusive. For example, a positive answer to the first of the following questions should also result in a positive answer being given to the second: (a) Have you held three or more full-time jobs? and (b) Have you ever held a full-time job? The percentage of agreement between six pairs of mutually inclusive items ranged from 74.3 to 98.3. (3) Other inventory items were designed to yield answers which logically should be mutually exclusive. The percentage of agreement between 12 pairs of these items ranged from 76.9 to 99.9. (4) Finally, a group of 108 recruits was administered the inventory twice during a period of three days to obtain a measure of test-retest reliability. The percentage of agreement of the inventory responses between the two testing sessions ranged from 75.0 to 100. An investigation of item halo effect yielded results which were not supportive of the premise that the inventory item responses are dependent upon one another.

Chi square was utilized as the test of significance in ascertaining the discriminatory value of the 215 predictor variables in terms of the four criteria for both phases of the investigation. Selection of items for the subsequent factorization was made on the basis of their statistical significance in discriminating the four criteria. The psychiatric unacceptability criterion was given the greatest weight because of its importance as regards the general mission of the Psychiatric Unit. Ninety-two items met the selection criterion.

The eight areas of psychological development and performance in which more than 50 per cent of the items met the selection criterion were: (a) non-conforming behavior, where the significant questions concerned failure, expul-

sion, and loss of interest in school, non-church attendance, and arrests; (b) bodily complaints and preoccupation, measured by significant questions related to symptoms such as headaches, dizziness, backpains, fatigue, tremulousness, fainting spells, and heart or chest pains; (c) authority-figure relationships, exemplified by items pertaining to experiences with father and teachers; (d) motivation for service, containing items dealing with the reasons, planning, and individual initiative which prompted the recruit's enlistment; (e) pre-service achievements, measured by items related to sports participation, educational advancement, membership in clubs, and employment; (f) emotional instability and immaturity, as reflected by items such as those referring to stuttering, fears, homesickness, homosexuality, enuresis, treatment for emotional problems, somnambulism, nightmares, and impulsive behavior; (g) work attitudes and goals, assessed by questions dealing with the purpose of employment, individual initiative in a work situation, and employment plans; and (h) specific abilities, measured by GCT, ARI, MECH, and CLER scores.

Only seven of the 195 items showed chi-square values which were not significant at or beyond the .05 level of confidence for any of the criteria in either of the two phases of the investigation. These items are the following:

- (1) Is your mother living?
- (2) Are you Protestant?
- (3) Do you have any children?
- (4) Do your parents often argue or fight?
- (5) Was (is) your father in the Navy?
- (6) Do you feel closer to your mother than to your father?
- (7) Do you enjoy being with boyfriends more than with girlfriends?

On the other hand, eight of the items were significant at or beyond the .05 confidence level in differentiating all four criteria for both phases of the investigation. With one exception these questions all deal with some aspect of schooling or chronological age. These eight questions are the following:

- (1) Did you fail two or more grades in school? (-)<sup>120</sup>
- (2) Did you complete high school? (+)
- (3) Have you ever run away from home? (-)
- (4) Did you complete only eight years of schooling? (-)
- (5) Were you 17 years old on your last birthday? (-)
- (6) Did you quit school because you lost interest? (-)
- (7) Did you quit school because you were failing? (-)
- (8) Are you closer to your 17th birthday than your 18th? (-)

The chi-square values for some of these items were indeed sizeable, ranging up to 379.08 for an eight-celled table for item number (2).

None of the questions dealing with sexual attitudes and practices, except for the item which inquired about homosexuality, was significantly related to enough of the criteria to warrant selection for the factorization. The experimental inventory items pertaining to sports participation yielded directionally inconsistent chi-square values. While recruits who reported that they had taken an active part in sports activities in school, including the captaining of a team, performed significantly better in the military as-

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<sup>120</sup>A (+) following the question means that a positive answer is indicative of success, while a (-) means that a positive answer is predictive of failure or poor performance.

pects of training and were significantly less apt to fall into the psychiatrically unacceptable category, their performance according to the classroom criterion was significantly poorer. Because these questions were not predictive of good performance for all of the criteria they were not included in the factorization. On the other hand, the experimental inventory item, "Do you like to attend athletic events or read about them in the newspapers?", did yield directionally consistent results and was included in the factorization.

The tetrachoric correlation was chosen to express the relationship between the dichotomized predictor variables for the factorization. Thurstone's centroid method was used to extract twenty factors from the 92 by 92 correlation matrix and rotation to simple structure was undertaken to arrive at a meaningful interpretation of the results. Eight of the twenty factors were clearly interpretable and these were labeled (a) social activity, (b) limited education related to extrinsic variables, (c) limited schooling related to intrinsic variables, (d) authority conflict, (e) somatic complaints, (f) practical intelligence, (g) economic orientation, and (h) masculine inadequacy. Five of the factors could not be interpreted, while the remaining seven were tentatively designated as (a) familiarity with water, (b) level of anxiety, (c) neurotic expression of aggression, (d) expressive dysfunction, (e) motivation for service, (f) externalized control, and (g) sleep dysfunction.

The 92 significant items which were used for the factorization were cast into a new format which was labeled Personal History Record. This inventory was administered to 2429 recruits who entered training during November of 1959, and comparisons were made between the predictive validity of the scored questionnaire--based upon the assignment of values to the items differentiating

each of the twenty factors--and that of clinicians utilizing the unscored Personal History Record as a screening adjunct. The results indicated that neither prediction technique was more than moderately successful in labeling those recruits who were subsequently discharged from service during recruit training. However, in keeping with the results of the pilot studies, it was found that actuarial prediction was not significantly less valid than the clinical, although some individual clinicians were able to better the actuarial procedure.

In terms of the original goals of the investigation, a valid psychiatric screening questionnaire, the Personal History Record, has been devised, although the one cross-validated investigation did not yield results from which one could conclude that predictive efficiency had been enhanced. Secondly, comparisons have been made between clinical and statistical prediction, the results of which reinforce the position that the initial psychiatric assessment of recruits entering service can be as effectively carried out by mechanical means as by the use of the trained clinician. Thirdly, the exploration of pre-enlistment variables related to success in recruit training by factor analytic means has resulted in the delineation of some basic parameters and permitted the advancement of reasonable hypotheses concerning others.

Additional studies are indicated. A second-order factorization would undoubtedly reduce the number of primary factors to fewer, more fundamental psychological parameters. Such a reduction would allow for the construction of a factorially 'pure' questionnaire in which subscores from the various second-order factors could be combined in a regression equation to yield a better predictive estimate of a recruit's adaptability to recruit training.

Since the calibre of recruits received for training varies from season to season, and because the significance of certain inventory items varies with these calibre shifts, other cross-validational studies should be undertaken at other seasons of the year and with other criteria of successful performance.

Rather than pitting the scored Personal History Record against the clinician's initial psychiatric assessment, an investigation should be undertaken to measure possible improvements in the clinician's predictions which would be attributable to his utilization of the scored inventory. Such a combination of assessment procedures may raise the value of psychiatric screening from the present level of an educated guess to the position of a probable certainty, and regain for the clinician a role of integrity and merit.



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## QUESTIONNAIRES AND FORMS

Page 1

NAME \_\_\_\_\_  
 (LAST) (FIRST)  
 SERVICE # \_\_\_\_\_  
 BILLET \_\_\_\_\_

Date you arrived at G.L. \_\_\_\_\_

# RECRUIT PERSONAL HISTORY INVENTORY

U.S. NAVAL TRAINING CENTER

GREAT LAKES, ILLINOIS

DISPENSARY 172

X X

This booklet contains many questions about your private life and background. The doctors need this information so that they may better understand you and your abilities. The information which you give will be treated as confidential and is only available to medical personnel. This is not a test. Your answers are right or wrong only in terms of your truthfulness. Be as honest as you can. Remember it is to your advantage to answer each question honestly.

Answer each question YES or NO. Circle the correct answer on the line opposite each question. Make absolutely certain your answers are placed opposite the correct question. ANSWER ALL QUESTIONS. LEAVE NONE BLANK. If a question does not apply to you, answer it no, but be sure to answer the question. To make it easier for you to understand the questions they will be read to you one at a time. Answer all the questions only as they are read to you. DO NOT WORK AHEAD. DO NOT TALK, for questions cannot be repeated.

X X

<sup>a</sup>Classification test scores did not comprise the inventory.

## Page 2

1. Is your mother living?.....Yes...No
2. Are you married?.....Yes...No
3. Are you Jewish?.....Yes...No
4. Are you Catholic?.....Yes...No
5. Are you Protestant?.....Yes...No
6. Are you bothered by pimples?.....Yes...No
7. Is your father living?.....Yes...No
8. Does swearing upset you?.....Yes...No
9. Do you have any children?.....Yes...No
10. Do you usually like to work?.....Yes...No
11. Is your home located on a farm?.....Yes...No
12. Do you have any brothers?.....Yes...No
13. Are you underweight?.....Yes...No
14. Do you often daydream?.....Yes...No
15. Do you stutter or stammer?.....Yes...No
16. Are you much overweight?.....Yes...No
17. Are you afraid of water?.....Yes...No
18. Do you feel homesick now?.....Yes...No
19. Does noise bother you?.....Yes...No
20. Have you ever taken dope?.....Yes...No
21. Do you know how to swim?.....Yes...No
22. Do you have any sisters?.....Yes...No
23. Are you an adopted child?.....Yes...No
24. Do you often cuss or swear?.....Yes...No



25. Do you owe anybody any money?.....Yes...No

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

Page 3

26. Do you know how to swim?.....Yes...No

27. Did you fail two or more grades in school?.....Yes...No

28. Do people usually dislike you?.....Yes...No

29. Do you sometimes get drunk?.....Yes...No

30. Are you afraid of the dark?.....Yes...No

31. Do you save money regularly?.....Yes...No

32. Do you have life insurance?.....Yes...No

33. Are you Mexican, Negro, or Indian?.....Yes...No

34. Does talk of sex upset you?.....Yes...No

35. Do you easily "blow your top"?.....Yes...No

36. Did you complete high school?.....Yes...No

37. Do you believe there is a God?.....Yes...No

38. Do you ever talk in your sleep?.....Yes...No

39. Were you ever expelled from school?.....Yes...No

40. Are your parents living together?.....Yes...No

41. Is it sometimes alright to tell a lie?.....Yes...No

42. Do you seldom, or never go to church?.....Yes...No

43. Should a man work if he does not have to?.....Yes...No

44. Are you often tired in the mornings?.....Yes...No

45. Have you ever held a full time job?.....Yes...No

46. Do you usually go around by yourself?.....Yes...No

47. Do your parents often argue or fight?.....Yes...No
48. Are your teeth in poor condition?.....Yes...No
49. Was (is) your father in the Navy?.....Yes...No
50. Are you often troubled by headaches?.....Yes...No

**STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.**

Page 4

51. Are you often bothered by dizziness?.....Yes...No
52. Have you ever been fired from a job?.....Yes...No
53. Does handling guns frighten you?.....Yes...No
54. Have you ever run away from home?.....Yes...No
55. Were you ever active in the Boy Scouts?.....Yes...No
56. Do people hurt your feelings easily?.....Yes...No
57. Are you often bothered by back pains?.....Yes...No
58. Did you belong to any clubs in school?.....Yes...No
59. Did you complete only 8 years of schooling?.....Yes...No
60. Do people usually dislike you?.....Yes...No
61. Were you 17 years old on your last birthday?.....Yes...No
62. Are you a member of the U.S. Naval Reserve?.....Yes...No
63. Were there 5 or more children in your family?.....Yes...No
64. Is your home in a town under 17,000 people?.....Yes...No
65. Are you usually at ease around your friends?.....Yes...No
66. Have you had any schooling beyond high school?.....Yes...No
67. Do you often have trouble getting to sleep?.....Yes...No
68. Are you ever bothered by nervousness?.....Yes...No

- 69. Do you awake frequently during the night?.....Yes...No
- 70. Do other people often take advantage of you?.....Yes...No
- 71. Did you have to quit school to go to work?.....Yes...No
- 72. Have you been fired from 2 or more jobs?.....Yes...No
- 73. Do you respect your parents' opinions?.....Yes...No
- 74. Did you fail just one grade in school?.....Yes...No
- 75. Do you attend church fairly regularly?.....Yes...No

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

Page 5

- 76. Was your father (stepfather) often out of work?.....Yes...No
- 77. Have you ever had fits or convulsions?.....Yes...No
- 78. Did you often play hookey from school?.....Yes...No
- 79. Are you often bothered by back pains?.....Yes...No
- 80. Did your father want you to join the Navy?.....Yes...No
- 81. Was your father (stepfather) often sick?.....Yes...No
- 82. Do other fellows your own age often tease you?.....Yes...No
- 83. Would you tell a lie to help out a friend?.....Yes...No
- 84. Have you cried at all in the past year?.....Yes...No
- 85. Have you ever been treated for your nerves?.....Yes...No
- 86. Have you ever been away from home before?.....Yes...No
- 87. So far as you know, were you a healthy child?.....Yes...No
- 88. Have you ever held three or more full time jobs?.....Yes...No
- 89. Do you have any physical or health problems?.....Yes...No
- 90. Were you ever a patient in a mental hospital?.....Yes...No

91. Did you quit school because you lost interest?.....Yes...No
92. Do your hands ever shake enough to bother you?.....Yes...No
93. Do you think you will feel homesick in the Navy?.....Yes...No
94. Does it bother you to see someone else get hurt?.....Yes...No
95. Have you wet the bed since you were 8 or 9 years old?.....Yes...No
96. Do you feel upset when someone shouts at you?.....Yes...No
97. Have you ever been bothered by "cold sweats"?.....Yes...No
98. Do you often have trouble with your stomach?.....Yes...No
99. Did you quit school because you were failing?.....Yes...No
100. Do you usually take a bath or a shower once a day?.....Yes...No
101. Have you been expelled from school more than once?.....Yes...No

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

Page 6

102. Have you ever thought seriously of killing someone?.....Yes...No
103. Have you ever been divorced, widowed, or separated?.....Yes...No
104. Do you often play tennis, pool, pingpong, or bowling?.....Yes...No
105. Have you ever had a sexual experience with another man?.....Yes...No
106. Have you walked in your sleep in the last 3 years?.....Yes...No
107. Have you had any fainting spells in the last 3 years?.....Yes...No
108. Does your father (stepfather) drink a great deal?.....Yes...No
109. Are you satisfied with your physical development?.....Yes...No
110. Did you quit school because of family problems?.....Yes...No
111. Did you enlist in the Navy to keep from being drafted?.....Yes...No
112. Did your parents object to your quitting school?.....Yes...No

113. Does your family attend church fairly regularly?.....Yes...No
114. Did you enlist in the Navy to get away from home?.....Yes...No
115. Were you ever Captain of a sports team in school?.....Yes...No
116. Did you take an active part in church activities?.....Yes...No
117. Has your father (stepfather) changed jobs often?.....Yes...No
118. Did you enlist in the Navy because you were out of work?.....Yes...No
119. Have you ever thought seriously of killing yourself?.....Yes...No
120. Was your father (stepfather) often difficult to please?.....Yes...No
121. Do you plan at sometime to finish your education?.....Yes...No
122. Are you closer to your 17th birthday than your 18th?.....Yes...No
123. Do you believe hard work usually brings success in life?.....Yes...No
124. Do you feel closer to your mother than to your father?.....Yes...No
125. Do you have dates less often than most fellows your age?.....Yes...No
126. Would you tell a lie if it meant getting out of trouble?.....Yes...No
127. Do you feel you will have trouble making good in service?.....Yes...No

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

Page 7

128. Have you often "told off" your teachers, boss, or father?.....Yes...No
129. Have you wet the bed at all since you were 14 years old?.....Yes...No
130. Were you ever elected to an office in any organization?.....Yes...No
131. Did you join the Navy primarily to make a man of yourself?.....Yes...No
132. Have you often been afraid of your father (stepfather)?.....Yes...No
133. Does it upset you to get undressed in front of other men?.....Yes...No
134. While working, did you often have trouble with the boss?.....Yes...No

- 135. Have you walked in your sleep in the last three years?.....Yes...No
- 136. Do you believe it is best never to lend anything to anybody?.....Yes...No
- 137. Does masturbation (playing with yourself sexually) bother you?...Yes...No
- 138. Are you often bothered by pains in your heart or chest?.....Yes...No
- 139. Do you regularly use pills, creams, lotions, or ointments?.....Yes...No
- 140. Did you have trouble getting along with teachers in school?.....Yes...No
- 141. Were you ever in military service before you entered the Navy?...Yes...No
- 142. Did your parents suggest or want you to come into service?.....Yes...No
- 143. Did you go to the 5th but not beyond the 7th grade in school?....Yes...No
- 144. Are you often bothered by nightmares or frightening dreams?.....Yes...No
- 145. Did you enlist in the Navy because you had nothing else to do?...Yes...No
- 146. Did you complete only 11 years (Junior in H.S.) of schooling?....Yes...No
- 147. Do you enjoy being with boyfriends more than with girlfriends?...Yes...No
- 148. Did you join the Navy mostly because someone else wanted you to?.Yes...No
- 149. Do you have trouble with constipation or diarrhea (the runs)?....Yes...No
- 150. Do you often have trouble with your brother(s) and/or sister(s)?.Yes...No
- 151. Does being in a large group of people make you feel upset?.....Yes...No
- 152. When driving, do you sometimes speed when the cops aren't around?Yes...No

**STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.**

Page 8

- 153. Do you believe that the purpose of friends is to do things for you?.....Yes...No
- 154. If you saw someone breaking into a house, would you call the police?.....Yes...No
- 155. Do you feel that you are different than other fellows your age?..Yes...No

156. Would you work hard at a low paying job just to get good experience?.....Yes...No
157. Did you complete only 9 years (Freshman in H.S.) of schooling?...Yes...No
158. Did you complete only 10 years (Sophomore in H.S.) of schooling?...Yes...No
159. Do you believe that in order to be successful in life a man must make a lot of money?.....Yes...No
160. If a girl does not object, would you have sex relations with her?Yes...No
161. Would you have joined some other branch of the service if you could have?.....Yes...No
162. Have you ever been so nervous that you had to stay home for a rest?.....Yes...No
163. Were your parents divorced or separated after you were 12 years old?.....Yes...No
164. Did you join the Navy primarily to make a man of yourself?.....Yes...No
165. If you saw an auto accident, would you give your name as a witness?.....Yes...No
166. Have you ever been arrested for reasons other than traffic violations?.....Yes...No
167. Would you get drunk, provided your friends or parents did not see you?.....Yes...No
168. Do you believe the primary purpose of working is to make money?..Yes...No
169. Do you enjoy being with boyfriends more than with girlfriends?...Yes...No
170. Were your parents divorced or separated before you were 12 years old?.....Yes...No
171. Did you play football, basketball, baseball, or wrestle on a school team?.....Yes...No
172. Did you have difficulty in getting along with your father or stepfather?.....Yes...No
173. If you were in a hurry to go someplace, would you borrow an article of clothing from a buddy without asking him for it?.....Yes...No
174. Had you thought about enlisting for several months or longer before you did so?.....Yes...No

175. Would you have sex relations with another man's wife if she wanted you to?.....Yes...No
176. Would you take a cigarette or pencil or something of little value from someone if you needed it?.....Yes...No

**STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.**

Page 9

177. Is your home in one of the following states: The Virginias, the Carolinas, Kentucky, Tennessee, Arkansas, Missouri, Georgia, Alabama, Mississippi, or Louisiana?.....Yes...No
178. Did you complete only 10 years (Sophomore in H.S.) of schooling?.....Yes...No
179. Do you think it is foolish to go to college when you could by making good money on a job?.....Yes...No
180. Have you made any definite plans as to the type of work you want to do later in life?.....Yes...No
181. In order to make something of yourself, you must have pull. Do you agree?.....Yes...No
182. Do you have any plans for what you will do after you finish this hitch in the Navy?.....Yes...No
183. Do you believe it is necessary to have a good paying job before one gets married?.....Yes...No
184. Suppose you were to find a large sum of money. Would you attempt to find the owner?.....Yes...No
185. Did your parents like your brothers and/or sisters more than they liked you?.....Yes...No
186. Did you belong to any clubs or organizations outside of school (YMCA, CYO, Junior Achievement, 4-H, etc.)?.....Yes...No
187. Have you often felt that you would have liked someone else as your father (stepfather)?.....Yes...No
188. Did you receive any awards in school or in any of the clubs to which you belonged?.....Yes...No



189. Do you believe that the main reason for not doing the wrong thing is because you might get caught?.....Yes...No
190. Do you sometimes have thoughts or ideas you cannot put out of your mind?.....Yes...No
191. Do you like to attend athletic events or read about them in the newspapers?.....Yes...No
192. Have you ever been arrested for reasons other than traffic violations?.....Yes...No
193. Did you often do things you did not want to do simply to please your parents?.....Yes...No
194. Have you been arrested more than once for reasons other than traffic violations?.....Yes...No
195. Do you feel your brother(s) and/or sister(s) have accomplished more than you have?.....Yes...No

#### Classification Test Scores

196. GCT score from 22 - 35 inclusive
197. GCT score from 36 - 45 inclusive
198. GCT score from 46 - 55 inclusive
199. GCT score from 56 - 65 inclusive
200. GCT score from 66 - 77 inclusive
201. ARI score from 22 - 35 inclusive
202. ARI score from 36 - 45 inclusive
203. ARI score from 46 - 55 inclusive
204. ARI score from 56 - 65 inclusive
205. ARI score from 66 - 73 inclusive
206. MECH score from 23 - 35 inclusive
207. MECH score from 36 - 45 inclusive
208. MECH score from 46 - 55 inclusive
209. MECH score from 56 - 65 inclusive
210. MECH score from 66 - 77 inclusive
211. CLER score from 28 - 35 inclusive
212. CLER score from 36 - 45 inclusive
213. CLER score from 46 - 55 inclusive
214. CLER score from 56 - 65 inclusive
215. CLER score from 66 - 73 inclusive

STANDARD MEDICAL SCREENING FORM A  
PERSONAL INFORMATION

..... Billet or Process No. ....  
(Recruit Training Facility)

1. Name..... Today's date.....  
Last Middle First
2. Age..... Where were you born?..... Date of birth.....  
City State Mo. Day Year
3. Rate..... Circle one: USN USNR USNR-SV Serial number.....
4. Permanent home address.....  
Street or RFD City State
5. Where is your permanent home located? On a farm..... In a small town..... In a city.....
6. Where did you get your last medical exam for the service?.....
7. Check branch of service you really wanted: Air Force..... Navy..... Marine Corps..... Army..... Other.....
8. Are you now (check one): Single..... Married..... Widowed..... Divorced..... Separated.....
9. Do you have any children? Yes..... No..... How many living?..... How many dead?.....
10. Circle highest grade completed at school: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
11. Draw a line under any of the above numerals to show school grades you failed or repeated.
12. How old were you when you quit school?..... Your race? Caucasian..... Negroid..... Other.....
13. What is your religion?..... How often do you attend church? { regularly .....  
often .....  
seldom .....  
never .....
14. Where was your father born?..... How far did he go in school?.....
15. Where was your mother born?..... How far did she go in school?.....
16. Check if any of the following applies to your parents: Your age when this happened:  
Mother dead .....  
Father dead .....  
Parents separated .....  
Parents divorced .....  
I was adopted .....
17. How many brothers do you have?..... How many brothers older than you?.....  
How many sisters do you have?..... How many sisters older than you?.....
18. Did you ever play on an athletic team? Yes..... No..... Were you ever captain? Yes..... No.....
19. What sports have you taken an active part in:.....
20. What previous military service do you have?..... How long?.....  
(This includes National Guard or any Reserve time)
21. How many jobs have you had since you left school?.....
22. What was the longest you ever worked at any ONE full-time job?..... Years..... Months. What was it? .....
23. How did each of your parents (or guardian) feel about your enlistment? Check space below which shows their attitude.  
Refused to give Recommended Left it Liked the Recommended it  
permission against it up to you idea strongly  
Father: .....  
Mother: .....  
Guardian (if you had one): .....
24. What was the longest time you ever spent away from home? Years..... Months..... Days.....
25. If you weren't drafted, why did you enlist? .....

If your answer to a question is "Yes," place an "X" in the box to the left of the number.  
If your answer to a question is "No," leave the box blank.

- ☐ 1. Do you feel that you will have trouble making good in the service?
- ☐ 2. Are you ever worried or upset?
- ☐ 3. Have you ever been fired or asked to resign from a job?
- ☐ 4. Could you do more for your country in a civilian job than in the service?
- ☐ 5. Do you have any particular physical or health problem?
- ☐ 6. Did your parents bring you up more strictly than other kids?
- ☐ 7. Do you sometimes get violently angry without too good reason?
- ☐ 8. Are you ever troubled by a sick headache?
- ☐ 9. Are you deliberate about deciding on a course of action?
- ☐ 10. Are you very good in standing up for your rights?
- ☐ 11. Are you often at ease around your friends?
- ☐ 12. Do you ever feel you have more than your share of bad luck?
- ☐ 13. Did you ever go steady with one girl before age of 15?
- ☐ 14. Did you dislike going to school as a kid?
- ☐ 15. Are you bothered often by having an upset stomach?
- ☐ 16. As a kid did you feel you were often punished unfairly?
- ☐ 17. Did you ever have a very unusual experience such as a "miracle"?
- ☐ 18. Do you ever have pains in the heart or chest?
- ☐ 19. Do you feel dissatisfied unless you are among the best?
- ☐ 20. Insofar as you know, were you considered a very healthy child?
- ☐ 21. Do you resent others trying to advise you?
- ☐ 22. Do you prefer to go around by yourself?
- ☐ 23. Do you have dates less often than most fellows your own age?
- ☐ 24. Have you had to make undue sacrifices by coming into the service?
- ☐ 25. Have you ever been bothered by having nightmares or frightening dreams?
- ☐ 26. When you were punished, was it usually more severe than other kids got?
- ☐ 27. Did you ever look in a mirror and think you might be someone else?
- ☐ 28. Does your skin break out easily?
- ☐ 29. Would you prefer to go steady with a girl instead of playing the field?
- ☐ 30. Do you feel that petting without being engaged is wrong?
- ☐ 31. Do you feel that your life has been unsuccessful up to now?
- ☐ 32. Are you ever bothered with nervousness?
- ☐ 33. Do you have trouble making friends?
- ☐ 34. Do you feel that others have more of a personal stake in the emergency than you?
- ☐ 35. Have you ever had fainting spells?
- ☐ 36. Did you feel unable to ask your parents about very personal problems?
- ☐ 37. Have you ever smoked reefers or taken dope?
- ☐ 38. Have you ever been troubled by cold sweats?
- ☐ 39. As a kid did you have trouble stuttering or stammering?
- ☐ 40. Do you consider your friends to be your equals?
- ☐ 41. Does the thought of ever going into combat frighten you very much?
- ☐ 42. Do people usually misunderstand you?
- ☐ 43. Have you ever been in trouble for drinking?
- ☐ 44. Do you feel that the privileges you now enjoy are worth fighting for?
- ☐ 45. Do you often have trouble in getting to sleep?
- ☐ 46. Do you think you were loved more by one parent than the other?
- ☐ 47. Do you sometimes feel electric currents in your head?
- ☐ 48. Did you bite your fingernails often as a kid?
- ☐ 49. Have you wet the bed since you were 8 or 9?
- ☐ 50. Did you get into fights often as a kid?
- ☐ 51. Do people you know frequently dislike you?
- ☐ 52. Do you really like to fight?
- ☐ 53. Have you ever kept house for your father or some other man?
- ☐ 54. Do you feel that obligations of the military service are unfair?
- ☐ 55. Do your hands ever tremble enough to bother you?
- ☐ 56. Has anyone in your family ever had a nervous breakdown or been treated for their nerves?
- ☐ 57. Do you frequently drink just to get drunk?
- ☐ 58. Are you ever bothered by your hands sweating so they feel damp and clammy?
- ☐ 59. Did you ever have trouble with bed-wetting?
- ☐ 60. Do you get tight or drunk easily?
- ☐ 61. Do others often talk about you behind your back?
- ☐ 62. Do you often get down in the dumps?
- ☐ 63. Do you enjoy being with boy friends more than with girl friends?
- ☐ 64. Will your time in the service seriously hinder achievement of your personal goals?
- ☐ 65. Are you frequently bothered by back pains?
- ☐ 66. Were either of your parents often mean or unkind to you?
- ☐ 67. Do you often get unreasonably jealous of your friends?
- ☐ 68. Do you bite your fingernails now?
- ☐ 69. Do you feel that it was unfair for you to be called into the Service at this time?
- ☐ 70. Do you suffer from asthma or hay fever?

## REPORT OF MEDICAL HISTORY

THIS INFORMATION IS FOR OFFICIAL USE ONLY AND WILL NOT BE RELEASED TO UNAUTHORIZED PERSONS

1. LAST NAME—FIRST NAME—MIDDLE NAME		2. GRADE AND COMPONENT OR POSITION		3. IDENTIFICATION NO.	
4. HOME ADDRESS (Number, street or RFD, city or town, zone and State)		5. PURPOSE OF EXAMINATION		6. DATE OF EXAMINATION	
7. SEX	8. RACE	9. TOTAL YRS. GOVT. SERVICE MILITARY      CIVILIAN	10. DEPARTMENT, AGENCY, OR SERVICE		11. ORGANIZATION UNIT
12. DATE OF BIRTH		13. PLACE OF BIRTH		14. NAME, RELATIONSHIP, AND ADDRESS OF NEXT OF KIN	
15. EXAMINING FACILITY OR EXAMINER, AND ADDRESS			16. OTHER INFORMATION		
17. STATEMENT OF EXAMINEE'S PRESENT HEALTH IN OWN WORDS. (Follow by description of past history, if complaint exists)					

18. FAMILY HISTORY					19. HAS ANY BLOOD RELATION (Parent, brother, sister, other) OR HUSBAND OR WIFE:			
RELATION	AGE	STATE OF HEALTH	IF DEAD, CAUSE OF DEATH	AGE AT DEATH	YES	NO	(Check each item)	RELATION(S)
FATHER							HAD TUBERCULOSIS	
MOTHER							HAD SYPHILIS	
SPOUSE							HAD DIABETES	
BROTHERS AND SISTERS							HAD CANCER	
							HAD KIDNEY TROUBLE	
							HAD HEART TROUBLE	
CHILDREN							HAD STOMACH TROUBLE	
							HAD RHEUMATISM (Arthritis)	
							HAD ASTHMA, HAY FEVER, HIVES	
							HAD EPILEPSY (Fits)	
							COMMITTED SUICIDE	
							BEEN INSANE	

20. HAVE YOU EVER HAD OR HAVE YOU NOW (Place check at left of each item)								
YES	NO	(Check each item)	YES	NO	(Check each item)	YES	NO	(Check each item)
		SCARLET FEVER, ERYSIPELAS			GOITER			TUMOR, GROWTH, CYST, CANCER
		DIPHTHERIA			TUBERCULOSIS			RUPTURE
		RHEUMATIC FEVER			SOAKING SWEATS (Night sweats)			APPENDICITIS
		SWOLLEN OR PAINFUL JOINTS			ASTHMA			PILES OR RECTAL DISEASE
		MUMPS			SHORTNESS OF BREATH			FREQUENT OR PAINFUL URINATION
		WHOOPING COUGH			PAIN OR PRESSURE IN CHEST			KIDNEY STONE OR BLOOD IN URINE
		FREQUENT OR SEVERE HEADACHE			CHRONIC COUGH			SUGAR OR ALBUMIN IN URINE
		DIZZINESS OR FAINTING SPELLS			PALPITATION OR POUNDING HEART			BOILS
		EYE TROUBLE			HIGH OR LOW BLOOD PRESSURE			VENEREAL DISEASE
		EAR, NOSE OR THROAT TROUBLE			CRAMPS IN YOUR LEGS			RECENT GAIN OR LOSS OF WEIGHT
		RUNNING EARS			FREQUENT INDIGESTION			ARTHRITIS OR RHEUMATISM
		CHRONIC OR FREQUENT COLDS			STOMACH, LIVER OR INTESTINAL TROUBLE			BONE, JOINT, OR OTHER DEFORMITY
		SEVERE TOOTH OR GUM TROUBLE			GALL BLADDER TROUBLE OR GALL STONES			LAMENESS
		SINUSITIS			JAUNDICE			LOSS OF ARM, LEG, FINGER, OR TOE
		HAY FEVER			ANY REACTION TO SERUM, DRUG OR MEDICINE			PAINFUL OR "TRICK" SHOULDER OR ELBOW

21. HAVE YOU EVER (Check each item)				22. FEMALES ONLY: A. HAVE YOU EVER—				B. COMPLETE THE FOLLOWING:			
		WORN GLASSES			ATTEMPTED SUICIDE			BEEN PREGNANT			AGE AT ONSET OF MENSTRUATION
		WORN AN ARTIFICIAL EYE			BEEN A SLEEP WALKER			HAD A VAGINAL DISCHARGE			INTERVAL BETWEEN PERIODS
		WORN HEARING AIDS			LIVED WITH ANYONE WHO HAD TUBERCULOSIS			BEEN TREATED FOR A FEMALE DISORDER			DURATION OF PERIODS
		STUTTERED OR STAMMERED			COUGHED UP BLOOD			HAD PAINFUL MENSTRUATION			DATE OF LAST PERIOD
		WORN A BRACE OR BACK SUPPORT			bled excessively after injury OR TOOTH EXTRACTION			HAD IRREGULAR MENSTRUATION			QUANTITY: <input type="checkbox"/> NORMAL <input type="checkbox"/> EXCESSIVE <input type="checkbox"/> SCANTY
23. HOW MANY JOBS HAVE YOU HAD IN THE PAST THREE YEARS?				24. WHAT IS THE LONGEST PERIOD YOU HELD ANY OF THESE JOBS? MONTHS				25. WHAT IS YOUR USUAL OCCUPATION?			
								26. ARE YOU (Check one) <input type="checkbox"/> RIGHT HANDED <input type="checkbox"/> LEFT HANDED			

YES	NO	CHECK EACH ITEM YES OR NO. EVERY ITEM CHECKED "YES" MUST BE FULLY EXPLAINED IN BLANK SPACE ON RIGHT
		27. HAVE YOU BEEN UNABLE TO HOLD A JOB BECAUSE OF: A. SENSITIVITY TO CHEMICALS, DUST, SUNLIGHT, ETC.
		B. INABILITY TO PERFORM CERTAIN MOTIONS
		C. INABILITY TO ASSUME CERTAIN POSITIONS
		D. OTHER MEDICAL REASONS ( <i>If yes, give reasons</i> )
		28. HAVE YOU EVER WORKED WITH RADIOACTIVE SUBSTANCE?
		29. DID YOU HAVE DIFFICULTY WITH SCHOOL STUDIES OR TEACHERS? ( <i>If yes, give details</i> )
		30. HAVE YOU EVER BEEN REFUSED EMPLOYMENT BECAUSE OF YOUR HEALTH? ( <i>If yes, state reason and give details</i> )
		31. HAVE YOU EVER BEEN DENIED LIFE INSURANCE? ( <i>If yes, state reason and give details</i> )
		32. HAVE YOU HAD, OR HAVE YOU BEEN ADVISED TO HAVE, ANY OPERATIONS? ( <i>If yes, describe and give age at which occurred</i> )
		33. HAVE YOU EVER BEEN A PATIENT ( <i>committed or voluntary</i> ) IN A MENTAL HOSPITAL OR SANATORIUM? ( <i>If yes, specify when, where, why, and name of doctor, and complete address of hospital or clinic</i> )
		34. HAVE YOU EVER HAD ANY ILLNESS OR INJURY OTHER THAN THOSE ALREADY NOTED? ( <i>If yes, specify when, where, and give details</i> )
		35. HAVE YOU CONSULTED OR BEEN TREATED BY CLINICS, PHYSICIANS, HEALERS, OR OTHER PRACTITIONERS WITHIN THE PAST 5 YEARS? ( <i>If yes, give complete address of doctor, hospital, clinic, and details</i> )
		36. HAVE YOU TREATED YOURSELF FOR ILLNESSES OTHER THAN MINOR COLDS? ( <i>If yes, which illnesses</i> )
		37. HAVE YOU EVER BEEN REJECTED FOR MILITARY SERVICE BECAUSE OF PHYSICAL, MENTAL, OR OTHER REASONS? ( <i>If yes, give date and reason for rejection</i> )
		38. HAVE YOU EVER BEEN DISCHARGED FROM MILITARY SERVICE BECAUSE OF PHYSICAL, MENTAL, OR OTHER REASONS? ( <i>If yes, give date, reason, and type of discharge: whether honorable, other than honorable, for unfitness or unsuitability</i> )
		39. HAVE YOU EVER RECEIVED, IS THERE PENDING, HAVE YOU APPLIED FOR, OR DO YOU INTEND TO APPLY FOR PENSION OR COMPENSATION FOR EXISTING DISABILITY? ( <i>If yes, specify what kind, granted by whom, and what amount, when, why</i> )

I CERTIFY THAT I HAVE REVIEWED THE FOREGOING INFORMATION SUPPLIED BY ME AND THAT IT IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.  
I AUTHORIZE ANY OF THE DOCTORS, HOSPITALS, OR CLINICS MENTIONED ABOVE TO FURNISH THE GOVERNMENT A COMPLETE TRANSCRIPT OF MY MEDICAL RECORD FOR PURPOSES OF PROCESSING MY APPLICATION FOR THIS EMPLOYMENT OR SERVICE.

TYPED OR PRINTED NAME OF EXAMINEE	SIGNATURE
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40. PHYSICIAN'S SUMMARY AND ELABORATION OF ALL PERTINENT DATA (*Physician shall comment on all positive answers in items 20 thru 39*)

TYPED OR PRINTED NAME OF PHYSICIAN OR EXAMINER	DATE	SIGNATURE	NUMBER OF ATTACHED SHEETS
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INSTRUCTIONS

This booklet contains many questions about your private life and background. The doctors need this information so that they may better understand you and your abilities. The information which you give will be treated as confidential and is only available to medical personnel. **THIS IS NOT A TEST.** Your answers are right or wrong only in terms of your truthfulness. Be as honest as you can. Remember, it is to your advantage to answer each question honestly.

11. HOME ADDRESS					12. AGE					13. DATE OF BIRTH				
(Street or RFD) (City) (State)										(Day) (Month) (Year)				
14. CIRCLE HIGHEST GRADE COMPLETED IN SCHOOL:  1    2    3    4    5    6    7    8    9    10    11    12    13    14    15    16    17+  DRAW A LINE UNDER GRADES WHICH YOU FAILED OR REPEATED.														
15. HOW OLD WERE YOU WHEN YOU QUIT OR FINISHED SCHOOL?														
16. WHAT IS YOUR RELIGION? (Circle one)  PROTESTANT    CATHOLIC    JEWISH    OTHER _____														
17. WHAT IS YOUR RACE? (Circle one)  WHITE    NEGRO    OTHER _____														
18. HAVE YOU EVER BEEN MARRIED? (Circle one)    YES    NO														
19. HOW MANY BROTHERS AND SISTERS DO YOU HAVE?										19A. HOW MANY ARE OLDER THAN YOU?				
20. DID YOU EVER PLAY ON AN ATHLETIC TEAM? (Circle one)    YES    NO														
20A. WERE YOU EVER CAPTAIN? (Circle one)    YES    NO														
21. CHECK IF ANY OF THE FOLLOWING APPLIES TO YOUR FAMILY: <u>YOUR</u> AGE WHEN THIS HAPPENED:  MOTHER DEAD    _____ FATHER DEAD    _____ PARENTS SEPARATED    _____ PARENTS DIVORCED    _____ I WAS ADOPTED    _____														
22. WHY DID YOU ENLIST IN THE NAVY? _____														
23. WHAT PREVIOUS MILITARY SERVICE DO YOU HAVE?										23A. HOW LONG?				

DO NOT WRITE BELOW THIS LINE

1. NAME

5. SERVICE NUMBER

6. RATE

7. (Circle one)  
USN    USNR

8. DATE ENLISTED  
(Mo.) (Day) (Year)

9. PLACE ENLISTED  
(City) (State)

2. PLACE OF BIRTH

3. DATE ARRIVED  
(Mo.) (Day) (Year)

4. BILLET NUMBER

10. (Year)

## INSTRUCTIONS FOR ANSWERING THE FOLLOWING QUESTIONS:

## INTERVIEW NOTES

DATE

Each of the following questions is to be answered YES or NO. Circle the correct answer on the line opposite each question. Make absolutely certain your answers are placed opposite the correct question. ANSWER ALL QUESTIONS. LEAVE NONE BLANK. If a question does not apply to you, answer is NO, but be sure to answer the question. To make it easier for you to understand the questions, they will be read to you one at a time. Answer all the questions only as they are read to you. DO NOT WORK AHEAD. DO NOT TALK for questions cannot be repeated.

- YES NO 1. Do you save money regularly?
- YES NO 2. Do you have life insurance?
- YES NO 3. Do you usually like to work?
- YES NO 4. Do you attend church fairly regularly?
- YES NO 5. Does noise bother you?
- YES NO 6. Do you owe anybody any money?
- YES NO 7. Do you feel homesick now?
- YES NO 8. Are your teeth in poor condition?
- YES NO 9. Did you complete high school?
- YES NO 10. Do you stutter or stammer?
- YES NO 11. Were you ever expelled or suspended from school?
- YES NO 12. Do you usually go around by yourself?
- YES NO 13. Were there five or more children in your family?
- YES NO 14. Do you easily "blow your top"?
- YES NO 15. Are you often tired in the mornings?
- YES NO 16. Do you seldom or never go to church?
- YES NO 17. Are you often troubled by headaches?
- YES NO 18. Have you ever been fired from a job?
- YES NO 19. Do you know how to swim?
- YES NO 20. Did you fail two or more grades in school?
- YES NO 21. Have you ever run away from home?
- YES NO 22. Did you fail just one grade in school?
- YES NO 23. Are you ever bothered by nervousness?
- YES NO 24. Are you often bothered by backpains?
- YES NO 25. Should a man work if he does not have to?
- YES NO 26. Do people hurt your feelings easily?
- YES NO 27. Did you belong to any clubs in school?
- YES NO 28. Does talk of sex upset you?
- YES NO 29. Do you like to attend athletic events or read about them in the newspapers?
- YES NO 30. Are you often bothered by dizziness?
- YES NO 31. Do you often have trouble getting to sleep?
- YES NO 32. Have you been fired from two or more jobs?
- YES NO 33. Do other people often take advantage of you?
- YES NO 34. Are you afraid of water?
- YES NO 35. Were you ever active in the Boy Scouts?
- YES NO 36. Have you held three or more full-time jobs?
- YES NO 37. Did you quit school because you were failing?
- YES NO 38. Did you have to quit school to go to work?
- YES NO 39. Have you ever been treated for your nerves?
- YES NO 40. Do your hands ever shake enough to bother you?
- YES NO 41. Have you ever been bothered by "cold sweats"?
- YES NO 42. Do other fellows your own age often tease you?
- YES NO 43. Do you have any physical or health problems?
- YES NO 44. Did you often play hookey from school?
- YES NO 45. Do you feel you will have trouble making good in service?
- YES NO 46. Has your father (stepfather) changed jobs often?
- YES NO 47. Do you awake frequently during the night?





## Questions Selected as Measures of Twelve Psychological Areas

## A. Identifying Information

1. Are you married?
2. Are you Jewish?
3. Are you Catholic?
4. Are you Protestant?
5. Do you have any children?
6. Is your home located on a farm?
7. Do you have any brothers?
8. Do you have any sisters?
9. Are you Mexican, Negro, or Indian?
10. Do you believe there is a God?
- 11.<sup>a</sup> Were you 17 years old on your last birthday?
12. Are you a member of the U. S. Naval Reserve?
13. Is your home in a town under 17,000 people?
14. Have you ever been divorced, widowed, or separated?
- 15.<sup>a</sup> Are you closer to your 17th birthday than your 18th?
16. Were you ever in military service before you entered the Navy?
17. Is your home in one of the following states: The Virginias, the Carolinas, Kentucky, Tennessee, Arkansas, Missouri, Georgia, Alabama, Mississippi, or Louisiana?

## B. Peer Relationships

1. Do people usually dislike you?
- 2.<sup>a</sup> Do you usually go around by yourself?
- 3.<sup>a</sup> Do people hurt your feelings easily?
4. Are you usually at ease around your friends?
- 5.<sup>a</sup> Do other people often take advantage of you?
- 6.<sup>a</sup> Do other fellows your own age often tease you?
- 7.<sup>a</sup> Do you have dates less often than most fellows your age?
8. Do you enjoy being with boyfriends more than with girlfriends?
9. Do you feel that you are different than other fellows your age?

## C. Non-conforming Behavior

1. Have you ever taken dope?
- 2.<sup>a</sup> Did you fail two or more grades in school?
3. Do you sometimes get drunk?
- 4.<sup>a</sup> Were you ever expelled from school?

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<sup>a</sup>These items were highly significant and were selected for the factorization.

### C. Non-conforming Behavior (continued)

- 5.a Do you seldom, or never go to church?
- 6.a Have you ever been fired from a job?
- 7.a Did you have to quit school to go to work?
- 8.a Have you been fired from two or more jobs?
- 9.a Did you fail just one grade in school?
- 10.a Do you attend church fairly regularly?
- 11.a Did you often play hookey from school?
- 12.a Did you quit school because you lost interest?
- 13.a Did you quit school because you were failing?
- 14. Do you usually take a bath or shower once a day?
- 15.a Have you been expelled from school more than once?
- 16.a Did you quit school because of family problems?
- 17.a Have you ever been arrested for reasons other than traffic violations?
- 18.a Have you been arrested more than once for reasons other than traffic violations?

### D. Bodily Complaints and Preoccupation

- 1. Are you bothered by pimples?
- 2. Are you underweight?
- 3. Are you much overweight?
- 4.a Are you often tired in the mornings?
- 5.a Are your teeth in poor condition?
- 6.a Are you often troubled by headaches?
- 7.a Are you often bothered by dizziness?
- 8.a Are you often bothered by backpains?
- 9. Have you ever had fits or convulsions?
- 10. So far as you know, were you a healthy child?
- 11.a Do you have any physical or health problems?
- 12.a Do your hands ever shake enough to bother you?
- 13.a Have you ever been bothered by "cold sweats"?
- 14. Do you often have trouble with your stomach?
- 15.a Have you had any fainting spells in the last three years?
- 16. Are you satisfied with your physical development?
- 17.a Are you often bothered by pains in your heart or chest?
- 18. Do you regularly use pills, creams, lotions, or ointments?
- 19.a Do you have trouble with constipation or diarrhea (the runs)?

### E. Family Relationships and Stability

- 1. Is your mother living?
- 2. Is your father living?
- 3. Are you an adopted child?
- 4. Are your parents living together?
- 5. Do your parents often argue or fight?

### E. Family Relationships and Stability (continued)

- 6.a Have you ever run away from home?
- 7.a Were there five or more children in your family?
8. Was your father (stepfather) often out of work?
- 9.a Was your father (stepfather) often sick?
10. Does your father (stepfather) drink a great deal?
11. Does your family attend church fairly regularly?
- 12.a Has your father (stepfather) changed jobs often?
- 13.a Do you often have trouble with your brother(s) and/or sister(s)?
14. Were your parents divorced or separated after you were 12 years old?
15. Were your parents divorced or separated before you were 12 years old?
- 16.a Did your parents like your brother(s) and/or sister(s) more than they liked you?
17. Did you often do things you did not want to do simply to please your parents?
- 18.a Do you feel your brother(s) and/or sister(s) have accomplished more than you have?

### F. Authority-figure Relationships

1. Do you respect your parent's opinions?
2. Did your father want you to join the Navy?
- 3.a Did your parents object to your quitting school?
4. Was your father (stepfather) often difficult to please?
5. Do you feel closer to your mother than to your father?
- 6.a Have you often "told off" your teachers, boss, or father?
- 7.a Have you often been afraid of your father (stepfather)?
- 8.a While working, did you often have trouble with the boss?
- 9.a Did you have trouble getting along with teachers in school?
- 10.a Did you have difficulty in getting along with your father or stepfather?
11. Have you often felt that you would have liked someone else as your father (stepfather)?

### G. Motivation for Service

1. Was (is) your father in the Navy?
2. Did you enlist in the Navy to keep from being drafted?
3. Did you enlist in the Navy to get away from home?
- 4.a Did you enlist in the Navy because you were out of work?
- 5.a Did you join the Navy primarily to make a man of yourself?
- 6.a Did your parents suggest or want you to come into service?
- 7.a Did you enlist in the Navy because you had nothing else to do?
- 8.a Did you join the Navy mostly because someone else wanted you to?
- 9.a Would you have joined some other branch of service if you could have?
- 10.a Had you thought about enlisting for several months or longer before you did so?

### H. Pre-service Achievements

- 1.a Do you know how to swim?
- 2.a Did you complete high school?
3. Have you ever held a full-time job?
- 4.a Were you ever active in the Boy Scouts?
- 5.a Did you belong to any clubs in school?
- 6.a Did you complete only 8 years of schooling?
- 7.a Have you had any schooling beyond high school?
8. Have you ever been away from home before?
- 9.a Have you held three or more full-time jobs?
10. Do you often play tennis, pool, pingpong, or bowling?
11. Were you ever captain of a sports team in school?
12. Did you take an active part in church activities?
- 13.a Were you ever elected to an office in any organization?
- 14.a Did you go to the 5th but not beyond the 7th grade in school?
- 15.a Did you complete only 11 years (Junior in H. S.) of schooling?
- 16.a Did you complete only 9 years (Freshman in H. S.) of schooling?
- 17.a Did you complete only 10 years (Sophomore in H. S.) of schooling?
18. Did you play football, basketball, baseball, or wrestle on a school team?
- 19.a Did you belong to any clubs or organizations outside of school (YMCA, CYO, Junior Achievement, 4-H, etc.)?
- 20.a Did you receive any awards in school or in any of the clubs to which you belonged?
- 21.a Do you like to attend athletic events or read about them in the newspapers?

### I. Emotional Instability and Immaturity

1. Does swearing upset you?
2. Do you often daydream?
3. Do you stutter or stammer?
- 4.a Are you afraid of water?
- 5.a Do you feel homesick now?
- 6.a Does noise bother you?
7. Are you afraid of the dark?
- 8.a Do you save money regularly?
- 9.a Do you have life-insurance?
- 10.a Does talk of sex upset you?
- 11.a Do you easily "blow your top"?
12. Do you ever talk in your sleep?
13. Does handling guns frighten you?
- 14.a Do you often have trouble getting to sleep?
- 15.a Are you ever bothered by nervousness?
- 16.a Do you awake frequently during the night?
17. Have you cried at all in the past year?
- 18.a Have you ever been treated for your nerves?
19. Were you ever a patient in a mental hospital?

## I. Emotional Instability and Immaturity (continued)

20. Do you think you will feel homesick in the Navy?
21. Does it bother you to see someone else get hurt?
- 22.a Have you wet the bed since you were 8 or 9 years old?
23. Do you feel upset when someone shouts at you?
- 24.a Have you ever had a sexual experience with another man?
- 25.a Have you walked in your sleep in the last three years?
26. Have you ever thought seriously of killing yourself?
- 27.a Do you feel you will have trouble making good in service?
- 28.a Have you wet the bed at all since you were 14 years old?
29. Does it upset you to get undressed in front of other men?
30. Does masturbation (playing with yourself sexually) bother you?
- 31.a Are you often bothered by nightmares or frightening dreams?
- 32.a Does being in a large group of people make you feel upset?
- 33.a Have you ever been so nervous that you had to stay home for a rest?
34. Do you sometimes have thought or ideas you cannot put out of your mind?

## J. Moral Responsibility

1. Do you often cuss or swear?
- 2.a Do you owe anybody any money?
3. Is it sometimes alright to tell a lie?
4. Would you tell a lie to help out a friend?
5. Have you ever thought seriously of killing someone?
6. Would you tell a lie if it meant getting out of trouble?
7. Do you believe it is best never to lend anything to anybody?
- 8.a When driving, do you sometimes speed when the cops aren't around?
- 9.a Do you believe that the purpose of friends is to do things for you?
- 10.a If you saw someone breaking into a house, would you call the police?
11. If a girl does not object, would you have sex relations with her?
12. If you saw an auto accident, would you give your name as a witness?
13. Would you get drunk, provided your friends or parents did not see you?
14. If you were in a hurry to go someplace, would you borrow an article of clothing from a buddy without asking him for it?
15. Would you have sex relations with another man's wife if she wanted you to?
16. Would you take a cigarette or pencil or something of little value from someone if you needed it?
17. Suppose you were to find a large sum of money. Would you attempt to find the owner?
- 18.a Do you believe that the main reason for not doing the wrong thing is because you might get caught?

### K. Work Attitudes and Goals

- 1.a Do you usually like to work?
- 2.a Should a man work if he does not have to?
- 3. Do you plan at sometime to finish your education?
- 4.a Do you believe hard work usually brings success in life?
- 5.a Would you work hard at a low paying job just to get good experience?
- 6.a Do you believe that in order to be successful in life a man must make a lot of money?
- 7. Do you believe the primary purpose of working is to make money?
- 8.a Do you think it is foolish to go to college when you could be making good money on a job?
- 9. Have you made any definite plans as to the type of work you want to do later in life?
- 10.a In order to make something of yourself, you must have pull. Do you agree?
- 11.a Do you have any plans for what you will do after you finish this hitch in the Navy?
- 12.a Do you believe it is necessary to have a good paying job before one gets married?

### L. Specific Abilities

- 1.a GCT score.
- 2.a ARI score.
- 3.a MECH score.
- 4.a CLER score.

## APPENDIX II

### CRITERION MEASUREMENT

RECRUIT TRAINING COMMAND  
U.S. NAVAL TRAINING CENTER  
GREAT LAKES, ILLINOIS

RTC INST 1616.2  
J23:GL:J23-00:ky  
1 August 1957

#### RTC INSTRUCTION 1616.2

From: Commanding Officer, Recruit Training Command  
To: Distribution List

Subj: Recruit Performance Evaluation

Encl: (1) Sample Completed Recruit Military Performance Evaluation Forms  
and Description of Recruit Rating Categories

1. Purpose. To establish a procedure for continuous evaluation of incoming recruits in order that a comprehensive study may be made leading to the development of more accurate recruiting methods.
2. Effective date. The provisions of this instruction are effective immediately.
3. Discussion. This command is continually faced with the problem of the disposition of a significant number of new recruits who, because of disciplinary or intellectual and personality inadequacies, pose special training problems. The research project undertaken in this Instruction is designed to establish, after extensive use and study, more accurate criteria to be used in the selection of recruits for Naval Training. Company commanders will actively participate in this research by rating graduating recruits of their respective companies in the various categories established in enclosure (1).
4. Background. Company Commander's rating marks of recruits will be used for research purposes only. They will not affect the disposition of men in the company. It is extremely important to the success of this project that each rating given be carefully considered. Only by such detailed measures can criteria eventually be established for improvement of recruit selection, and ultimately, improvement in the overall quality of the Navy.

RTC INST 1616.2  
J23:GL:J23-00:ky  
1 August 1957

5. Action.

a. Company Commanders (Active Companies)

(1) Complete a copy of enclosure (1) on each member of the company during the last three days of the eighth week of training. The heading on these rating forms will have been completed when they are forwarded to the Company Commanders prior to the eighth week of training. Additional rating forms will be provided for recruits not originally assigned to the company. A rating form must be completed for each graduating recruit.

(2) Evaluate each man only for his strictly military performance. Include in this evaluation only; military bearing, military drill, acceptance of discipline, cleanliness, and ability to get along with other men.

(3) DO NOT take into consideration variables such as weekly test grades or GCT.

(4) Make only one rating for each recruit. Place an (X) on the line in the single category (Poor, Fair, Average, Excellent) which best describes his military performance. The meaning of each of these categories is furnished in enclosure (1). Read these descriptions carefully before rating recruits.

(5) Forward completed Recruit Military Performance Evaluation Forms by guard mail to Mr. J. PLAG, Building 172, Camp Barry.

(6) Refer any questions regarding the conduct of this research to Mr. J. PLAG at extension 556.

C. B. JACKSON, Jr

AUTHENTICATED:

/s/ T. L. Weeks  
T. L. WEEKS  
Lieutenant, U.S. Navy  
Administrative Officer

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RECRUIT MILITARY PERFORMANCE EVALUATION FORM

**INSTRUCTIONS:** Make one rating for each recruit by placing an (X) on the line in the single category which best describes his strictly military performance.. Base this rating only on military bearing, military drill, acceptance of discipline, cleanliness, and ability to get along with other men.

NAME DOOR, W.T. SERVICE NO. 111 11 11 COMPANY NO. 596  
DATE OF ARRIVAL AT GREAT LAKES 29 FEB 1957 BILLET NO. 789

	X		
Poor, barely meets minimum standards, just passable, very marginal	Fair, below average, a drag on the company, some difficulties	Average, satisfactory in all phases, acceptable, not outstanding in any way.	Excellent, good, very proficient, would definitely want man aboard ship.

RECRUIT MILITARY PERFORMANCE EVALUATION FORM

**INSTRUCTIONS:** Make one rating for each recruit by placing an (X) on the line in the single category which best describes his strictly military performance. Base this rating only on military bearing, military drill, acceptance of discipline, cleanliness and ability to get along with other men.

NAME GROSS, I.N. SERVICE NO. 222 22 22 COMPANY NO. 596  
DATE OF ARRIVAL AT GREAT LAKES 29 FEB 1957 BILLET NO. 792

		X	
Poor, barely meets minimum standards, just passable very marginal	Fair, below average, a drag on the company, some difficulties	Average, satisfactory in all phases, acceptable, not outstanding in any way	Excellent, good, very proficient, would definitely want man aboard ship.

RTC INST 1616.2  
J23:GL:J23-00:ky  
1 August 1957

### RECRUIT MILITARY PERFORMANCE EVALUATION FORM

**INSTRUCTIONS:** Make one rating for each recruit by placing an (X) on the line in the single category which best describes his strictly military performance. Base this rating only on military bearing, military drill, acceptance of discipline, cleanliness, and ability to get along with other men.

NAME READY, R.V. SERVICE NO. 333 33 33 COMPANY NO. 596

DATE OF ARRIVAL AT GREAT LAKES 29 FEB 1957 BILLET NO. 795

			X
Poor, barely meets minimum standards, just passable very marginal.	Fair, below average, a drag on the company, some difficulties	Average, satisfactory in all phases, acceptable, not outstanding in any way.	Excellent, good, very proficient, would definitely want man aboard ship.

### DESCRIPTION OF RATING CATEGORIES

1. An excellent rating indicates that you believe the recruit will be a definite asset to the Navy in respect to the variables in question; that he has performed better than the average recruit; that you would definitely want such a man aboard ship with you. An excellent recruit would be a man proficient in all military phases of training, and probably having few demerits.
2. An average rating indicates that you believe the recruit will perform an acceptable job in the Navy; that he is not particularly outstanding in any way; that there are many recruits just like him. The average recruit performs satisfactorily in all phases of military training.
3. A fair rating indicates that you believe the recruit may have some difficulty in the Navy; that he is below average in the variables mentioned; that he probably possesses more demerits than the average recruit; that he is performing below average in most military phases of training.
4. A poor rating indicates that although the recruit is acceptable to the fleet and can be graduated from recruit training, he barely meets minimum standards. Such a recruit is hardly able to keep up with the other recruits in training, and may very possibly experience difficulty in getting along in the fleet. He probably possesses many demerits and may have undergone frequent Battalion Commander interviews and/or Aptitude Board Appearances.

Table 44

## Average Weekly Test Grades and RFAT Score Equivalents

AWTG	RFAT	AWTG	RFAT	AWTG	RFAT
4.00	- 128.60	3.42	- 113.52	3.02	- 103.12
3.80	- 123.40	3.41	- 113.26	3.01	- 102.86
3.79	- 123.14	3.40	- 113.00	3.00	- 102.60
3.78	- 122.88	3.39	- 112.74	2.99	- 102.34
3.77	- 122.62	3.38	- 112.48	2.98	- 102.08
3.76	- 122.36	3.37	- 112.22	2.97	- 101.82
3.75	- 122.10	3.36	- 111.96	2.96	- 101.56
3.74	- 121.84	3.35	- 111.70	2.95	- 101.30
3.73	- 121.58	3.34	- 111.44	2.94	- 101.04
3.72	- 121.32	3.33	- 111.18	2.93	- 100.78
3.71	- 121.06	3.32	- 110.92	2.92	- 100.52
3.70	- 120.80	3.31	- 110.66	2.91	- 100.26
3.69	- 120.54	3.30	- 110.39	2.90	- 100.00
3.68	- 120.28	3.29	- 110.14	2.89	- 99.74
3.67	- 120.02	3.28	- 109.88	2.88	- 99.48
3.66	- 119.76	3.27	- 109.62	2.87	- 99.22
3.65	- 119.50	3.26	- 109.36	2.86	- 98.96
3.64	- 119.24	3.25	- 109.10	2.85	- 98.70
3.63	- 118.98	3.24	- 108.84	2.84	- 98.44
3.62	- 118.72	3.23	- 108.58	2.83	- 98.18
3.61	- 118.46	3.22	- 108.32	2.82	- 97.92
3.60	- 118.20	3.21	- 108.06	2.81	- 97.66
3.59	- 117.94	3.20	- 107.80	2.80	- 97.40
3.58	- 117.68	3.19	- 107.54	2.79	- 97.14
3.57	- 117.42	3.18	- 107.28	2.78	- 96.88
3.56	- 117.16	3.17	- 107.02	2.77	- 96.62
3.55	- 116.90	3.16	- 106.76	2.76	- 96.36
3.54	- 116.64	3.15	- 106.50	2.75	- 96.10
3.53	- 116.38	3.14	- 106.24	2.74	- 95.84
3.52	- 116.12	3.13	- 105.98	2.73	- 95.58
3.51	- 115.86	3.12	- 105.72	2.72	- 95.32
3.50	- 115.60	3.11	- 105.46	2.71	- 95.06
3.49	- 115.34	3.10	- 105.20	2.70	- 94.80
3.48	- 115.08	3.09	- 104.94	2.69	- 94.54
3.47	- 114.82	3.08	- 104.68	2.68	- 94.28
3.46	- 114.56	3.07	- 104.42	2.67	- 94.02
3.45	- 114.30	3.06	- 104.16	2.66	- 93.76
3.44	- 114.04	3.05	- 103.90	2.65	- 93.50
3.43	- 113.78	3.04	- 103.64	2.64	- 93.24
		3.03	- 103.38	2.63	- 92.98

Table 44 (continued)

## Average Weekly Test Grades and RFAT Score Equivalents

AWTG	RFAT	AWTG	RFAT	AWTG	RFAT
2.62	92.72	2.37	86.22	2.12	79.72
2.61	92.46	2.36	85.96	2.11	79.46
2.60	92.20	2.35	85.70	2.10	79.20
2.59	91.94	2.34	85.44	2.09	78.94
2.58	91.68	2.33	85.18	2.08	78.68
2.57	91.42	2.32	84.92	2.07	78.42
2.56	91.16	2.31	84.66	2.06	78.16
2.55	90.90	2.30	84.40	2.05	77.90
2.54	90.64	2.29	84.14	2.04	77.64
2.53	90.38	2.28	83.88	2.03	77.38
2.52	90.12	2.27	83.62	2.02	77.12
2.51	89.86	2.26	83.36	2.01	76.86
2.50	89.61	2.25	83.10	2.00	76.60
2.49	89.34	2.24	82.84	1.99	76.34
2.48	89.08	2.23	82.58	1.98	76.08
2.47	88.82	2.22	82.32	1.97	75.82
2.46	88.56	2.21	82.06	1.96	75.56
2.45	88.30	2.20	81.80	1.95	75.30
2.44	88.04	2.19	81.54	1.94	75.04
2.43	87.78	2.18	81.28	1.93	74.78
2.42	87.52	2.17	81.02	1.92	74.52
2.41	87.26	2.16	80.76	1.91	74.26
2.40	87.00	2.15	80.50	1.90	74.00
2.39	86.74	2.14	80.24	1.89	73.74
2.38	86.48	2.13	79.98	1.88	73.48

# APPENDIX III

## DATA PERTAINING TO THE VALIDATION OF THE RECRUIT PERSONAL HISTORY INVENTORY

Table 45

### RESPONSES TO RECRUIT PERSONAL HISTORY INVENTORY ITEMS

Item Number	Phase I (N=2568)		Phase II (N=3627)	
	Yes	Percent	Yes	Percent
1	2442	.95	3428	.95
2	66	.03	83	.02
3	10	.00	36	.01
4	619	.24	1332	.37
5	1829	.71	2125	.61
6	1278	.50	1758	.48
7	2312	.90	3247	.90
8	192	.07	303	.08
9	16	.01	27	.01
10	2316	.90	3214	.89
11	477	.19	488	.13
12	1936	.75	2580	.71
13	375	.15	734	.20
14	641	.25	982	.27
15	65	.03	96	.03
16	134	.05	157	.04
17	101	.04	128	.04
18	514	.20	928	.26
19	236	.09	353	.10
20	12	.00	16	.00
21	2221	.86	3188	.88
22	1937	.75	2673	.74
23	43	.02	100	.03
24	1628	.63	2194	.60
25	648	.25	931	.26
26	2225	.87	3213	.89
27	171	.06	448	.12

TABLE 45 (continued)

## RESPONSES TO RECRUIT PERSONAL HISTORY INVENTORY ITEMS

Item Number	Phase I (N=2568)		Phase II (N=3627)	
	Yes	Percent	Yes	Percent
28	33	.01	37	.01
29	1237	.48	1872	.52
30	27	.01	51	.01
31	1135	.44	1779	.49
32	1833	.71	2563	.71
33	88	.03	126	.03
34	40	.02	64	.02
35	187	.07	332	.09
36	1836	.71	2135	.59
37	2532	.99	3563	.98
38	529	.20	798	.22
39	366	.14	607	.17
40	1947	.79	2698	.74
41	995	.38	1706	.47
42	928	.36	1308	.36
43	1724	.67	2296	.63
44	1213	.47	1818	.50
45	1645	.64	2846	.73
46	216	.08	345	.10
47	338	.13	477	.13
48	711	.27	1115	.31
49	278	.10	404	.11
50	163	.06	257	.07
51	120	.04	135	.04
52	287	.11	439	.12
53	29	.01	57	.02
54	309	.12	491	.14
55	1223	.47	1862	.51
56	340	.12	524	.14
57	143	.05	204	.06
58	1587	.61	2227	.61
59	99	.03	222	.06
60	36	.01	26	.01
61	1243	.48	1646	.45
62	172	.06	462	.13
63	938	.36	1166	.32
64	1278	.49	1651	.46

TABLE 45 (continued)  
 RESPONSES TO RECRUIT PERSONAL HISTORY INVENTORY ITEMS

Item Number	Phase I (N=2568)		Phase II (N=3627)	
	Yes	Percent	Yes	Percent
65	2498	.97	3530	.97
66	144	.05	310	.09
67	315	.12	508	.14
68	631	.24	890	.25
69	112	.04	248	.07
70	228	.08	322	.09
71	155	.06	265	.07
72	23	.01	50	.01
73	2451	.95	3451	.95
74	578	.22	1003	.28
75	1762	.68	2390	.66
76	159	.06	209	.06
77	24	.01	39	.01
78	556	.21	899	.25
79	144	.05	203	.06
80	1822	.70	2406	.66
81	255	.10	334	.09
82	257	.10	350	.10
83	1644	.64	2422	.67
84	1024	.39	1442	.40
85	51	.02	101	.03
86	2182	.84	3080	.85
87	2464	.95	3480	.96
88	434	.17	604	.17
89	305	.12	478	.13
90	9	.00	15	.00
91	356	.14	799	.22
92	128	.05	177	.05
93	854	.33	1419	.39
94	1709	.66	2425	.67
95	123	.05	163	.04
96	579	.23	907	.25
97	129	.05	199	.05
98	120	.05	136	.04
99	183	.07	384	.13
100	1981	.77	2549	.70
101	127	.05	222	.06

TABLE 45 (continued)

## RESPONSES TO RECRUIT PERSONAL HISTORY INVENTORY ITEMS

Item Number	Phase I (N=2568)		Phase II (N=3627)	
	Yes	Percent	Yes	Percent
102	79	.03	116	.03
103	13	.01	11	.00
104	1885	.73	2588	.71
105	49	.02	78	.02
106	71	.03	110	.03
107	131	.05	202	.06
108	288	.11	391	.11
109	1600	.62	2327	.64
110	140	.05	295	.08
111	342	.13	510	.14
112	847	.33	1343	.37
113	1644	.64	2340	.65
114	407	.16	524	.14
115	707	.28	889	.25
116	1097	.43	1410	.39
117	194	.05	246	.07
118	386	.15	457	.13
119	61	.02	86	.02
120	493	.19	763	.21
121	2138	.83	3039	.84
122	393	.15	718	.20
123	2406	.93	3358	.93
124	1303	.51	1945	.54
125	509	.20	602	.17
126	827	.32	1347	.37
127	219	.09	376	.10
128	346	.13	600	.17
129	64	.02	78	.02
130	1229	.48	1513	.42
131	1262	.49	1700	.47
132	288	.11	459	.13
133	42	.02	48	.01
134	66	.03	114	.03
135	79	.03	107	.03
136	477	.19	662	.18
137	364	.14	632	.17
138	146	.06	192	.05



TABLE 45 (continued)

## RESPONSES TO RECRUIT PERSONAL HISTORY INVENTORY ITEMS

Item Number	Phase I (N=2568)		Phase II (N=3627)	
	Yes	Percent	Yes	Percent
139	246	.10	301	.08
140	355	.14	615	.17
141	247	.10	299	.09
142	973	.38	1262	.35
143	48	.02	78	.02
144	47	.02	84	.02
145	306	.12	342	.09
146	259	.10	580	.16
147	289	.11	370	.10
148	118	.05	215	.06
149	67	.03	109	.03
150	247	.10	308	.08
151	103	.04	164	.05
152	1957	.76	2659	.73
153	233	.09	385	.11
154	2406	.96	3325	.92
155	171	.07	244	.07
156	2291	.89	3211	.89
157	185	.07	371	.10
158	265	.10	539	.15
159	198	.08	333	.09
160	2148	.84	3091	.85
161	118	.05	330	.09
162	71	.03	108	.03
163	186	.07	254	.07
164	1136	.44	1573	.43
165	2297	.89	3083	.85
166	337	.13	467	.13
167	868	.34	1150	.32
168	1343	.52	1835	.51
169	283	.11	368	.10
170	374	.15	532	.15
171	1787	.70	2308	.64
172	282	.11	431	.12
173	143	.06	222	.06
174	2061	.80	2758	.76
175	1028	.40	1436	.40

TABLE 45 (continued)

## RESPONSES TO RECRUIT PERSONAL HISTORY INVENTORY ITEMS

Item Number	Phase I (N=2568)		Phase II (N=3627)	
	Yes	Percent	Yes	Percent
176	622	.24	951	.26
177	449	.17	480	.13
178	249	.10	552	.15
179	275	.11	513	.14
180	1401	.55	2032	.56
181	693	.27	1013	.28
182	1695	.66	2382	.66
183	2265	.88	3174	.88
184	2176	.85	3005	.83
185	93	.04	172	.05
186	1492	.58	2205	.61
187	242	.09	361	.10
188	1493	.58	1933	.53
189	637	.25	984	.27
190	1577	.61	2253	.62
191	2252	.88	3151	.87
192	296	.12	494	.14
193	1969	.77	2654	.73
194	150	.06	208	.06
195	544	.21	847	.23
196	65	.03	104	.03
197	443	.17	771	.21
198	1007	.39	1403	.39
199	870	.34	1078	.30
200	184	.07	271	.07
201	45	.02	79	.02
202	619	.24	989	.27
203	894	.35	1272	.35
204	913	.36	1191	.33
205	86	.03	96	.03
206	87	.03	183	.05
207	493	.19	841	.23
208	1280	.50	1690	.47
209	628	.24	790	.22
210	73	.03	123	.03
211	115	.04	198	.05
212	1011	.39	1393	.38

TABLE 45 (continued)  
RESPONSES TO RECRUIT PERSONAL HISTORY INVENTORY ITEMS

Item Number	Phase I (N=2568)		Phase II (N=3627)	
	Yes	Percent	Yes	Percent
213	1022	.40	1434	.40
214	393	.15	580	.16
215	21	.01	22	.01

TABLE 46

CHI-SQUARE VALUES\* OF RECRUIT PERSONAL HISTORY INVENTORY ITEMS  
WITH CRITERIA IN PHASES I AND II

Item No.	Phase I (N=2568)				Phase II (N=3627)			
	Disch.	M.I.C.	Milit.	Class.	Disch.	M.I.C.	Milit.	Class.
1	.00	1.70	.19	2.28	.14	.34	1.43	5.38
2	2.23	.82	15.50	2.39	1.60	.54	11.79	.33
3	3.47	.10	42.56	3.98	2.32	.50	5.17	2.61
4	1.12	2.66	1.53	1.90	6.81	.19	3.16	2.66
5	.27	.91	.58	2.97	1.62	.32	4.02	2.25
6	.14	.04	9.96	5.08	1.57	2.22	6.89	2.01
7	1.84	0.01	2.41	.29	6.37	.06	5.15	2.17
8	13.83	3.43	1.80	1.87	.00	5.08	2.15	1.56
9	1.06	3.25	4.30	3.48	1.03	.91	1.20	1.13
10 <sup>b</sup>	7.96	17.17	8.48	2.36	7.06	.14	10.62	11.01
11	1.22	1.94	9.99	10.08	3.19	.84	1.37	25.13
12 <sup>c</sup>	3.86	.01	3.25	9.81	1.97	.69	2.71	9.92
13	1.12	.15	2.07	4.19	2.51	5.64	15.25	8.37
14 <sup>d</sup>	10.41	1.50	4.18	2.00	9.57	.62	2.38	10.48
15	2.46	1.80	3.44	6.18	6.60	1.88	7.11	5.64
16	.01	.31	5.45	11.16	.04	.15	.11	.48
17 <sup>b</sup>	20.17	1.26	7.74	9.85	7.20	.66	3.26	12.10
18 <sup>b</sup>	28.15	0.28	0.22	0.34	4.50	3.38	1.74	5.39
19 <sup>b</sup>	23.91	1.91	.53	1.92	5.15	3.79	.38	2.22
20 <sup>e</sup>	16.59	.10	1.75	4.28	10.01	.20	7.96	.91
21 <sup>b</sup>	21.46	1.32	16.47	14.82	13.85	1.19	14.28	17.26
22 <sup>d</sup>	0.47	0.71	4.05	15.39	9.76	.00	5.01	19.72
23	2.12	.51	30.39	30.20	1.89	.10	7.27	2.28
24	0.33	0.00	4.43	17.71	.21	1.76	15.58	14.10
25 <sup>b</sup>	14.96	0.00	1.42	11.42	10.96	3.39	2.81	13.35
26 <sup>b</sup>	26.83	1.23	14.09	12.07	12.30	.66	8.60	16.97

TABLE 46 (continued)

CHI-SQUARE VALUES<sup>a</sup> OF RECRUIT PERSONAL HISTORY INVENTORY ITEMS  
WITH CRITERIA IN PHASES I AND II

Item No.	Phase I (N=2568)				Phase II (N=3627)			
	Disch.	M.I.C.	Milit.	Class.	Disch.	M.I.C.	Milit.	Class.
27 <sup>b</sup>	53.13	28.54	32.62	69.10	19.62	15.98	51.82	110.94
28	7.84	.92	5.76	1.41	.06	.61	4.31	4.24
29	3.29	1.97	1.22	16.39	.13	.93	10.49	12.69
30	3.36	1.67	0.52	4.13	5.96	.12	.85	6.03
31 <sup>b</sup>	.20	1.44	14.06	2.16	.44	5.97	23.21	11.95
32 <sup>b</sup>	47.66	.78	17.45	13.61	3.50	7.24	5.10	27.08
33	1.25	.56	2.14	14.86	.62	2.43	8.62	25.86
34 <sup>b</sup>	8.78	4.64	3.74	2.94	10.12	.01	.32	13.52
35 <sup>b</sup>	6.77	.23	6.77	11.74	22.81	1.80	12.80	6.78
36 <sup>b</sup>	144.21	11.61	101.02	115.77	57.01	56.09	215.32	379.08
37	.31	.51	1.18	0.82	6.27	.92	17.16	.17
38	4.92	.36	1.43	3.29	1.57	.42	2.11	2.16
39 <sup>b</sup>	18.07	3.17	7.51	25.31	7.80	16.32	42.68	28.95
40	.80	.67	6.12	11.26	2.18	7.87	11.37	3.07
41	9.10	.12	5.58	2.26	.15	.00	2.43	4.94
42 <sup>b</sup>	3.00	.08	13.10	23.20	12.40	1.61	26.55	23.28
43 <sup>b</sup>	5.42	.06	10.66	12.57	2.81	3.90	3.16	23.21
44 <sup>b</sup>	6.34	1.59	3.20	16.01	11.43	.12	10.93	9.10
45 <sup>b</sup>	3.19	0.71	12.08	8.66	.46	.71	12.64	.37
46 <sup>b</sup>	15.73	4.88	10.05	2.84	20.55	.22	1.07	5.29
47	.21	.12	0.09	2.41	1.23	.78	3.95	4.45
48 <sup>b</sup>	11.64	1.47	9.50	6.87	4.34	4.65	36.83	41.26
49	.03	.60	1.50	.93	.41	.58	4.68	1.38
50 <sup>b</sup>	35.39	.00	1.93	3.05	20.39	.02	10.45	4.34
51 <sup>b</sup>	31.37	.38	3.24	8.19	28.13	.43	3.39	3.84
52 <sup>b</sup>	15.29	.07	3.50	4.61	26.03	1.19	30.97	.47
53	2.90	.30	2.55	4.09	18.94	.82	8.02	4.70
54 <sup>b</sup>	67.20	3.95	21.23	18.03	17.06	22.58	48.89	12.90
55 <sup>b</sup>	1.38	.58	9.30	27.66	6.07	2.22	11.22	18.27
56 <sup>b</sup>	18.36	.33	0.96	4.33	7.19	2.17	2.26	3.25
57 <sup>b</sup>	41.55	1.70	2.18	8.87	14.62	1.31	4.61	5.85
58 <sup>b</sup>	34.37	.57	22.53	28.91	19.01	6.47	65.13	50.10
59	85.05	9.40	36.59	49.88	37.11	5.26	42.47	98.88
60 <sup>e</sup>	16.50	.92	6.69	3.91	5.10	.40	7.33	5.39
61	5.68	15.43	23.67	12.22	17.12	20.08	84.52	63.48

TABLE 46 (continued)

CHI-SQUARE VALUES<sup>a</sup> OF RECRUIT PERSONAL HISTORY INVENTORY ITEMS  
WITH CRITERIA IN PHASES I AND II

Item No.	Phase I (N=2568)				Phase II (N=3627)			
	Disch.	M.I.C.	Milit.	Class.	Disch.	M.I.C.	Milit.	Class.
62	.56	.01	3.50	16.37	.00	5.98	16.14	5.99
63 <sup>b</sup>	6.13	2.22	13.60	44.55	.34	.00	11.87	43.26
64	.01	6.73	3.17	4.33	.70	.66	2.13	7.02
65	33.55	2.50	4.84	13.01	.10	4.33	6.09	7.48
66 <sup>b</sup>	2.01	.44	42.20	19.55	4.92	1.80	157.52	100.10
67 <sup>b</sup>	43.21	.88	13.21	6.04	27.18	1.82	5.72	1.75
68 <sup>b</sup>	36.14	.27	3.21	.52	20.38	1.77	4.87	6.09
69 <sup>b</sup>	19.28	2.34	4.23	21.90	29.21	1.92	2.60	6.82
70 <sup>b</sup>	15.69	.67	4.20	7.69	11.20	.66	8.51	1.18
71 <sup>b</sup>	27.40	.02	6.54	37.24	16.00	5.05	23.80	45.44
72 <sup>b</sup>	16.23	.20	1.13	2.41	22.45	.12	13.13	2.79
73 <sup>d</sup>	3.38	1.48	2.31	1.34	4.02	4.73	10.23	.82
74 <sup>b</sup>	44.18	0.00	25.56	65.81	3.71	3.21	22.07	93.98
75 <sup>b</sup>	8.74	.12	5.30	3.37	7.34	.18	31.98	5.98
76	0.14	2.16	.71	6.77	8.56	.34	3.20	3.06
77 <sup>e</sup>	8.79	1.67	8.47	10.06	1.90	.26	2.01	.30
78 <sup>b</sup>	29.52	.12	21.97	52.47	16.17	4.50	60.48	52.81
79 <sup>b</sup>	45.33	1.70	3.30	10.57	11.80	1.31	.70	5.85
80	13.58	6.02	3.08	5.43	1.24	1.58	.13	3.44
81 <sup>b</sup>	3.75	.01	11.05	19.57	19.49	.00	4.11	15.73
82 <sup>b</sup>	21.40	.00	2.09	13.18	5.32	.68	12.31	12.78
83	.07	.11	3.77	3.55	7.65	2.08	4.04	1.52
84	3.48	.13	2.40	8.61	7.68	.98	.18	5.95
85 <sup>b</sup>	26.34	.51	4.27	1.53	12.12	.25	17.20	5.36
86	1.88	.00	1.02	8.21	.84	.20	1.64	17.56
87 <sup>d</sup>	9.62	.56	15.32	2.09	24.22	.59	.75	18.06
88 <sup>b</sup>	8.03	.08	5.86	20.68	7.97	.13	10.62	8.98
89 <sup>b</sup>	28.08	.81	3.41	3.09	25.77	.12	3.14	3.50
90 <sup>e</sup>	.64	8.22	3.74	3.81	12.97	.20	9.92	1.84
91 <sup>b</sup>	60.01	4.29	65.10	106.89	18.46	36.29	94.60	152.82
92 <sup>b</sup>	27.51	.18	11.01	5.92	20.47	.10	7.64	4.47
93 <sup>d</sup>	21.57	1.82	4.81	5.00	10.88	6.59	8.92	3.39
94	.60	2.09	0.74	3.89	.06	7.99	1.42	5.13
95 <sup>b</sup>	38.67	.27	9.59	1.45	15.83	.03	7.61	7.01
96	13.63	1.41	3.21	7.82	2.75	3.09	5.20	1.90
97 <sup>b</sup>	23.71	.18	4.68	8.20	15.65	.00	1.43	2.22

TABLE 46 (continued)

CHI-SQUARE VALUES<sup>a</sup> OF RECRUIT PERSONAL HISTORY INVENTORY ITEMS  
WITH CRITERIA IN PHASES I AND II

Item No.	Phase I (N=2568)				Phase II (N=3627)			
	Disch.	M.I.C.	Milit.	Class.	Disch.	M.I.C.	Milit.	Class.
98 <sup>c</sup>	6.29	.18	2.49	1.08	3.94	2.10	7.26	3.32
99 <sup>b</sup>	46.99	7.84	34.20	50.96	13.09	17.82	38.32	61.59
100 <sup>c</sup>	2.66	.45	8.55	5.28	4.67	.11	15.05	2.64
101	20.79	.18	8.04	17.29	11.96	2.63	26.48	18.18
102	8.35	.94	0.40	.65	2.18	3.24	8.44	.67
103	13.71	3.22	3.01	3.55	.41	.20	2.15	4.31
104	18.68	1.00	0.77	5.04	2.70	1.16	5.16	.72
105	8.43	.62	3.44	16.16	3.86	3.39	8.96	2.13
106	27.99	.05	4.23	4.37	2.62	.10	2.64	6.57
107	15.99	.18	6.63	14.92	25.70	1.82	6.10	4.35
108	4.40	2.14	2.97	3.32	2.25	.00	.73	.63
109	.36	4.09	2.70	10.75	3.58	.53	1.18	7.37
110	26.48	.23	15.22	48.90	17.20	.11	24.06	39.26
111	3.40	.12	2.07	1.16	1.65	3.36	3.70	10.97
112 <sup>b</sup>	17.64	.79	33.54	78.16	6.41	6.14	33.14	128.60
113 <sup>c</sup>	4.42	3.75	2.94	2.58	4.73	.57	11.30	1.99
114	.63	10.69	7.23	10.90	.39	.17	10.72	1.81
115 <sup>d</sup>	4.03	.21	20.18	11.31	.23	2.00	31.07	4.25
116	1.44	.17	4.44	2.54	.47	.98	24.46	4.43
117 <sup>b</sup>	9.33	.88	1.70	6.05	6.79	.10	1.96	7.88
118 <sup>b</sup>	16.92	1.31	9.54	16.08	23.58	.05	17.53	23.97
119 <sup>d</sup>	11.03	7.81	9.10	3.55	12.72	.03	4.85	1.29
120	12.84	7.07	7.16	.06	2.43	.24	6.08	2.19
121	4.96	.43	5.56	15.67	1.59	1.97	1.16	3.75
122 <sup>b</sup>	54.27	18.05	44.51	71.84	26.29	25.12	123.69	126.40
123 <sup>b</sup>	11.03	.00	19.17	11.14	10.62	.00	.59	6.18
124	.02	.16	.93	3.77	2.85	.38	1.39	1.58
125 <sup>b</sup>	6.32	4.14	28.22	6.27	12.82	3.52	13.34	1.28
126	.35	.22	2.54	2.89	3.12	.12	24.78	8.65
127 <sup>b</sup>	89.94	.89	19.81	34.70	18.77	.44	38.65	44.47
128 <sup>b</sup>	19.31	.17	18.17	59.4	20.70	.65	43.03	49.58
129 <sup>b</sup>	39.38	.72	4.71	.23	10.21	3.39	6.94	4.50
130 <sup>b</sup>	28.37	.57	31.88	44.88	11.26	7.87	52.36	100.66
131 <sup>b</sup>	2.86	.43	12.65	32.40	3.24	1.42	28.22	49.87
132 <sup>b</sup>	8.24	.71	6.40	9.46	3.37	.73	16.60	9.52
133 <sup>e</sup>	8.05	.50	8.32	.48	1.03	.71	8.12	2.61

TABLE 46 (continued)

CHI-SQUARE VALUES<sup>a</sup> OF RECRUIT PERSONAL HISTORY INVENTORY ITEMS  
WITH CRITERIA IN PHASES I AND II

Item No.	Phase I (N=2568)				Phase II (N=3627)			
	Disch.	M.I.C.	Milit.	Class.	Disch.	M.I.C.	Milit.	Class.
134 <sup>b</sup>	6.39	1.86	4.02	6.50	38.50	.16	18.11	19.14
135 <sup>b</sup>	14.70	1.38	3.92	3.71	7.58	.16	7.94	6.55
136 <sup>d</sup>	.46	.23	3.90	5.37	13.18	.00	8.83	9.76
137 <sup>d</sup>	4.72	.57	9.17	4.52	.14	.03	9.73	3.52
138 <sup>b</sup>	39.80	7.67	1.45	6.54	32.45	2.87	10.79	5.85
139	3.45	.28	1.00	16.13	.59	.54	9.37	13.80
140 <sup>b</sup>	56.95	.00	32.20	66.40	23.69	10.92	112.88	89.58
141	.86	.01	15.82	4.57	1.37	.07	12.63	14.17
142	1.20	7.11	4.77	4.40	.42	.67	6.27	1.13
143 <sup>b</sup>	9.04	.50	15.47	29.94	3.86	14.31	4.23	37.27
144 <sup>b</sup>	54.78	.40	14.86	5.12	46.32	1.13	1.17	7.27
145 <sup>b</sup>	16.01	8.65	16.30	7.40	13.38	2.01	23.35	16.48
146 <sup>b</sup>	10.41	.22	23.05	17.16	4.33	9.55	21.30	50.65
147	1.65	.11	7.69	3.54	.00	1.16	6.27	7.05
148 <sup>b</sup>	11.16	.26	13.20	18.31	22.28	.28	20.14	17.75
149 <sup>b</sup>	12.03	.81	5.58	.35	7.57	1.67	3.85	2.33
150 <sup>b</sup>	2.38	8.65	3.92	2.86	8.58	.55	14.02	1.73
151 <sup>b</sup>	23.33	.03	.55	.48	15.83	2.44	4.01	3.79
152 <sup>b</sup>	7.08	.88	8.76	.66	.12	14.56	10.33	17.47
153 <sup>b</sup>	7.29	.00	3.98	36.45	.98	.12	5.49	31.44
154 <sup>b</sup>	5.35	.00	8.81	19.29	2.94	3.01	18.68	13.03
155 <sup>d</sup>	24.99	4.85	2.00	1.33	19.84	.07	4.13	8.09
156 <sup>b</sup>	11.14	1.90	5.83	9.65	.85	1.98	9.30	6.13
157 <sup>b</sup>	50.55	.00	30.56	56.30	28.22	2.90	49.84	126.40
158 <sup>b</sup>	22.06	1.12	37.45	74.10	10.81	29.13	65.07	84.73
159 <sup>b</sup>	.66	.10	2.83	12.10	10.05	2.18	9.57	4.89
160	1.62	3.10	4.86	46.18	.95	.09	12.68	42.64
161 <sup>b</sup>	16.96	1.47	1.09	17.76	6.92	1.00	1.85	7.58
162 <sup>b</sup>	77.17	.72	.18	4.18	48.97	.26	9.61	.54
163	.01	.88	1.68	10.00	1.10	.18	1.87	.89
164	2.78	.27	5.74	35.80	2.95	.82	31.81	49.51
165 <sup>b</sup>	.65	4.29	2.25	2.51	.48	.70	31.13	6.95
166 <sup>d</sup>	13.13	1.04	7.22	20.04	4.03	0.00	27.54	7.55
167	5.10	.21	3.05	39.72	.23	2.57	6.47	12.56
168	2.29	.43	1.92	12.40	3.35	.21	3.57	12.08
169	1.30	.04	5.07	3.31	0.00	2.33	6.56	4.97



TABLE 46 (continued)

CHI-SQUARE VALUES<sup>a</sup> OF RECRUIT PERSONAL HISTORY INVENTORY ITEMS  
WITH CRITERIA IN PHASES I AND II

Item No.	Phase I (N=2568)				Phase II (N=3627)			
	Disch.	M.I.C.	Milit.	Class.	Disch.	M.I.C.	Milit.	Class.
170	.08	1.18	2.32	6.47	.03	11.65	8.71	7.75
171 <sup>d</sup>	7.34	9.88	20.06	11.24	10.70	.23	22.86	18.42
172 <sup>b</sup>	25.61	.84	2.77	.91	5.97	5.63	2.70	1.80
173	1.05	.44	9.48	8.89	1.09	.10	3.09	1.43
174 <sup>b</sup>	15.82	.97	.50	9.13	9.07	.09	3.01	22.57
175	.98	.00	5.08	26.76	.00	1.34	8.40	27.08
176	.01	.66	2.30	.80	.86	.20	3.87	17.39
177 <sup>d</sup>	5.57	4.60	6.63	20.77	.00	.84	5.99	46.85
178 <sup>b</sup>	28.95	1.68	33.78	79.17	13.17	28.39	69.12	93.38
179 <sup>b</sup>	19.92	.15	19.68	38.11	7.91	20.15	27.89	34.80
180 <sup>d</sup>	1.05	1.17	16.27	20.92	1.29	.00	8.93	37.13
181 <sup>b</sup>	16.06	.01	22.99	61.46	15.00	.11	30.08	61.51
182 <sup>b</sup>	.90	.48	19.28	8.80	2.36	.39	12.27	39.30
183 <sup>b</sup>	2.21	.28	9.19	16.07	.30	2.46	12.52	32.23
184	1.07	.23	4.21	22.78	3.64	.96	48.07	23.48
185 <sup>b</sup>	9.87	3.43	3.65	8.33	1.50	.14	15.23	8.57
186 <sup>b</sup>	12.06	.78	1.43	18.30	12.00	.04	34.34	39.94
187	2.70	3.34	12.72	6.61	2.54	.40	9.22	3.25
188 <sup>b</sup>	12.06	.78	56.25	19.44	3.56	.16	80.52	40.61
189 <sup>b</sup>	8.34	.66	51.23	78.76	1.62	2.63	46.44	69.24
190	6.06	.55	2.30	4.76	1.45	1.31	1.81	6.45
191 <sup>b</sup>	18.47	.41	10.70	7.25	23.52	4.38	16.37	2.87
192 <sup>b</sup>	18.02	1.81	6.28	18.54	5.09	.40	34.45	4.59
193	.81	.32	5.67	3.82	.07	5.71	14.36	8.16
194 <sup>b</sup>	22.83	.05	1.59	8.82	4.89	2.92	35.84	4.14
195 <sup>b</sup>	19.47	.99	4.13	34.62	.20	1.82	14.18	22.09
196 <sup>b</sup>	53.54	.26	6.96	131.45	19.88	1.90	9.39	405.91
197 <sup>b</sup>	11.06	1.36	39.52	534.22	7.93	2.26	75.25	714.27
198 <sup>d</sup>	1.09	.55	13.72	229.00	.01	.85	28.73	316.12
199 <sup>b</sup>	18.87	.29	25.84	328.86	8.73	.03	54.94	553.38
200 <sup>b</sup>	10.99	.98	49.96	385.73	5.08	1.26	121.18	540.78
201 <sup>b</sup>	26.04	.50	2.10	15.87	6.68	1.14	11.19	29.12
202 <sup>b</sup>	29.35	9.47	33.92	218.83	12.24	5.18	46.49	287.27
203	.53	2.61	2.77	36.76	1.24	2.53	8.50	45.56
204 <sup>b</sup>	37.48	.17	35.30	205.12	21.16	8.97	62.05	316.86
205 <sup>b</sup>	3.94	1.25	12.12	102.12	1.80	1.56	50.52	183.92

TABLE 46 (continued)

CHI-SQUARE VALUES<sup>a</sup> OF RECRUIT PERSONAL HISTORY INVENTORY ITEMS  
WITH CRITERIA IN PHASES I AND II

Item No.	Phase I (N=2568)				Phase II (N=3627)			
	Disch.	M.I.C.	Milit.	Class.	Disch.	M.I.L.	Milit.	Class.
206 <sup>b</sup>	18.80	0.00	8.48	84.09	18.52	.06	15.44	102.92
207 <sup>b</sup>	2.27	1.56	28.42	111.91	8.04	1.28	25.92	148.57
208 <sup>d</sup>	.00	.26	2.18	34.00	4.38	.58	1.94	25.22
209 <sup>b</sup>	6.17	.26	20.54	181.84	3.76	.09	45.12	225.01
210	1.51	0.00	5.70	76.73	2.71	2.00	6.72	126.77
211 <sup>b</sup>	54.81	.55	24.17	40.25	62.66	15.70	33.39	27.71
212 <sup>b</sup>	8.04	2.26	29.32	9.35	3.99	6.34	61.13	56.15
213 <sup>b</sup>	10.78	.71	9.07	5.62	10.49	7.69	22.52	19.55
214 <sup>b</sup>	12.33	1.19	21.35	33.94	9.41	3.37	47.33	52.94
215	.06	.30	17.35	1.17	.84	.30	3.79	2.52

<sup>a</sup>The chi-square values for the discharge and M.I.C. criteria were each calculated from a four-celled table where a value of 3.84 yields a p of .05 and 6.64 yields a p of .01. The chi-square values for the military and classroom criteria were each calculated from an eight-celled table where a value of 7.82 yields a p of .05 and 11.34 yields a p of .01.

<sup>b</sup>Item meets selection criterion.

<sup>c</sup>No chi-square values significant at or beyond the .01 confidence level.

<sup>d</sup>Directionally inconsistent.

<sup>e</sup>Expected frequencies under 5.

Table 47

Percentage of Recruits in Experimental and Control Groups of Investigation to Determine Item Halo Effects which Changed Answers on Retest

Item number <sup>a</sup>	Group A	Group B	Group C	Group D
21	2.4	6.5	3.0	2.3
10	6.0	0.0	3.0	8.0
19	14.5	7.4	15.0	8.0
31	6.0	7.4	5.0	3.4
32	3.6	2.8	4.0	1.1
15	1.2	4.6	1.0	1.1
17	0.0	1.9	2.0	0.0
36	1.2	0.9	0.0	0.0
25	9.6	3.7	6.0	3.4
18	20.5	7.4	18.0	11.4
61	3.6	1.9	3.0	1.1
75	8.4	1.9	8.0	5.7
39	4.8	3.7	5.0	3.4
35	3.6	0.0	10.0	5.5
48	10.8	8.3	7.0	3.4
46	6.0	7.4	3.0	5.7
42	16.9	13.9	15.0	10.2
63	2.4	0.0	2.0	3.4
66	1.2	6.5	4.0	0.0
27	7.2	3.7	4.0	4.5
44	18.1	25.0	28.0	27.3
50	7.2	1.9	6.0	3.4
34	2.4	0.9	2.0	0.0
54	6.0	1.9	3.0	0.0
52	4.8	6.5	4.0	6.8
74	8.4	7.4	15.0	4.5
71	2.4	1.9	3.0	3.4
68	18.1	12.0	16.0	17.0
43	12.0	18.5	14.0	8.0
51	2.4	3.7	6.0	1.1
56	9.6	3.7	15.0	9.1
58	7.2	8.3	12.0	6.8
59	6.0	3.7	3.0	1.1
67	12.0	6.5	5.0	1.1
72	0.0	2.8	0.0	1.1
70	6.0	7.4	8.0	2.3
55	2.4	2.8	5.0	2.3
88	6.0	13.0	6.0	1.1

Table 47 (continued)

Percentage of Recruits in Experimental and Control Groups of Investigation  
to Determine Item Halo Effects which Changed Answers on Retest

Item number <sup>a</sup>	Group A	Group B	Group C	Group D
79	3.6	2.8	5.0	0.0
78	0.0	4.6	9.0	5.7
81	2.4	2.8	9.0	1.1
85	3.6	0.0	2.0	1.1
99	4.8	5.6	8.0	6.8
92	7.2	2.8	3.0	1.1
97	4.8	2.8	4.0	1.1
101	0.0	2.8	1.0	1.1
82	6.0	2.8	9.0	5.7
89	4.8	7.4	10.0	1.1
122	6.0	1.9	2.0	1.1
127	15.7	8.3	12.0	4.5
117	0.0	4.6	8.0	4.5
69	6.0	3.7	5.0	0.0
123	9.6	10.2	9.0	6.8
105	0.0	3.7	4.0	0.0
91	9.6	11.1	11.0	9.1
118	3.6	15.7	13.0	8.0
112	10.8	13.0	16.0	13.6
95	2.4	2.8	1.0	1.1
110	6.0	2.8	4.0	5.7
107	2.4	0.9	3.0	2.3
152	3.6	6.5	13.0	4.5
161	7.2	7.4	4.0	1.1
125	6.0	2.8	8.0	2.3
131	8.4	8.3	19.0	14.8
135	1.2	0.9	1.0	0.0
138	6.0	5.6	4.0	2.3
143	3.6	2.8	2.0	1.1
145	10.8	10.2	9.0	4.5
144	6.0	0.9	5.0	1.1
140	7.2	10.2	16.0	10.2
149	1.2	0.9	4.0	0.0
134	4.8	0.9	3.0	0.0
130	8.4	3.7	11.0	10.2
128	4.8	6.5	7.0	4.5
151	10.8	6.5	6.0	0.0
146	4.8	6.5	3.0	4.5

Table 47 (continued)

Percentage of Recruits in Experimental and Control Groups of Investigation  
to Determine Item Halo Effects which Changed Answers on Retest

Item number <sup>a</sup>	Group A	Group B	Group C	Group D
148	6.0	2.8	4.0	3.4
150	2.4	2.8	4.0	2.3
174	13.3	9.3	19.0	10.2
192	2.4	6.5	4.0	1.1
132	3.6	3.7	13.0	1.1
154	4.8	9.3	7.0	0.0
194	0.0	5.6	5.0	2.3
129	1.2	1.9	4.0	3.4
162	4.8	3.7	6.0	1.1
157	6.0	2.8	3.0	0.0
185	1.2	0.0	7.0	1.1
153	4.8	7.4	11.0	8.0
188	15.7	9.3	13.0	11.4
191	6.0	5.6	12.0	8.0
182	16.9	14.8	21.0	11.4
189	9.6	11.1	18.0	10.2
156	7.2	3.7	11.0	5.7
195	9.6	10.2	15.0	15.9
183	9.6	8.3	11.0	4.5
181	10.8	13.9	17.0	3.4
158	4.8	3.7	3.0	4.5
159	12.0	9.3	14.0	6.8
172	6.0	5.6	11.0	5.7
186	7.2	11.1	14.0	13.6
179	9.6	11.1	12.0	4.5

<sup>a</sup>The order of the items in the table is the sequence in which they were administered to the experimental groups (Groups C and D).

Table 48

**Item Numbers Preparatory to Factorization and Their Designation in  
The Recruit Personal History Inventory**

Number in factor study	Number in exper. inventory	Number in factor study	Number in exper. inventory	Number in factor study	Number in exper. inventory
1	10	32	71	63	148
2	15	33	78	64	149
3	17	34	81	65	150
4	18	35	82	66	151
5	19	36	85	67	152
6	21	37	88	68	153
7	25	38	89	69	154
8	31	39	91	70	156
9	32	40	92	71	159
10	34	41	95	72	161
11	35	42	97	73	162
12	39	43	99	74	172
13	42	44	105	75	174
14	43	45	107	76	179
15	44	46	110	77	181
16	46	47	112	78	182
17	48	48	117	79	183
18	50	49	118	80	185
19	51	50	123	81	186
20	52	51	125	82	188
21	54	52	127	83	189
22	55	53	128	84	191
23	56	54	130	85	192
24	57	55	131	86	195
25	58	56	132	87	GCT
26	61	57	134	88	ARI
27	63	58	135	89	MECH
28	67	59	138	90	CLER
29	68	60	140	91	Education
30	69	61	144	92	Grade
31	70	62	145		failures

APPENDIX IV

THE FACTORIZATION

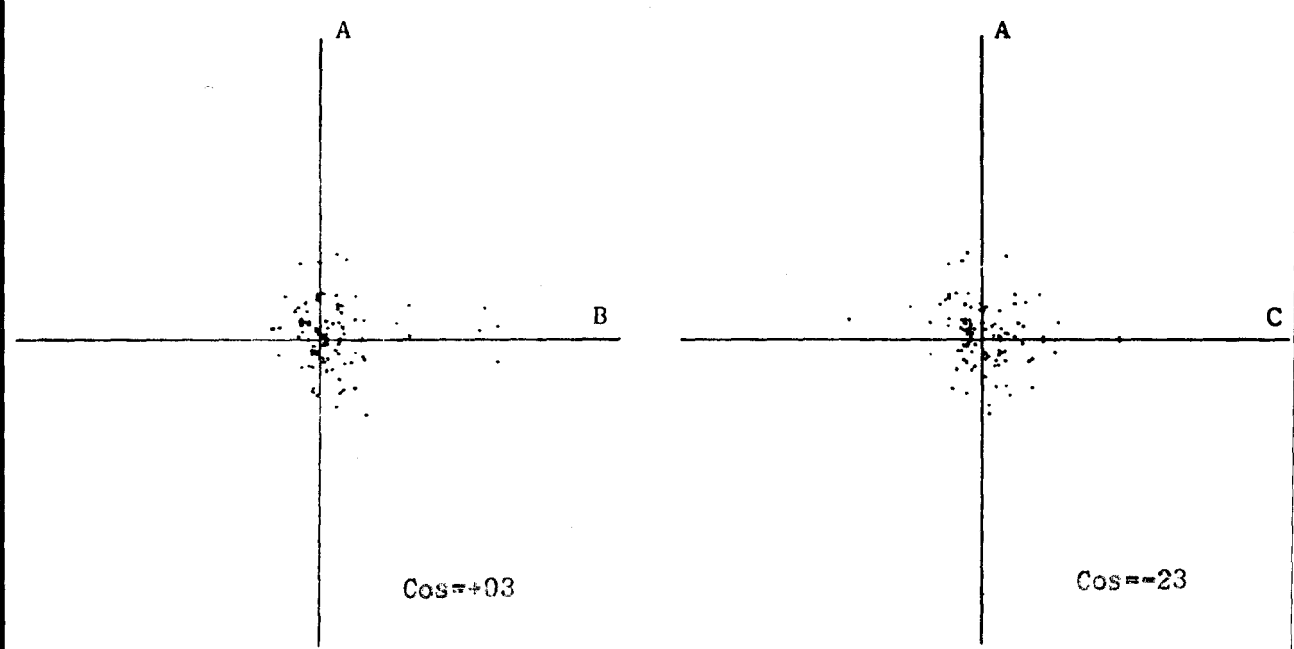


FIGURE 3

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

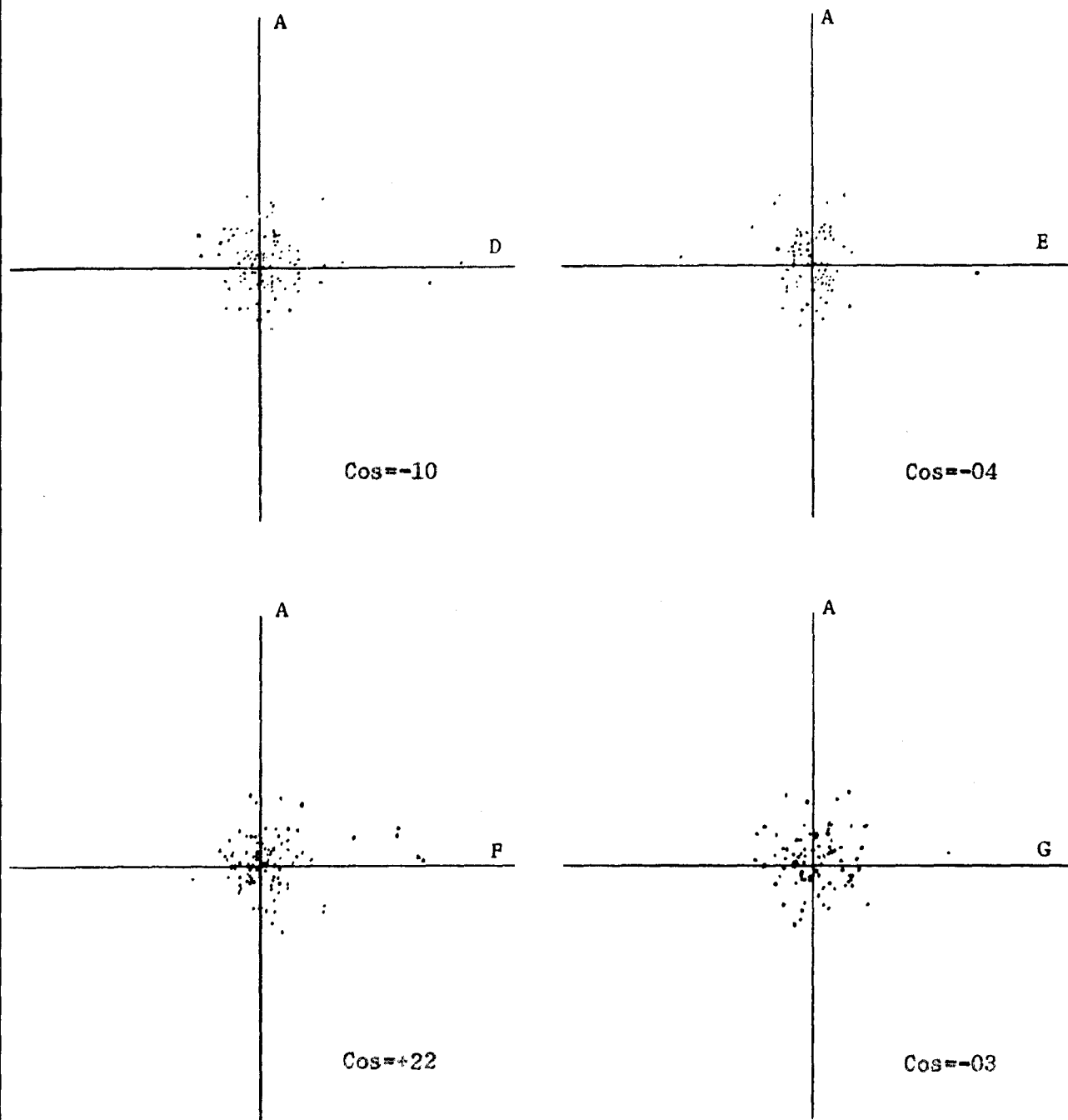


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX



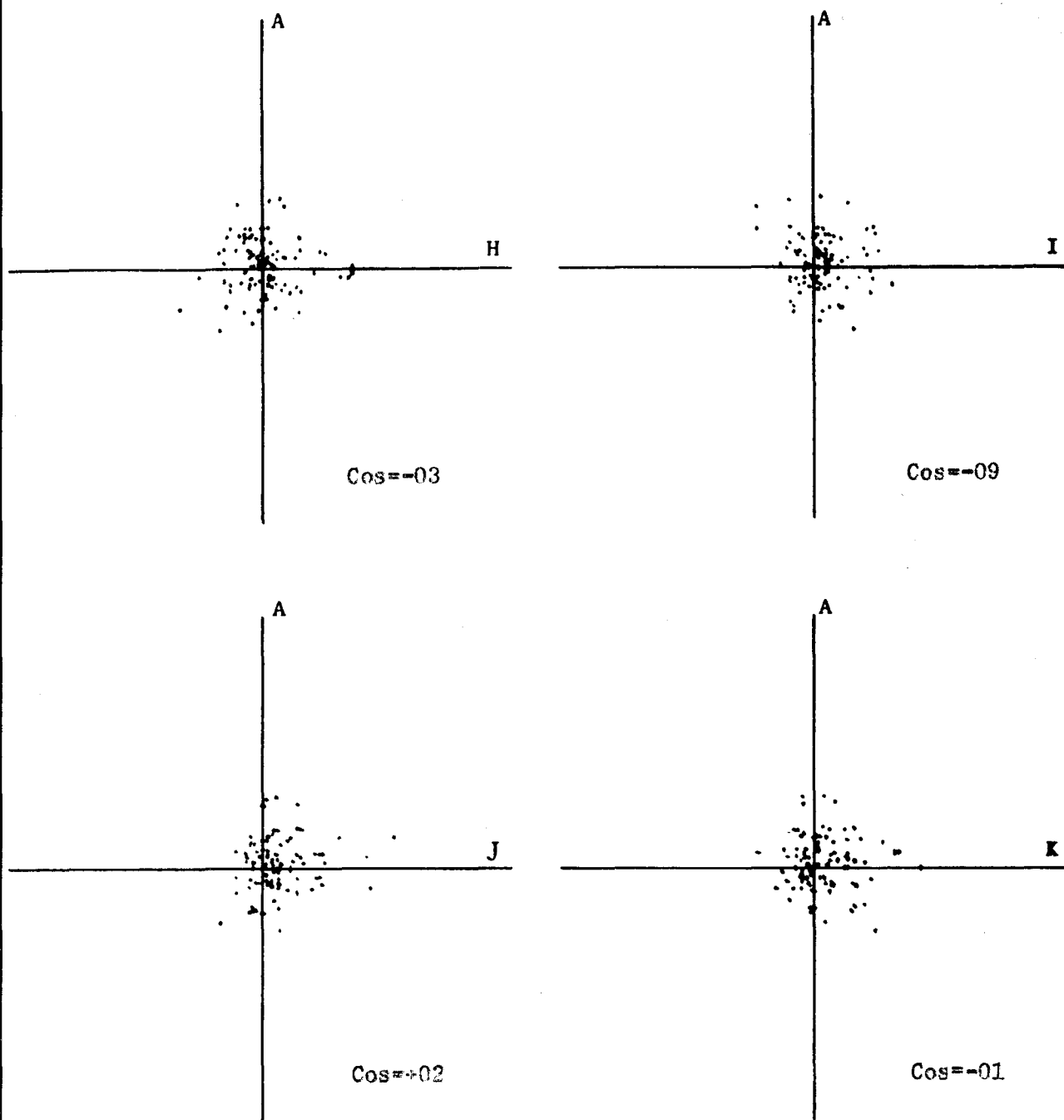


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

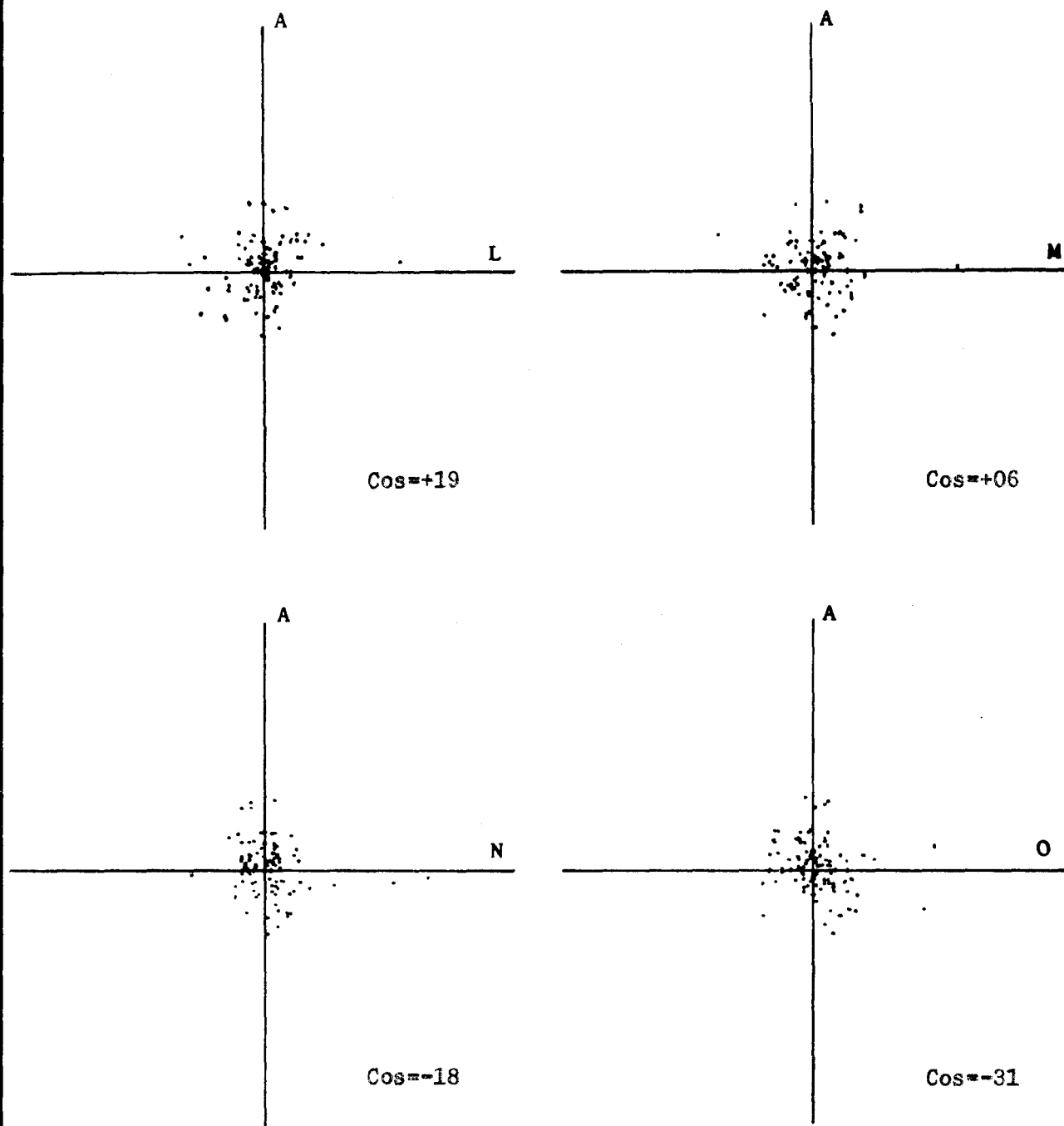


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

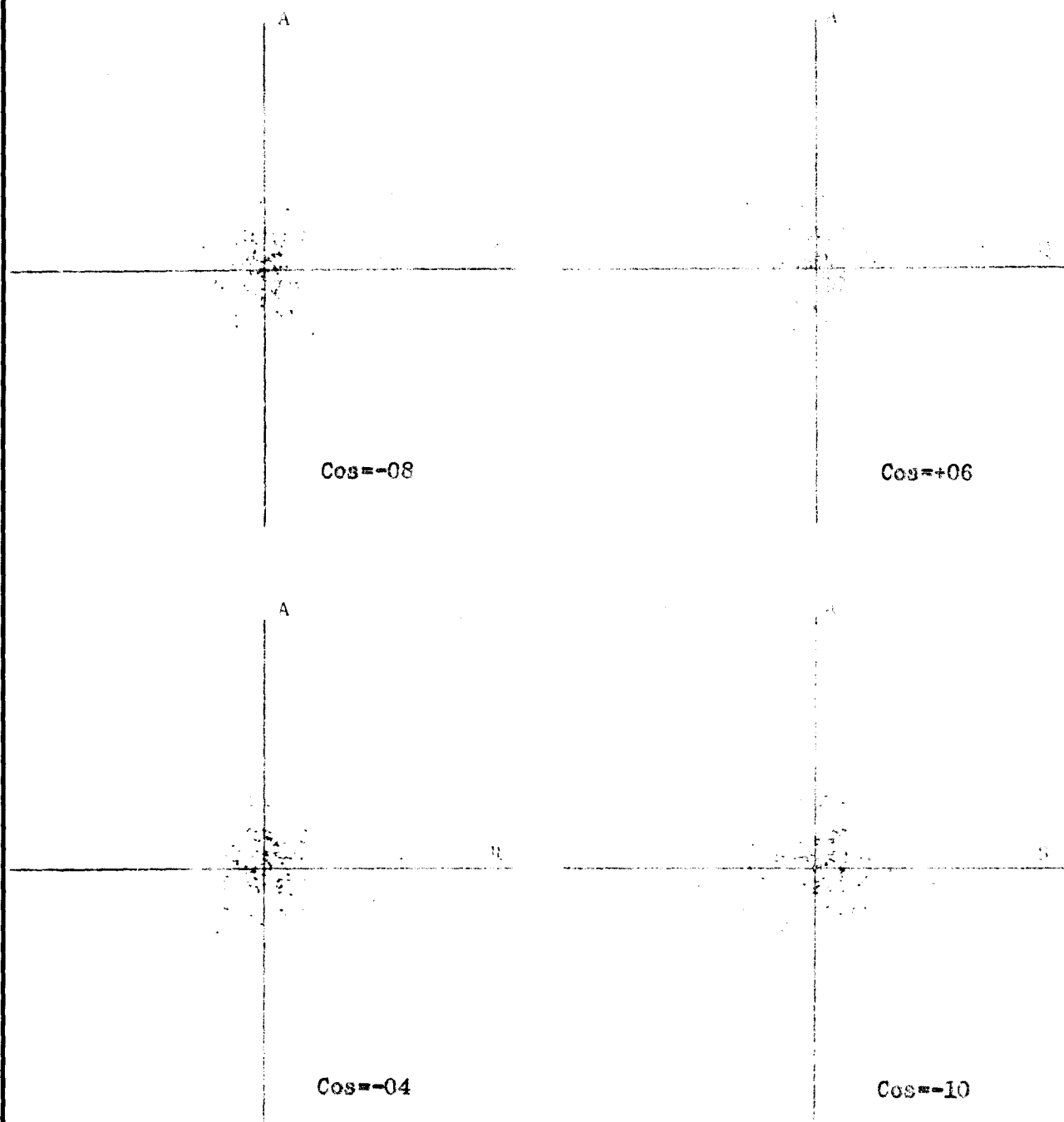


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

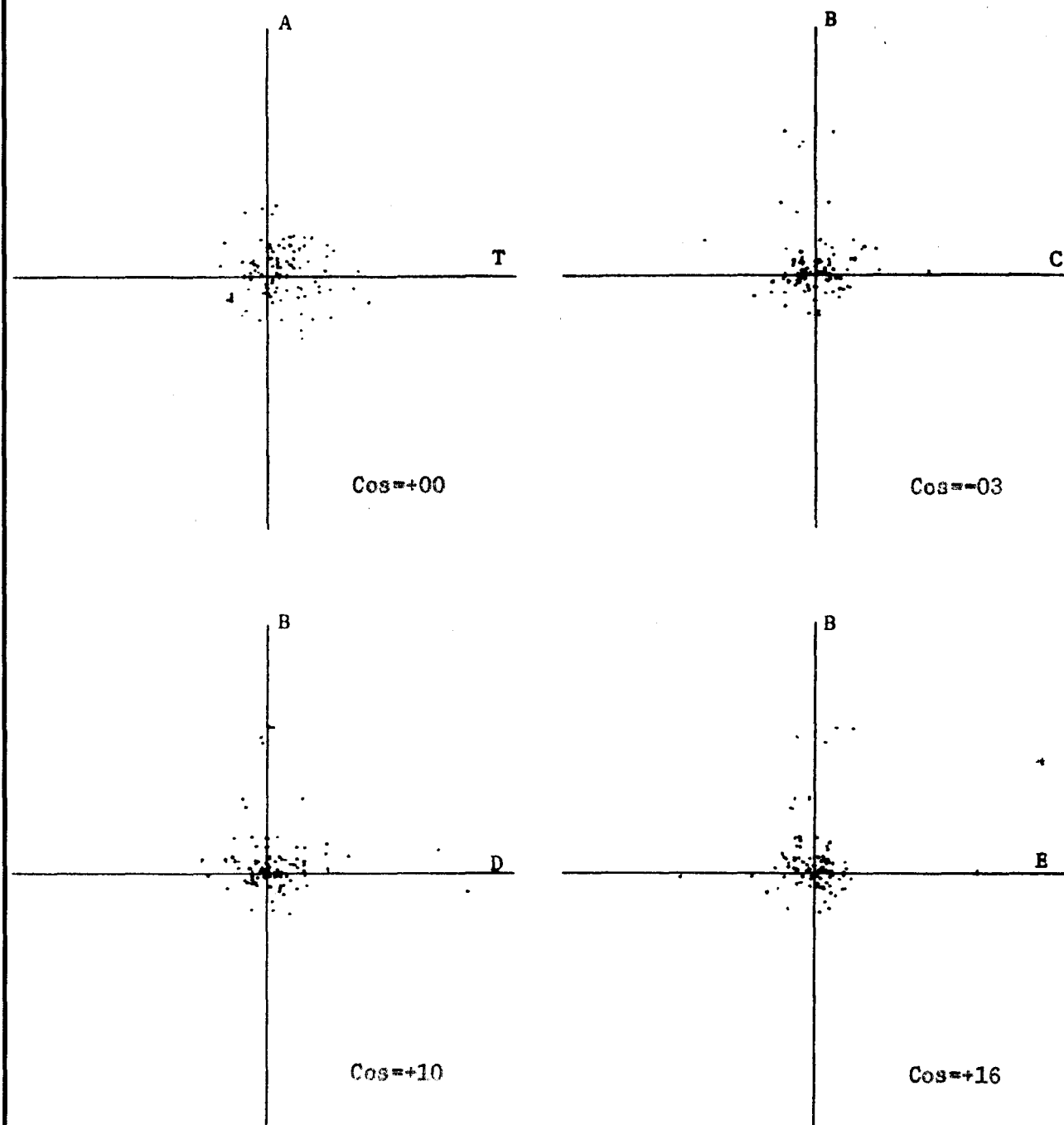


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

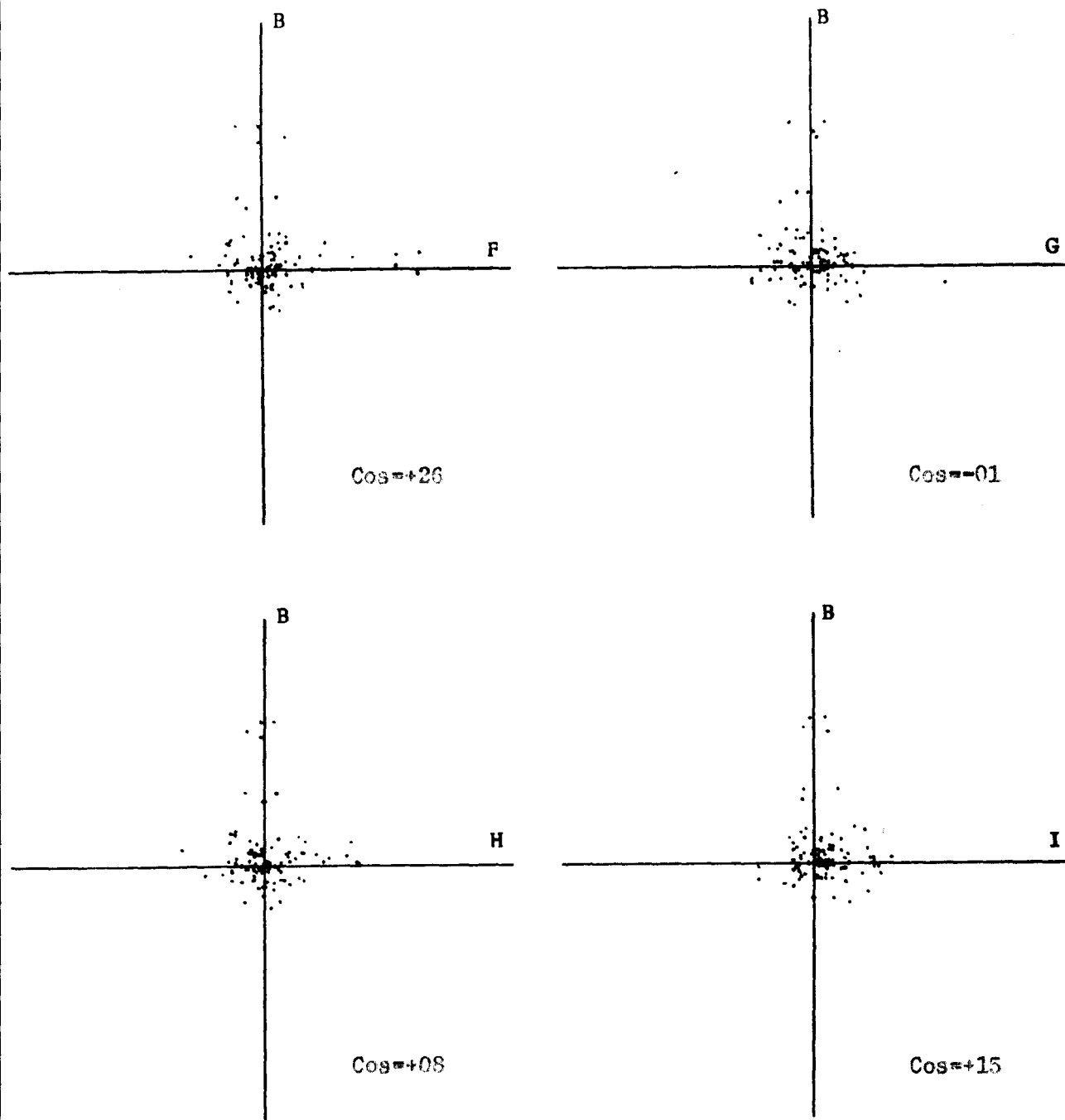


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

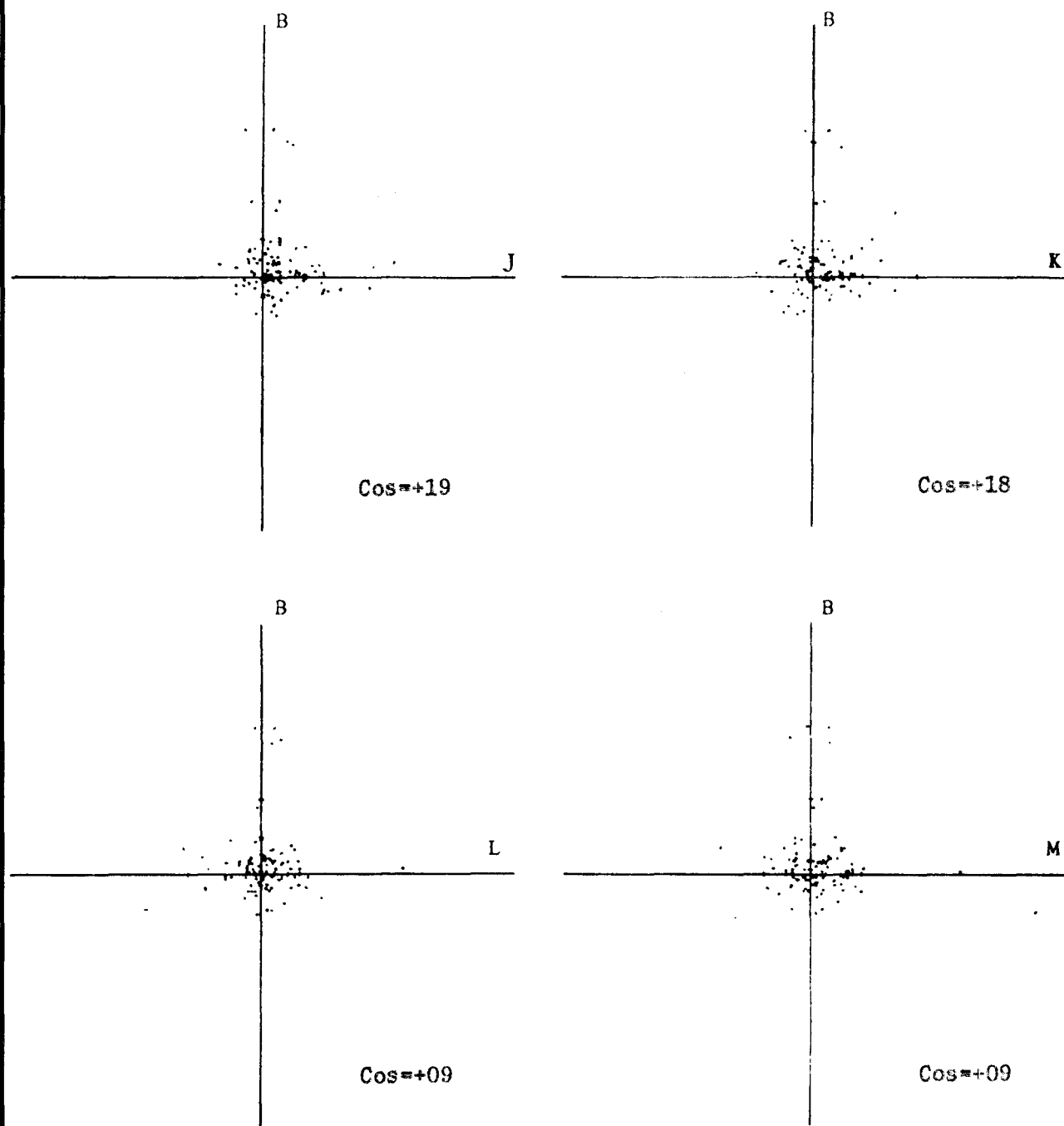


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

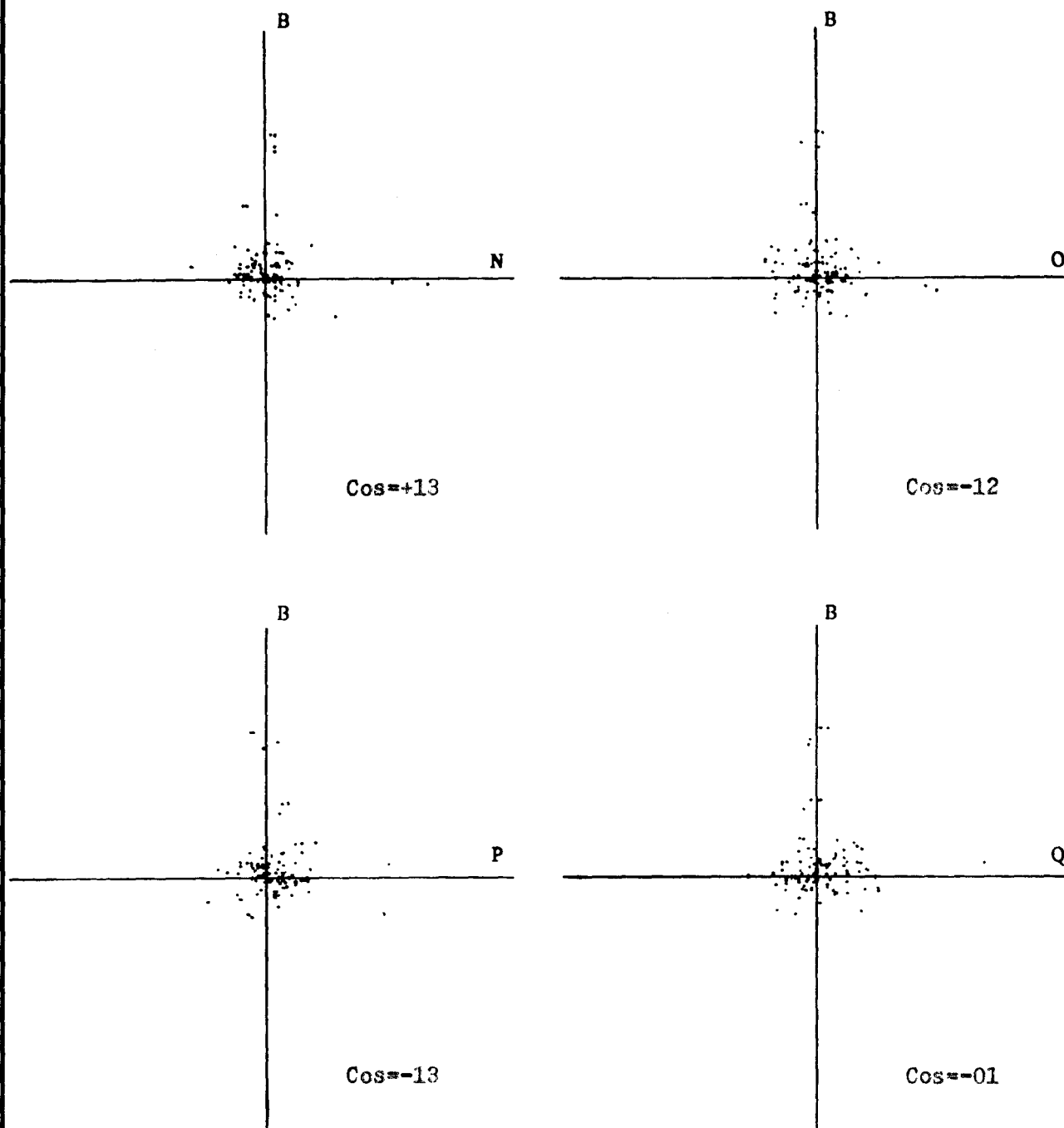


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

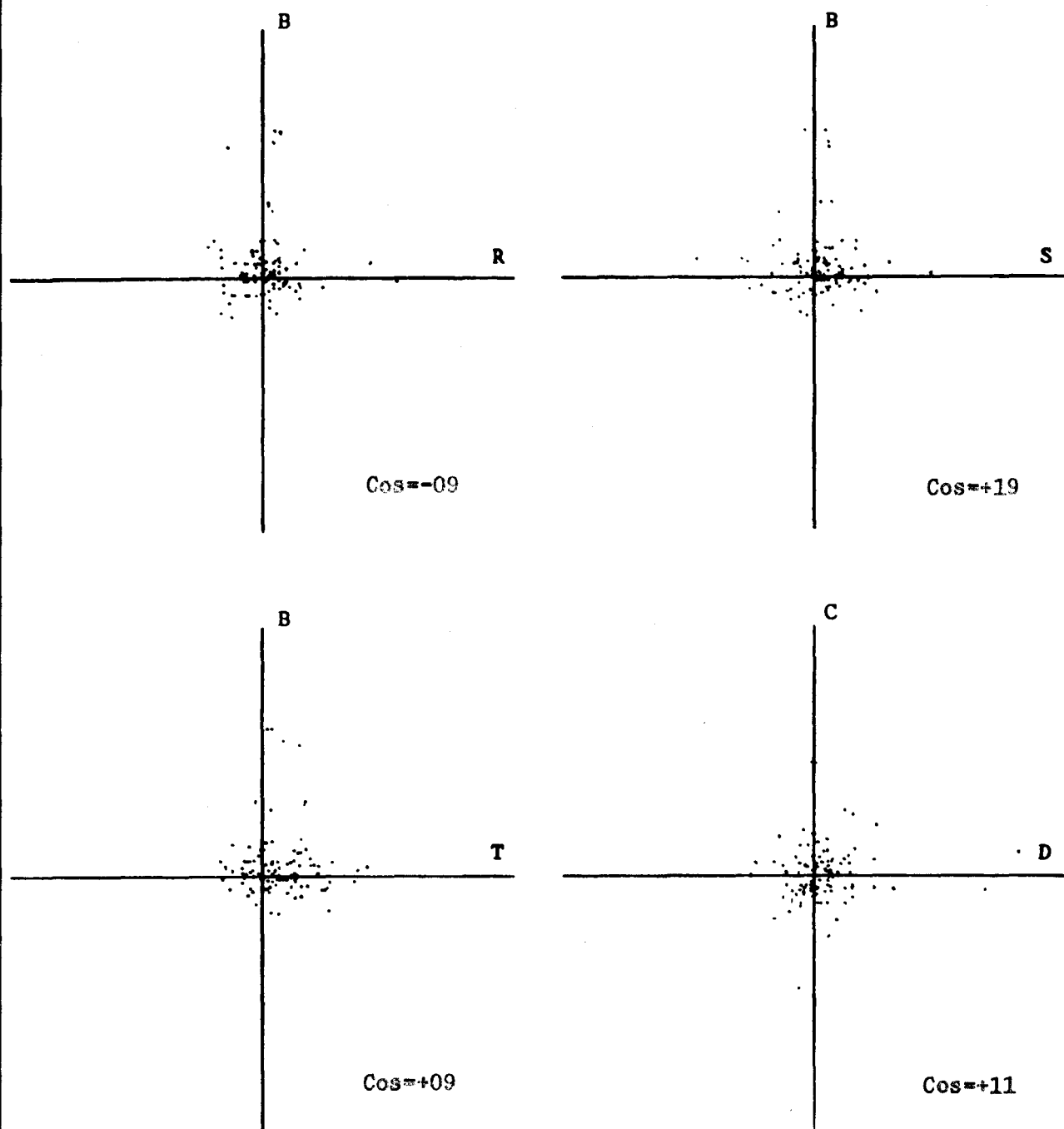


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX



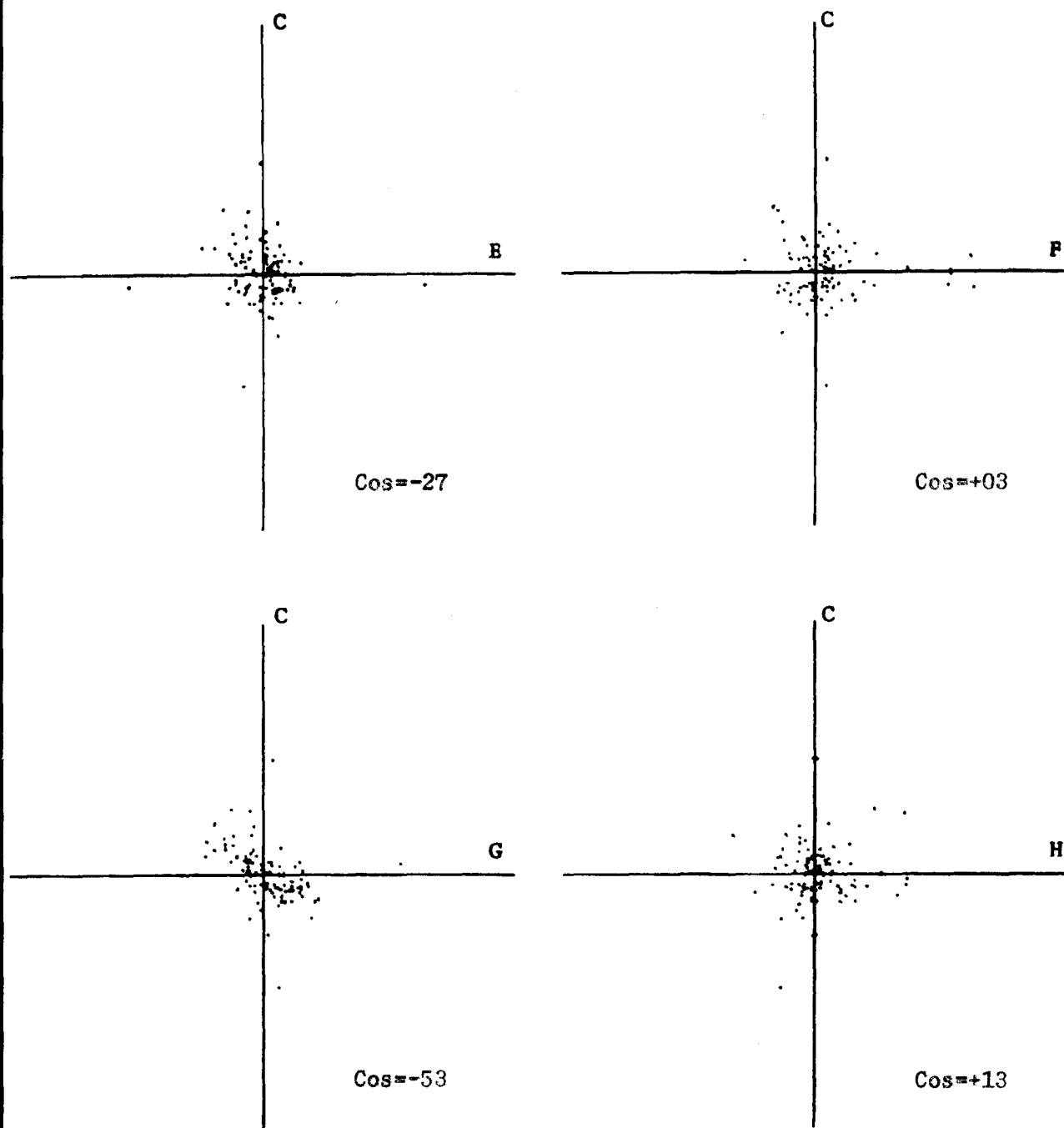


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

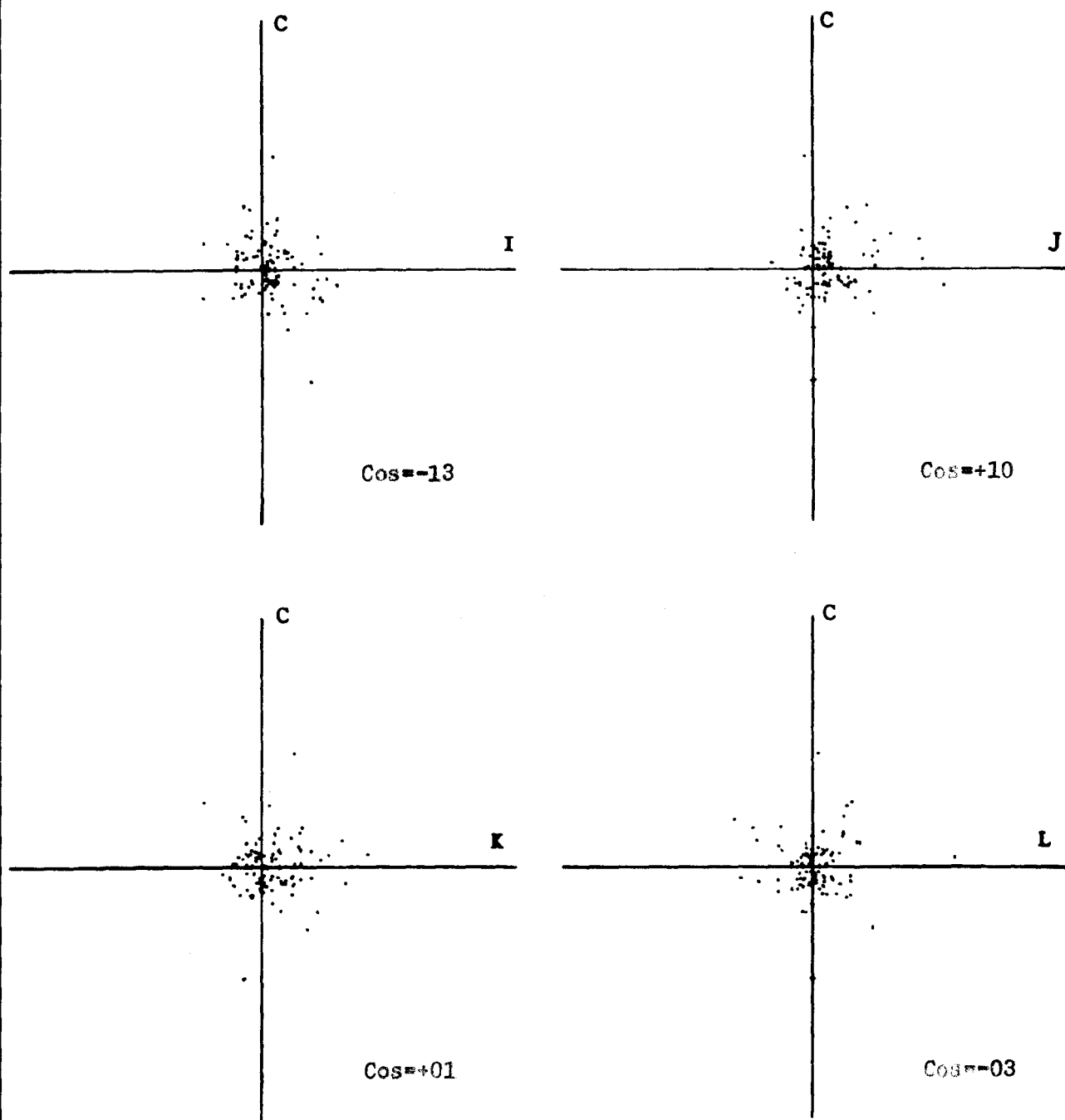


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

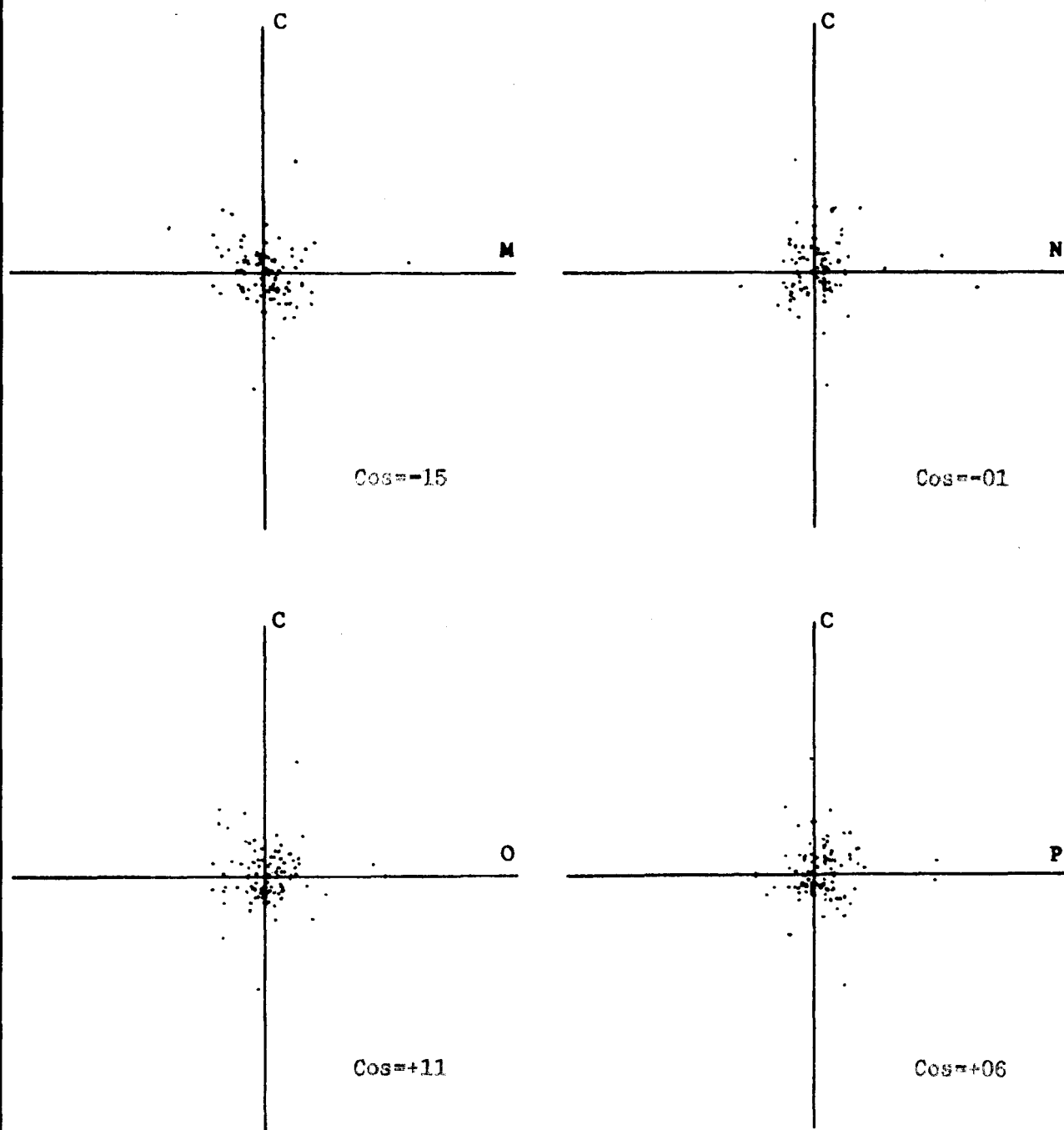


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

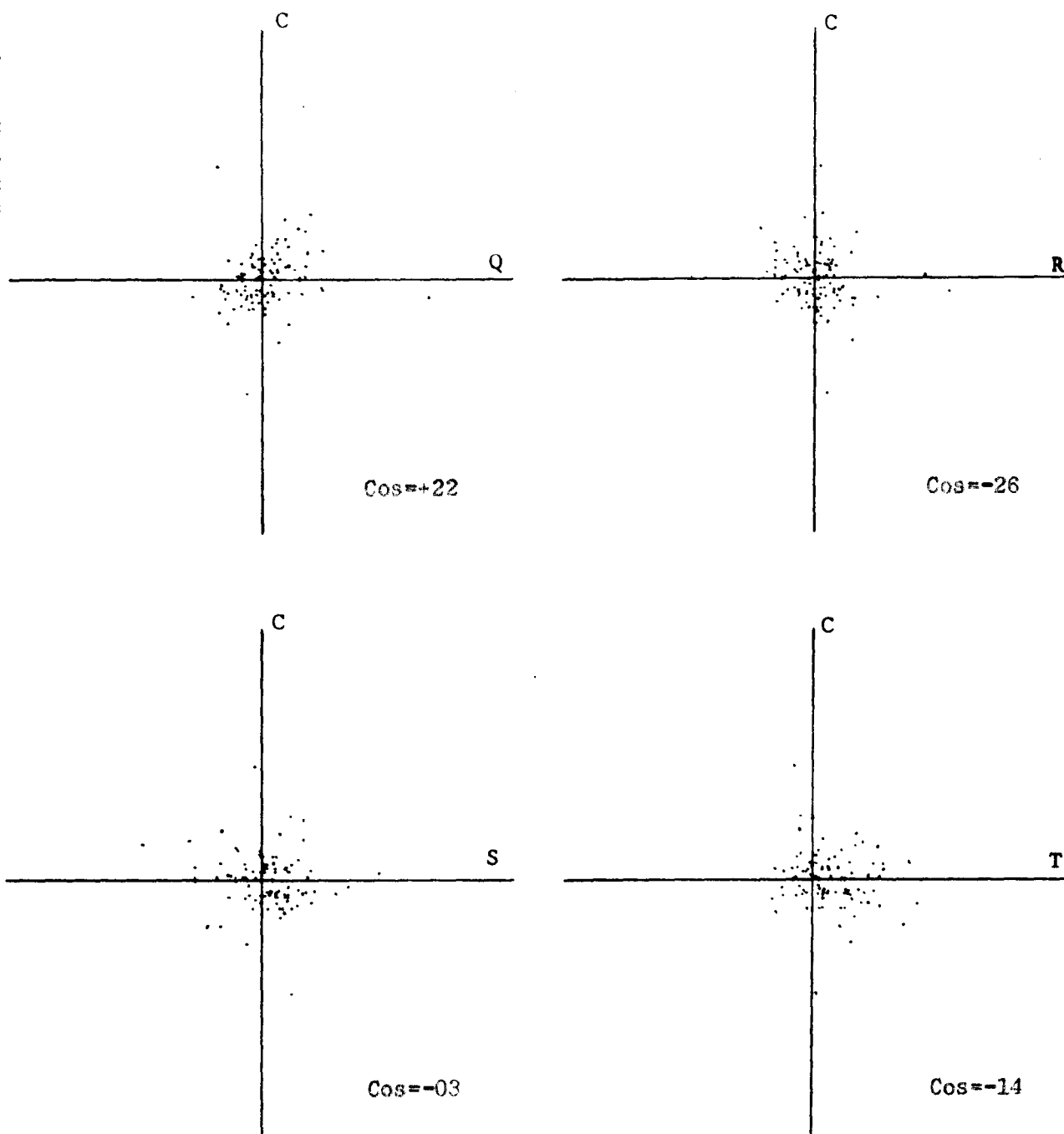


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

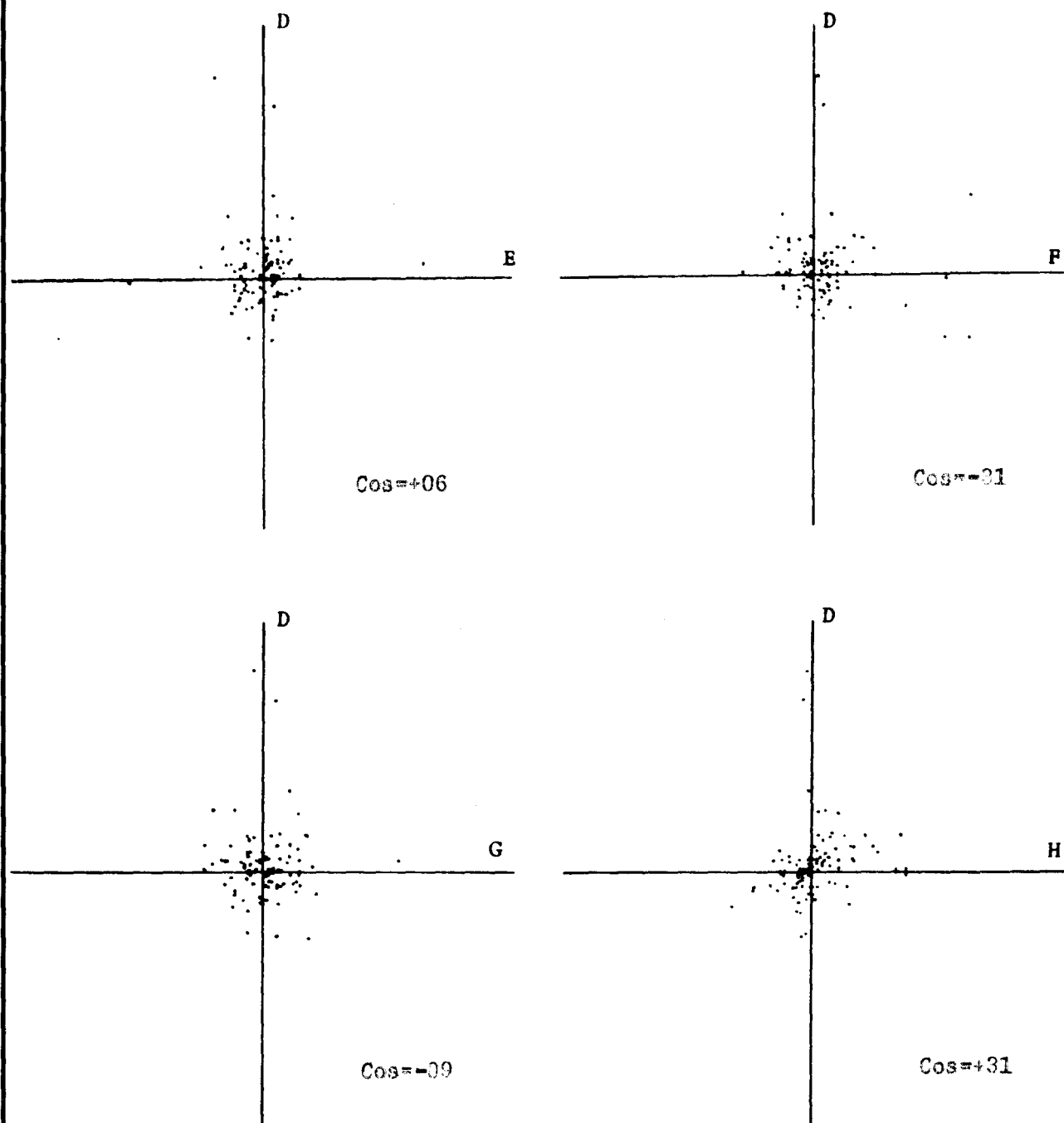


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

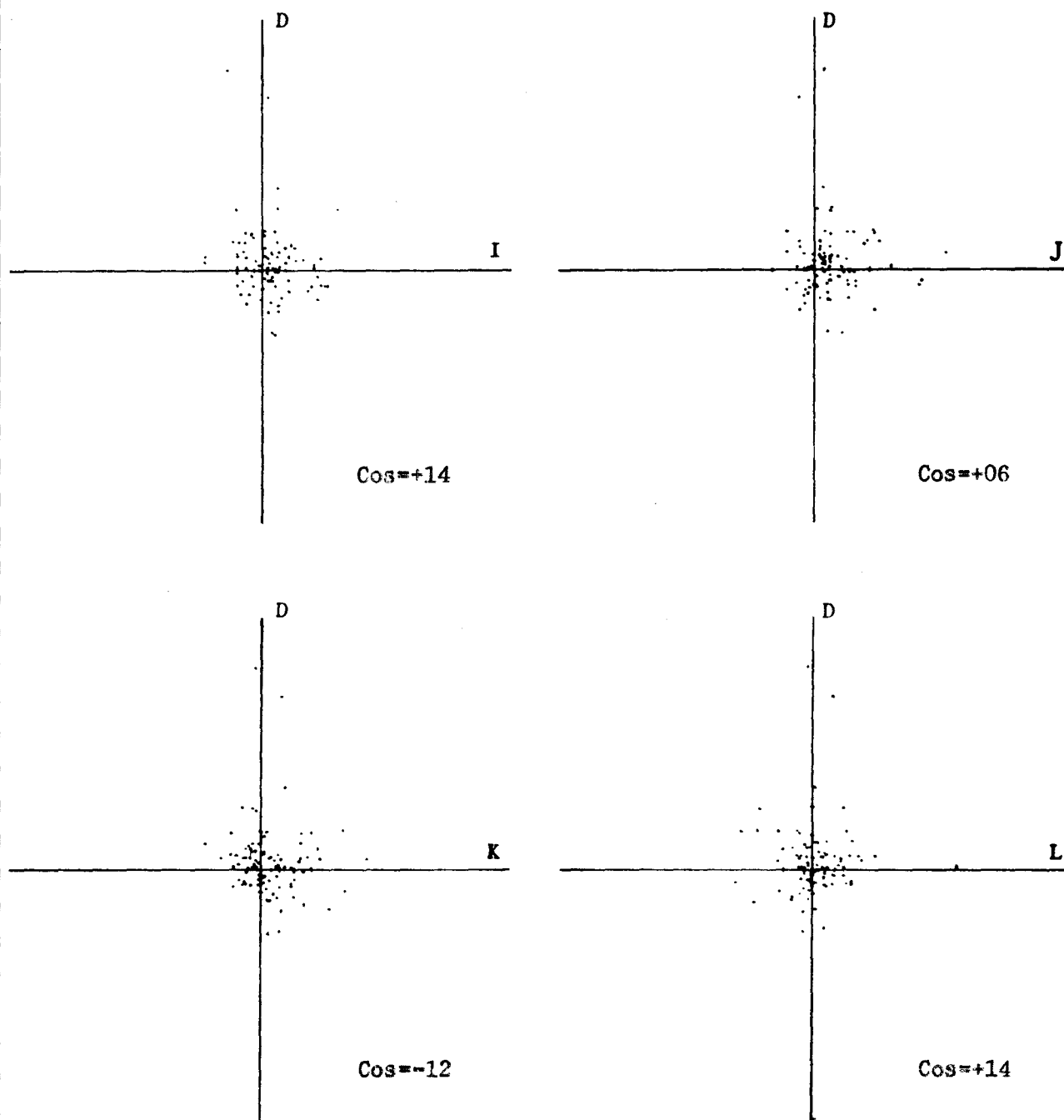


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

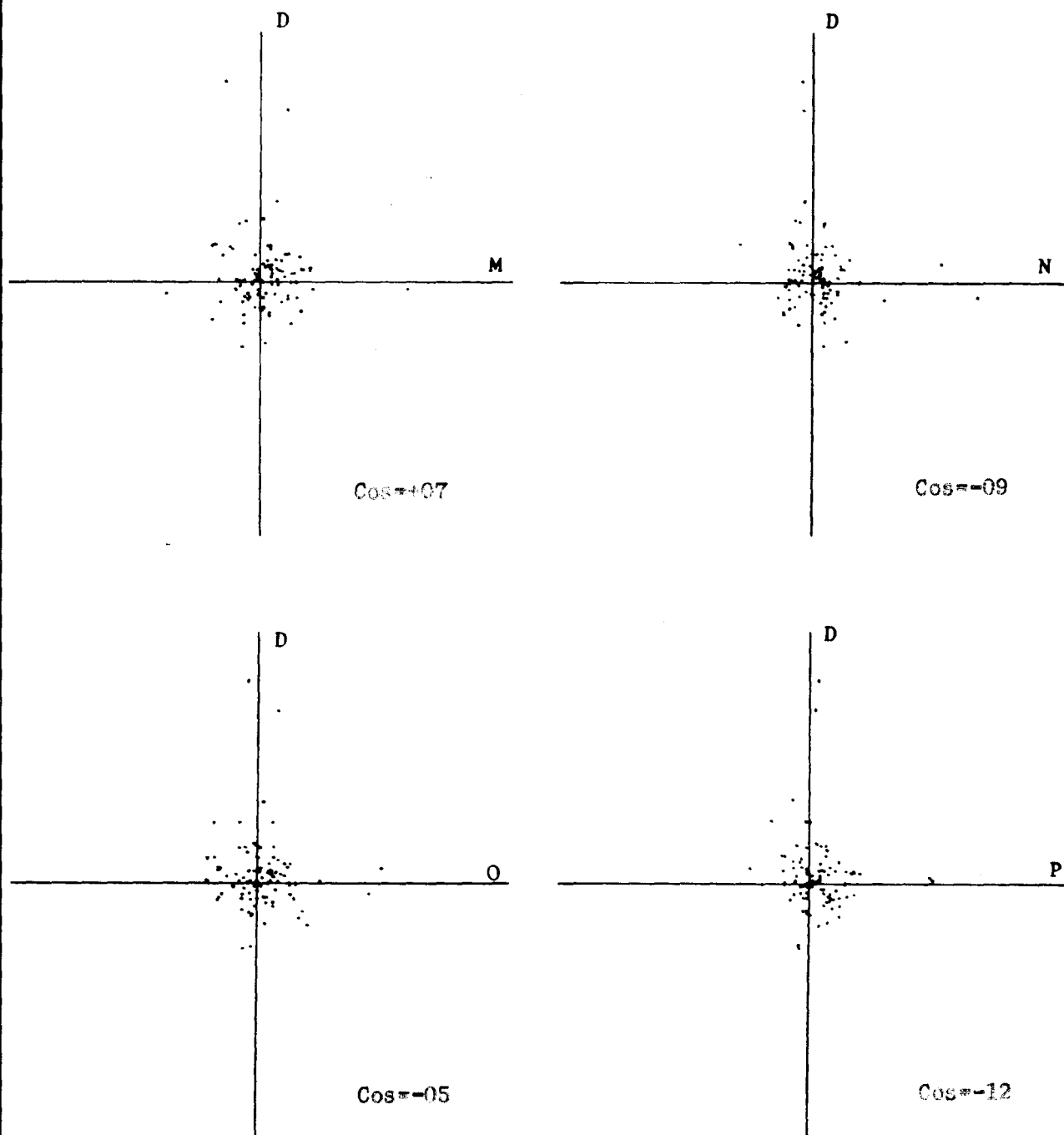


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

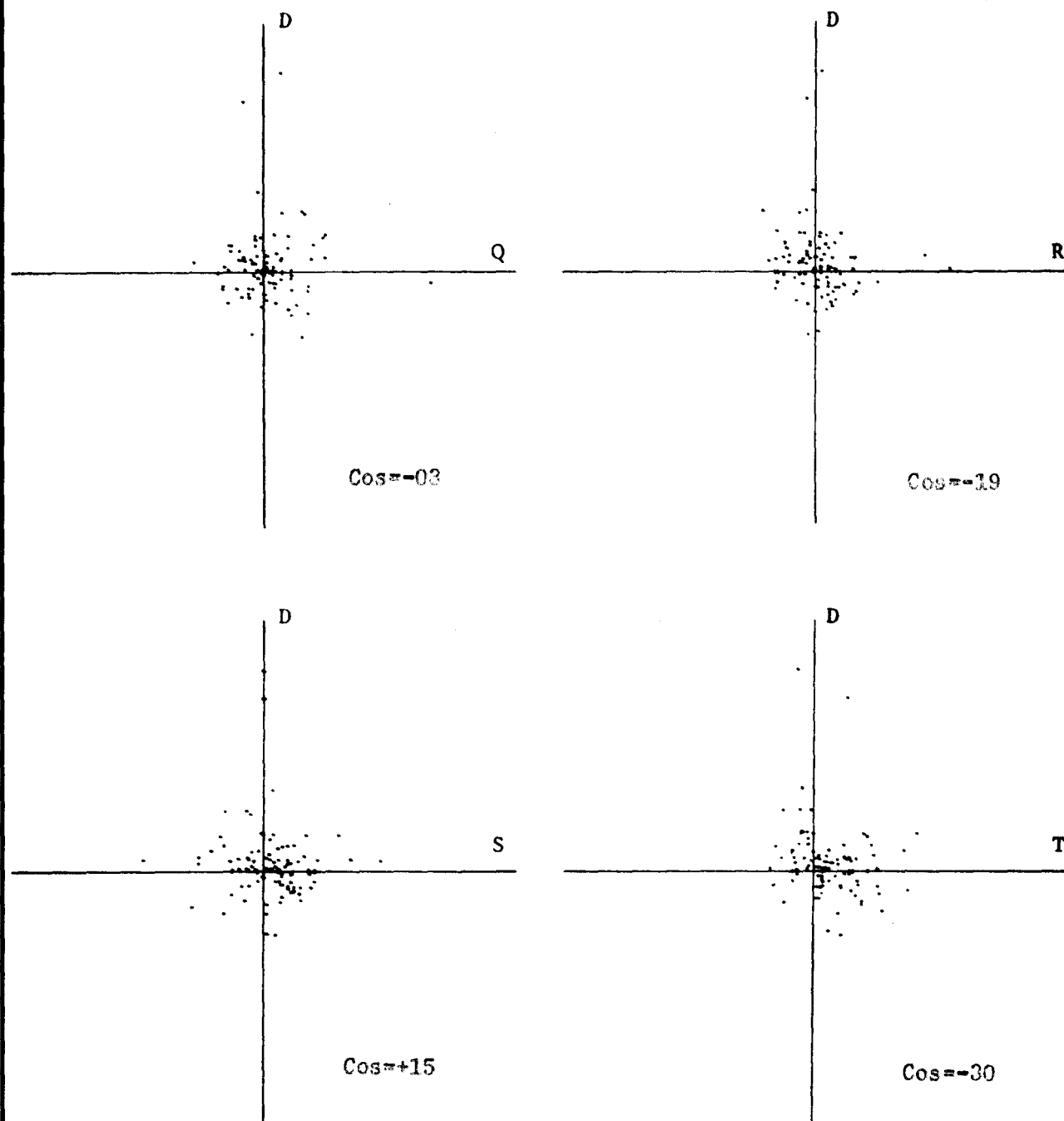


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX



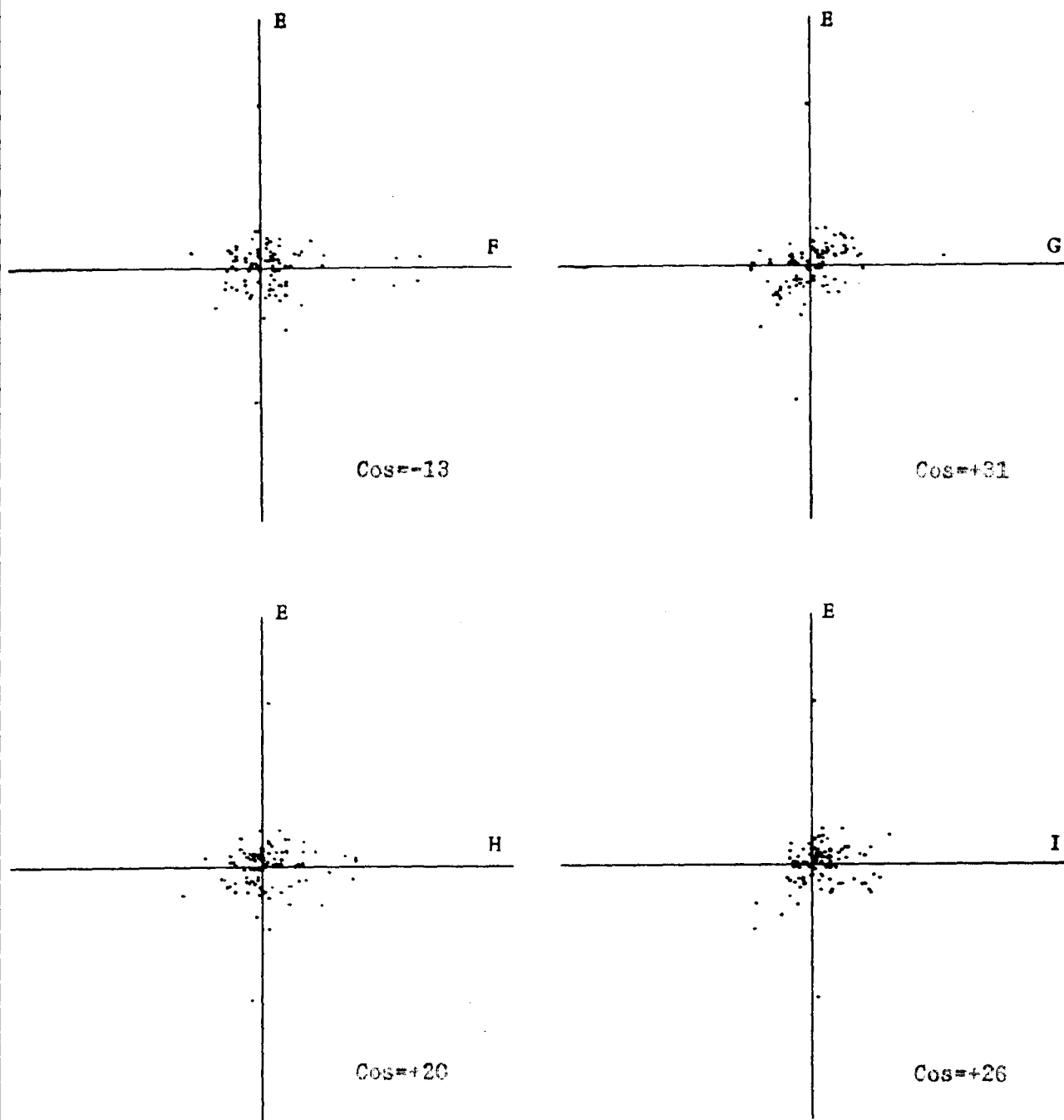


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

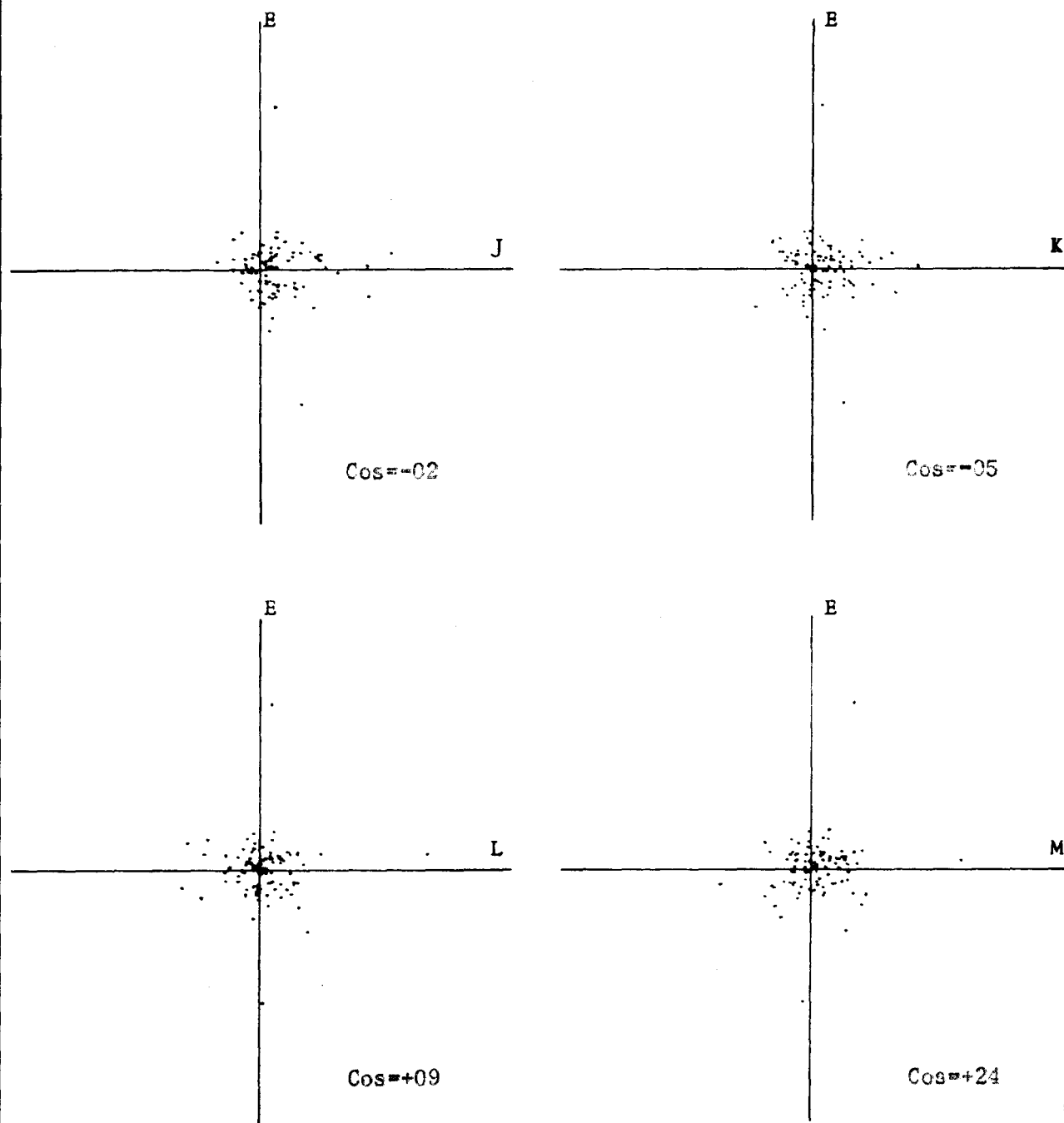


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

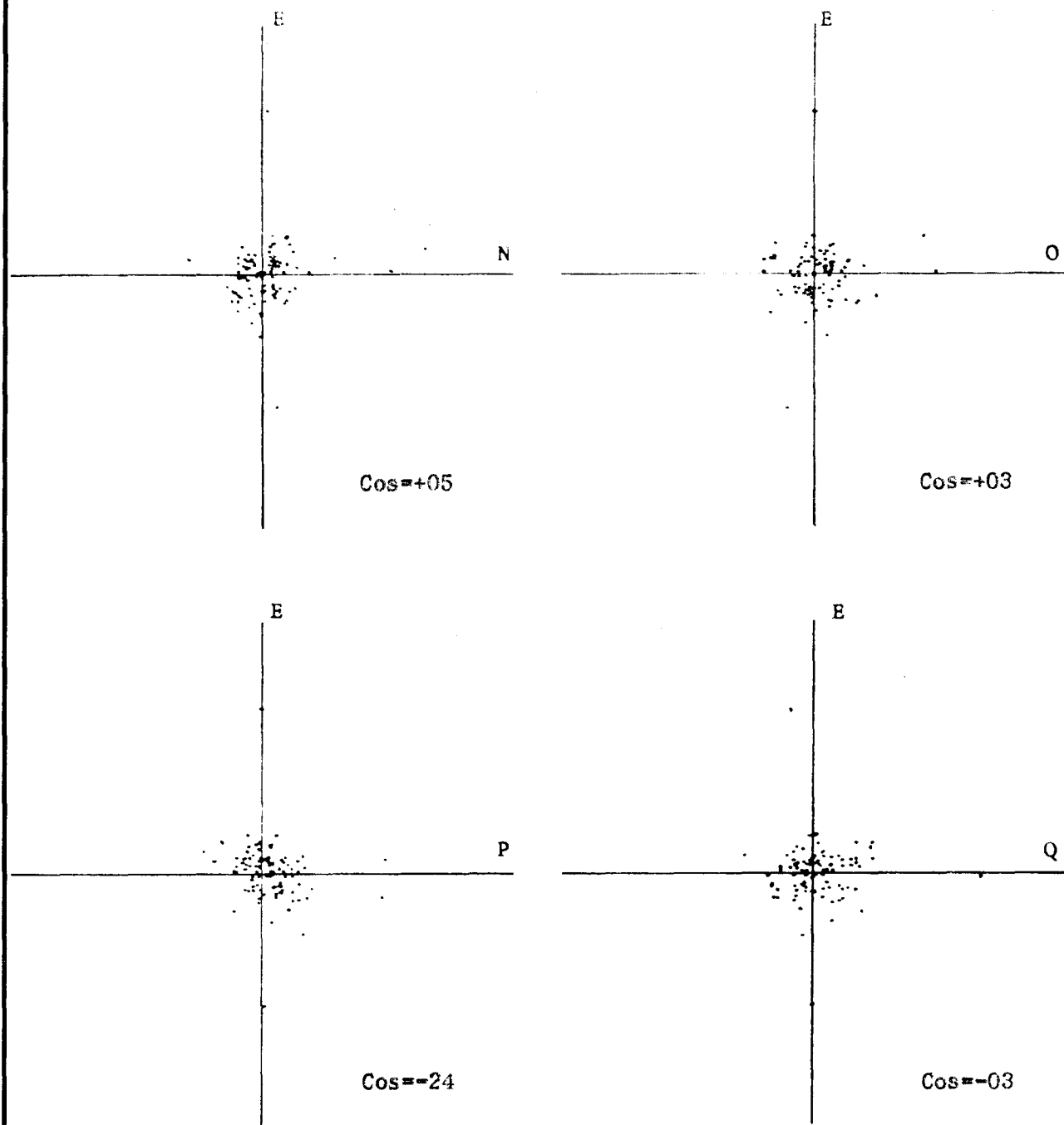


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

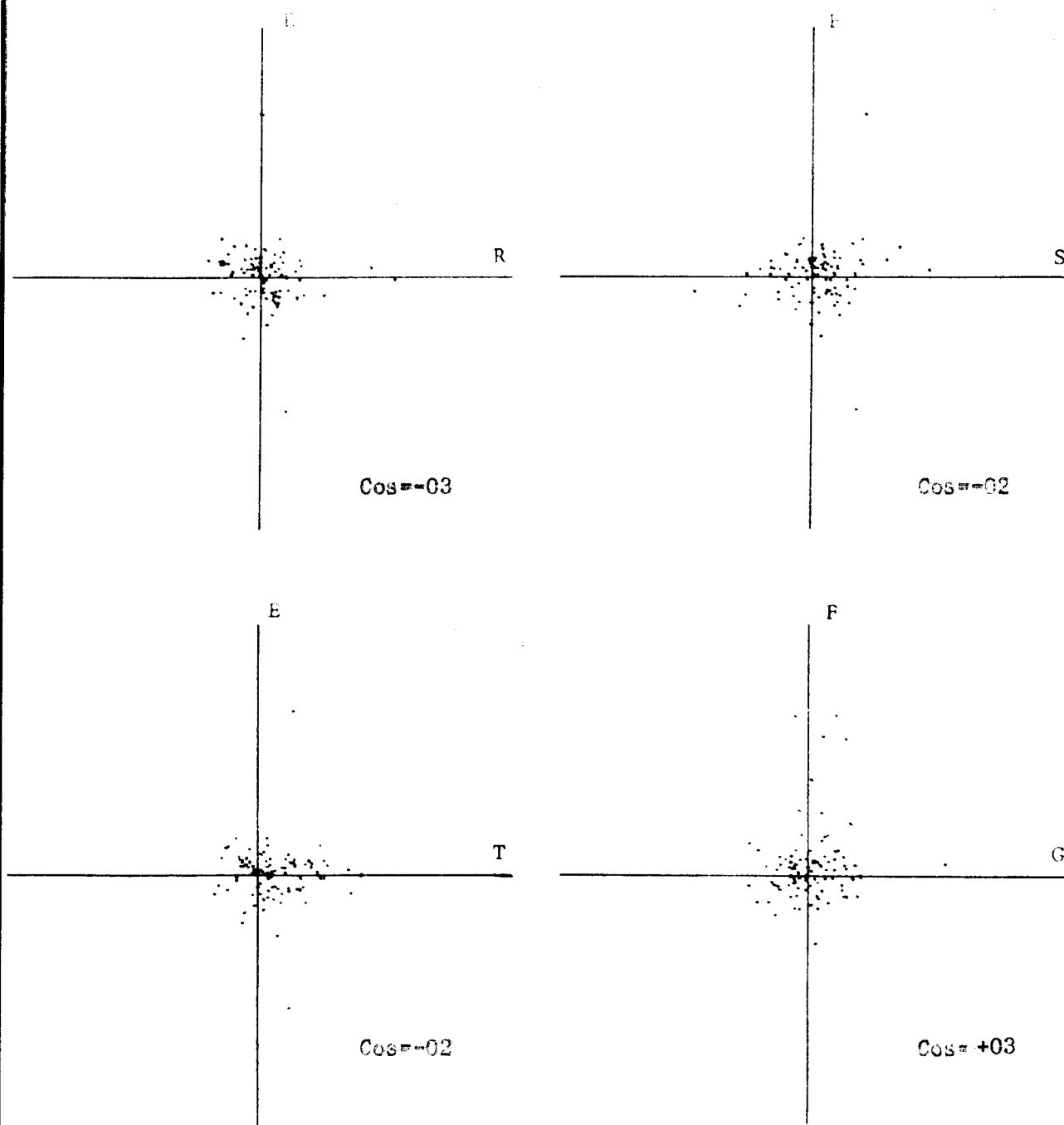


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

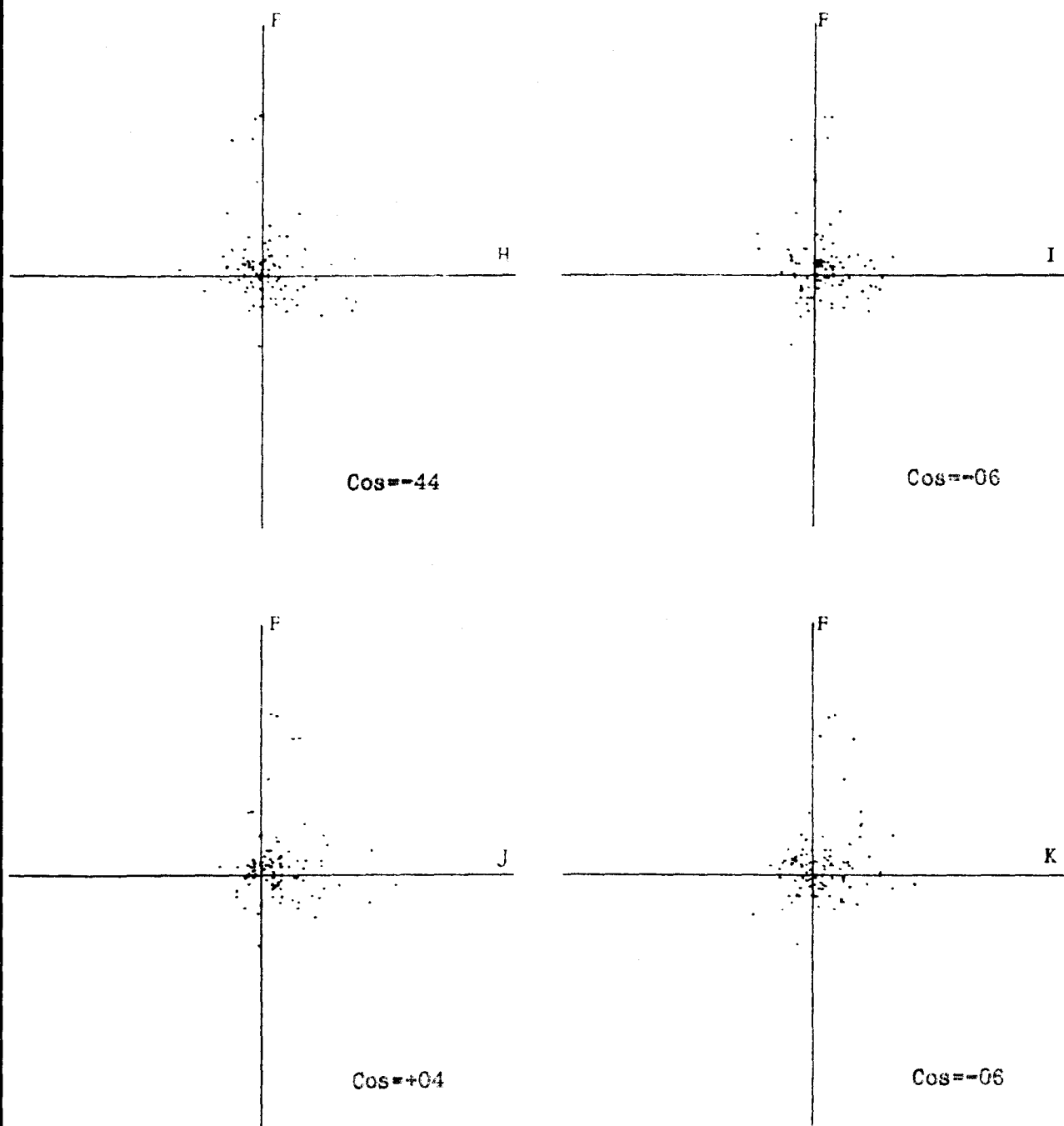


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

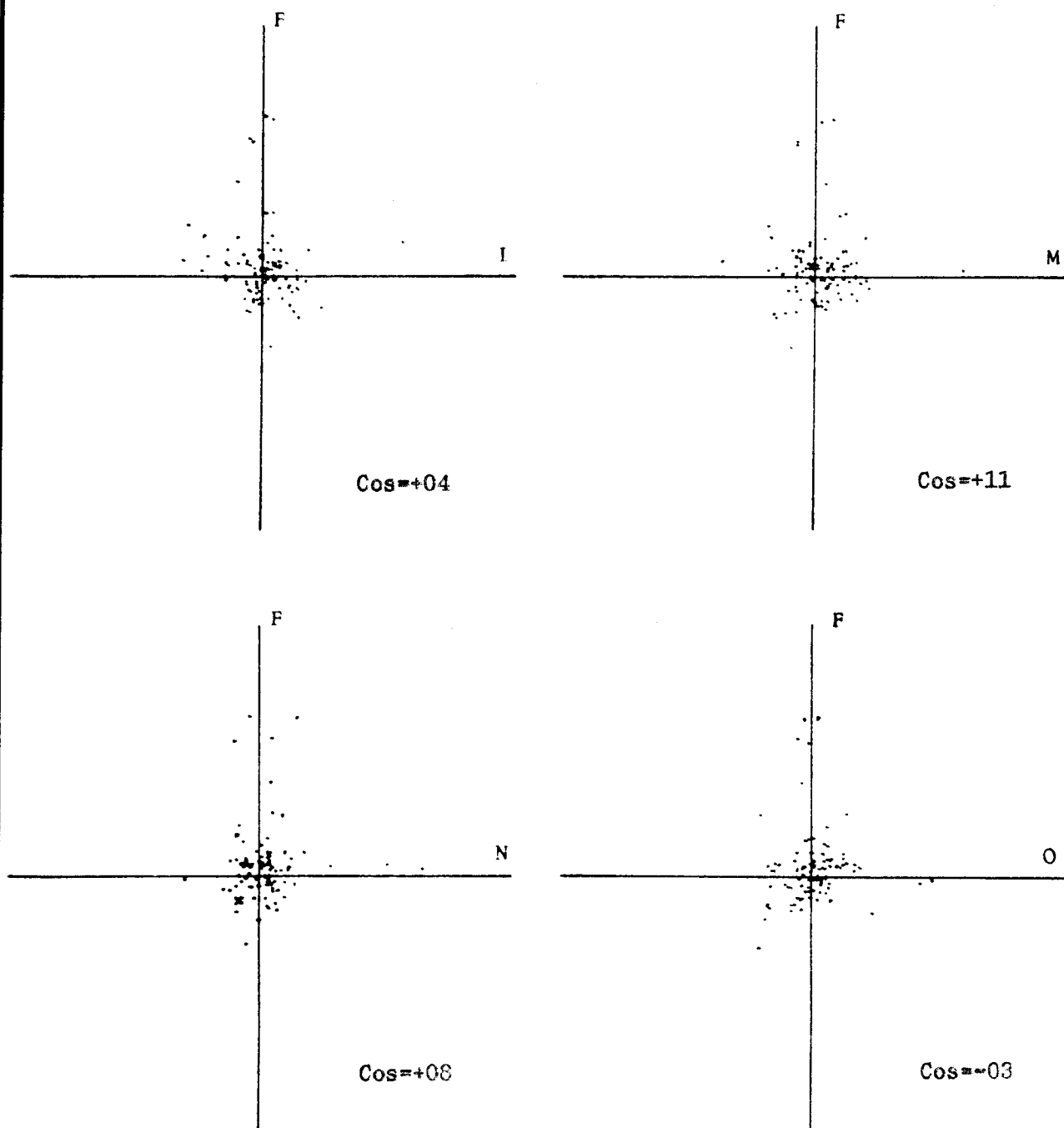


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

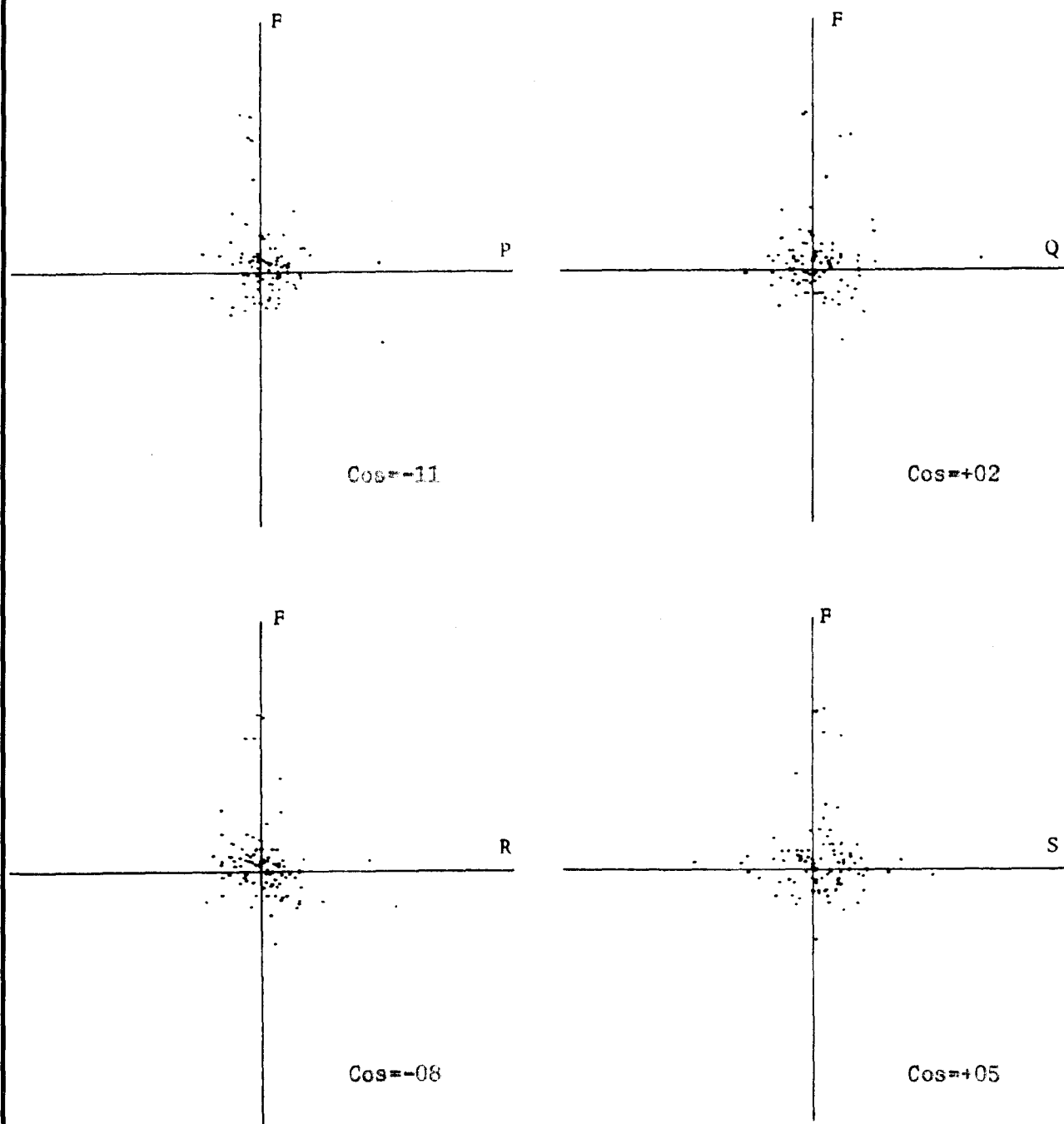


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

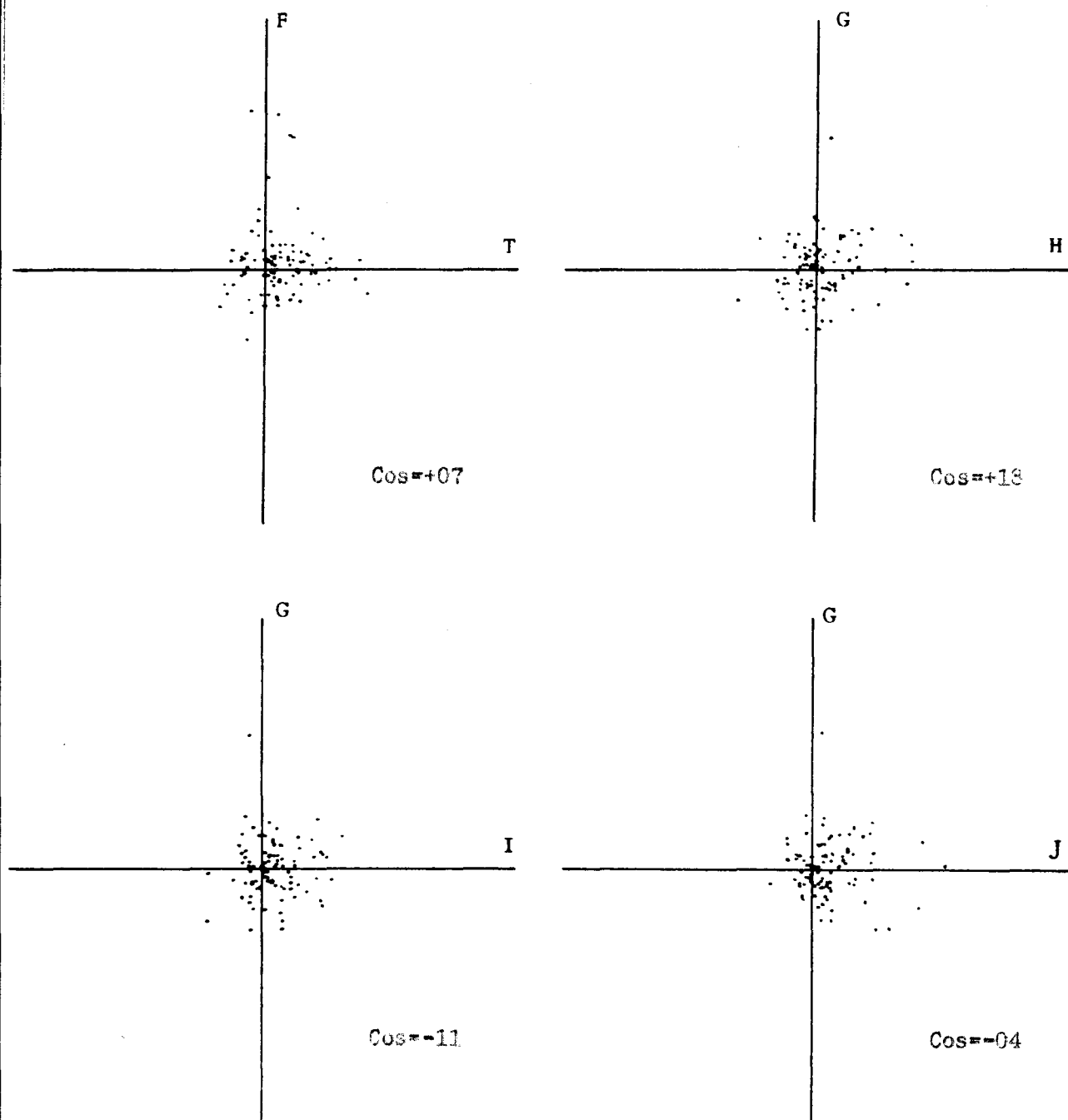


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX



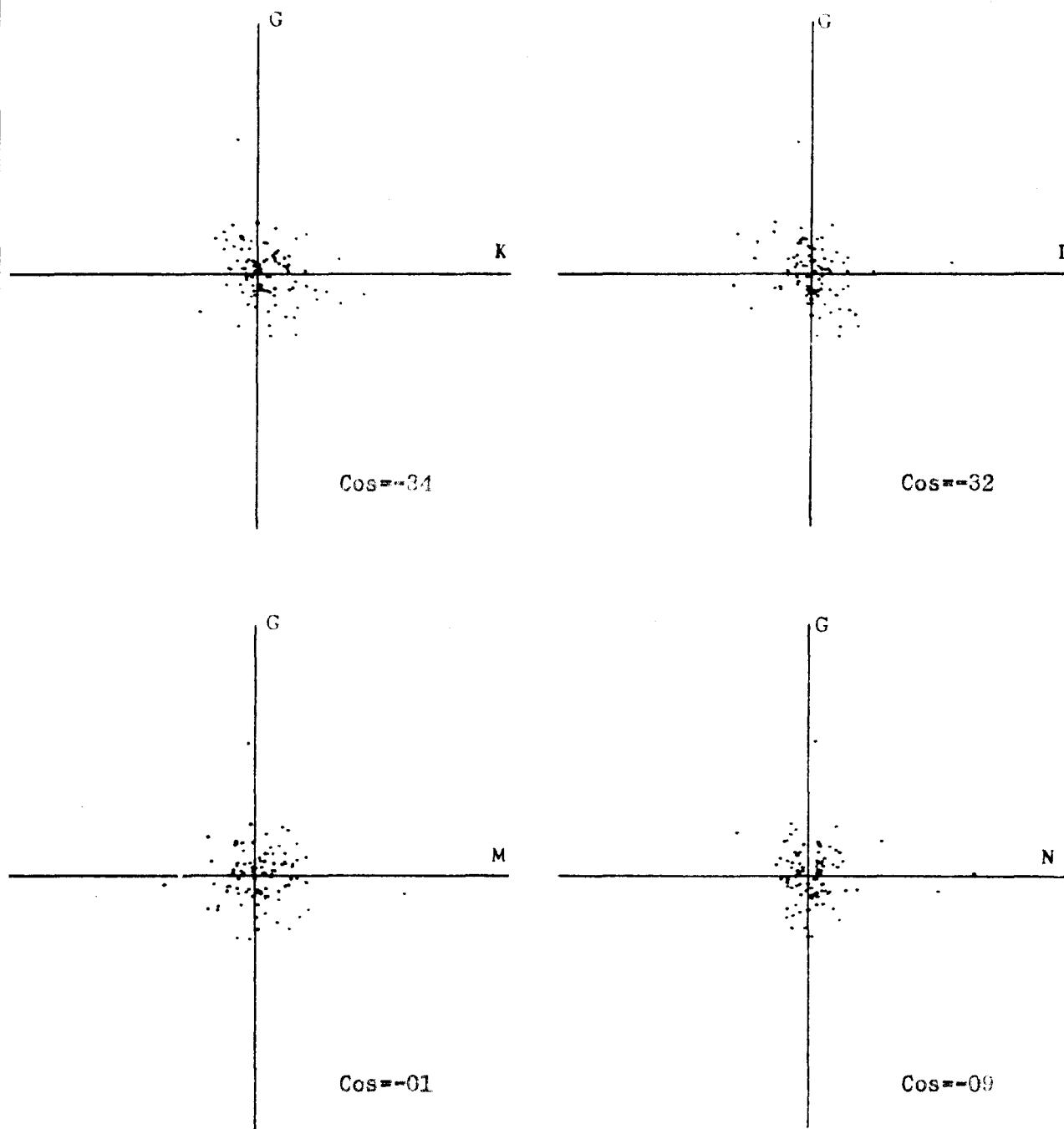


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

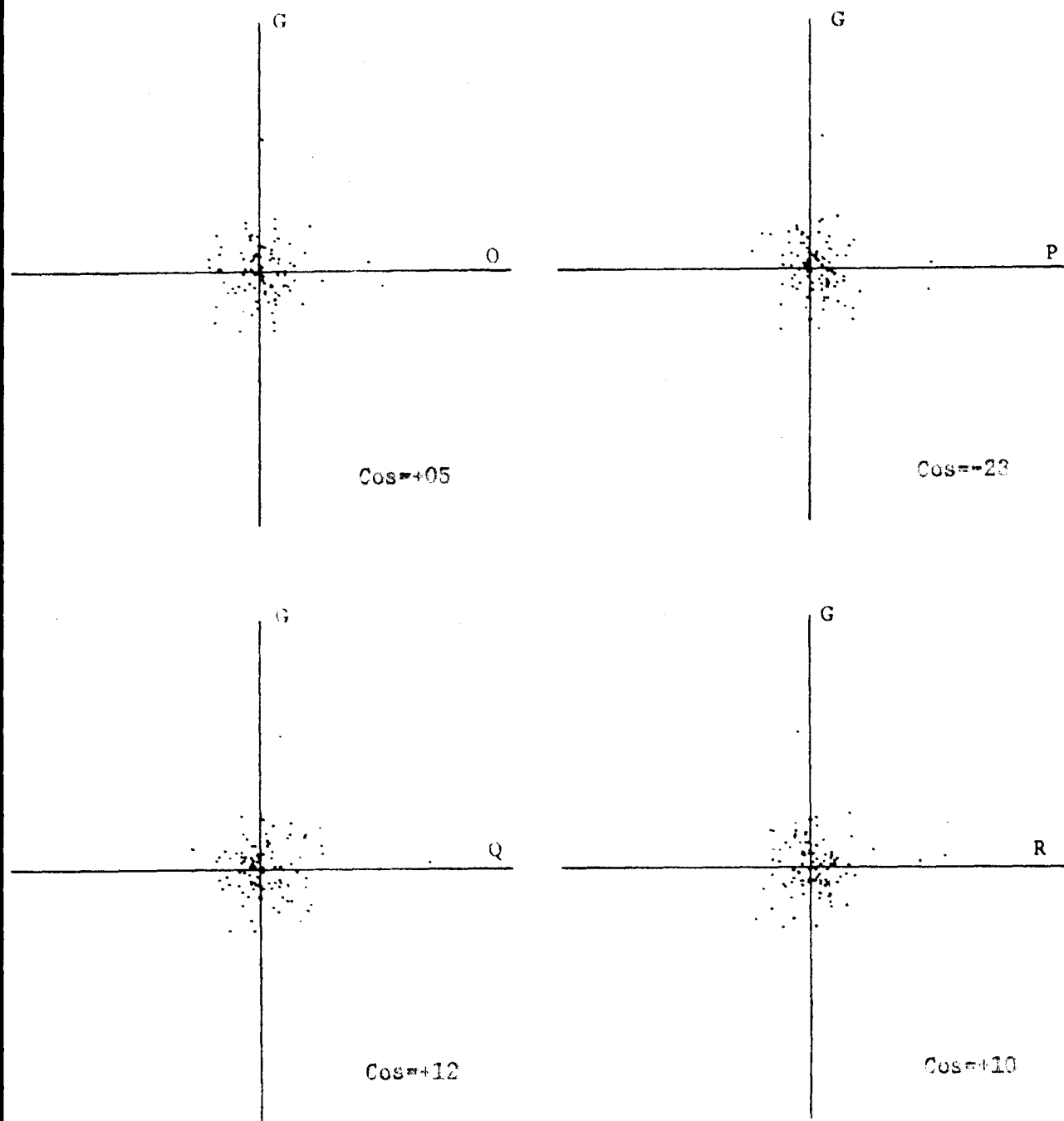


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

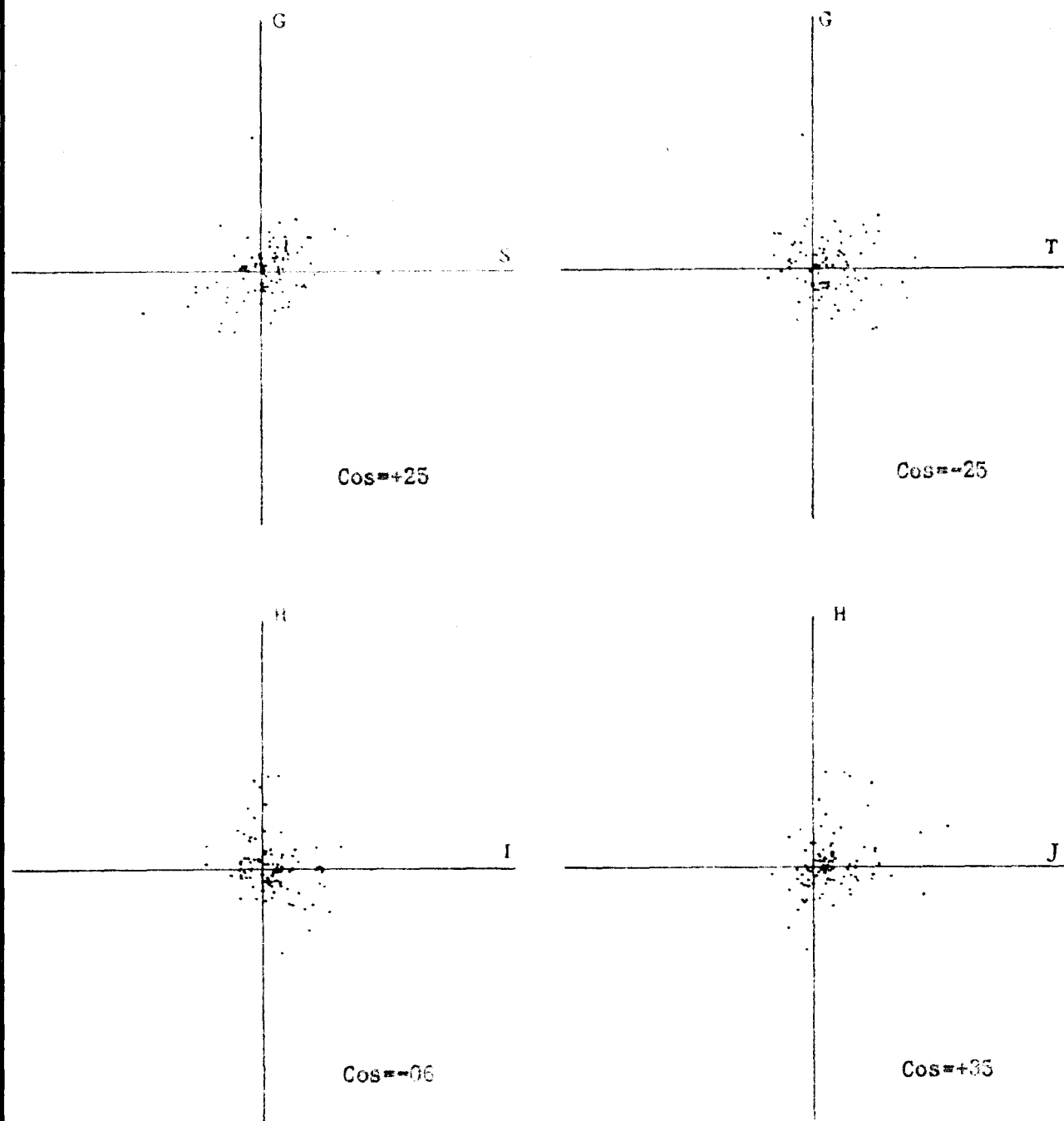


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

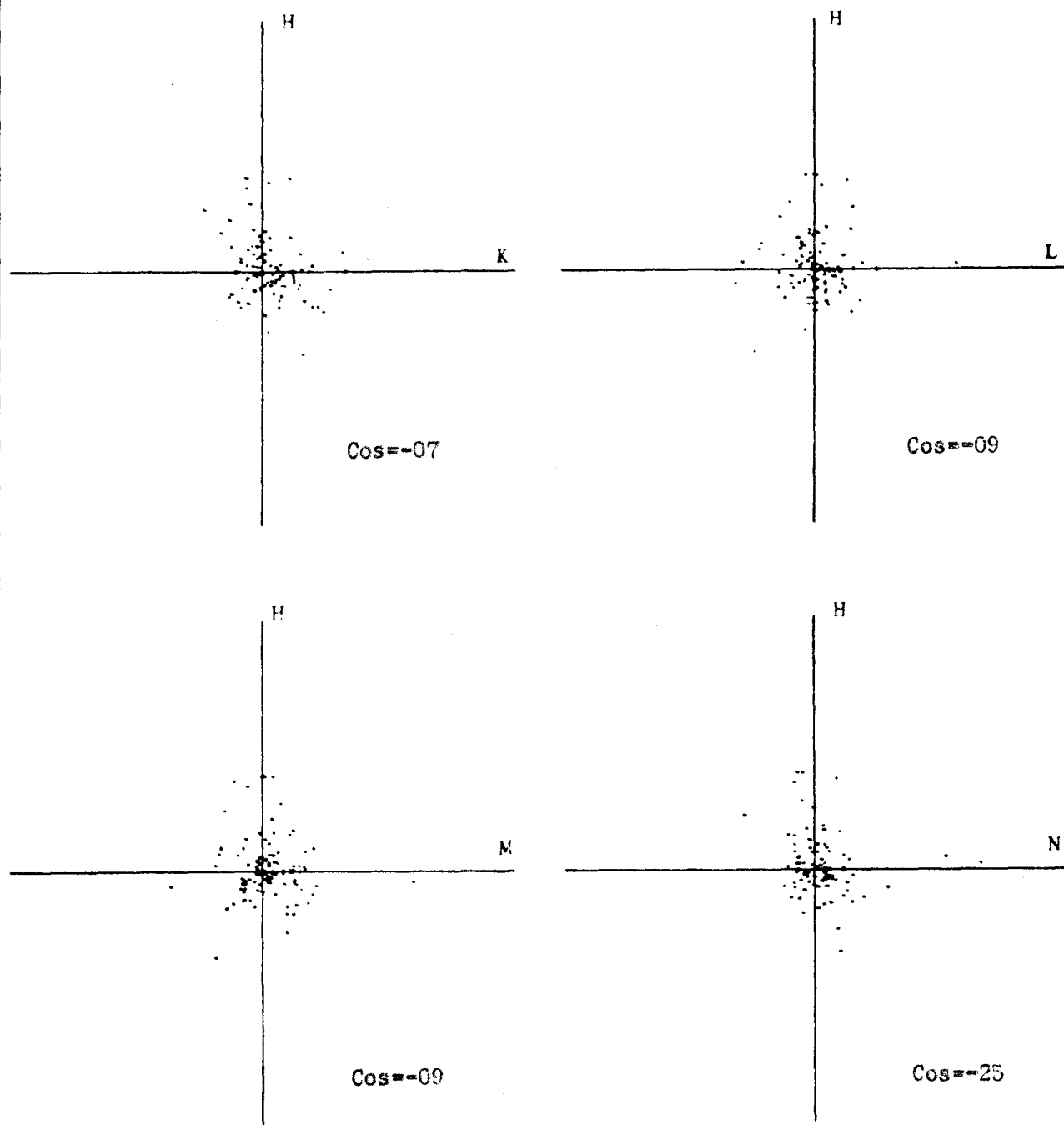


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

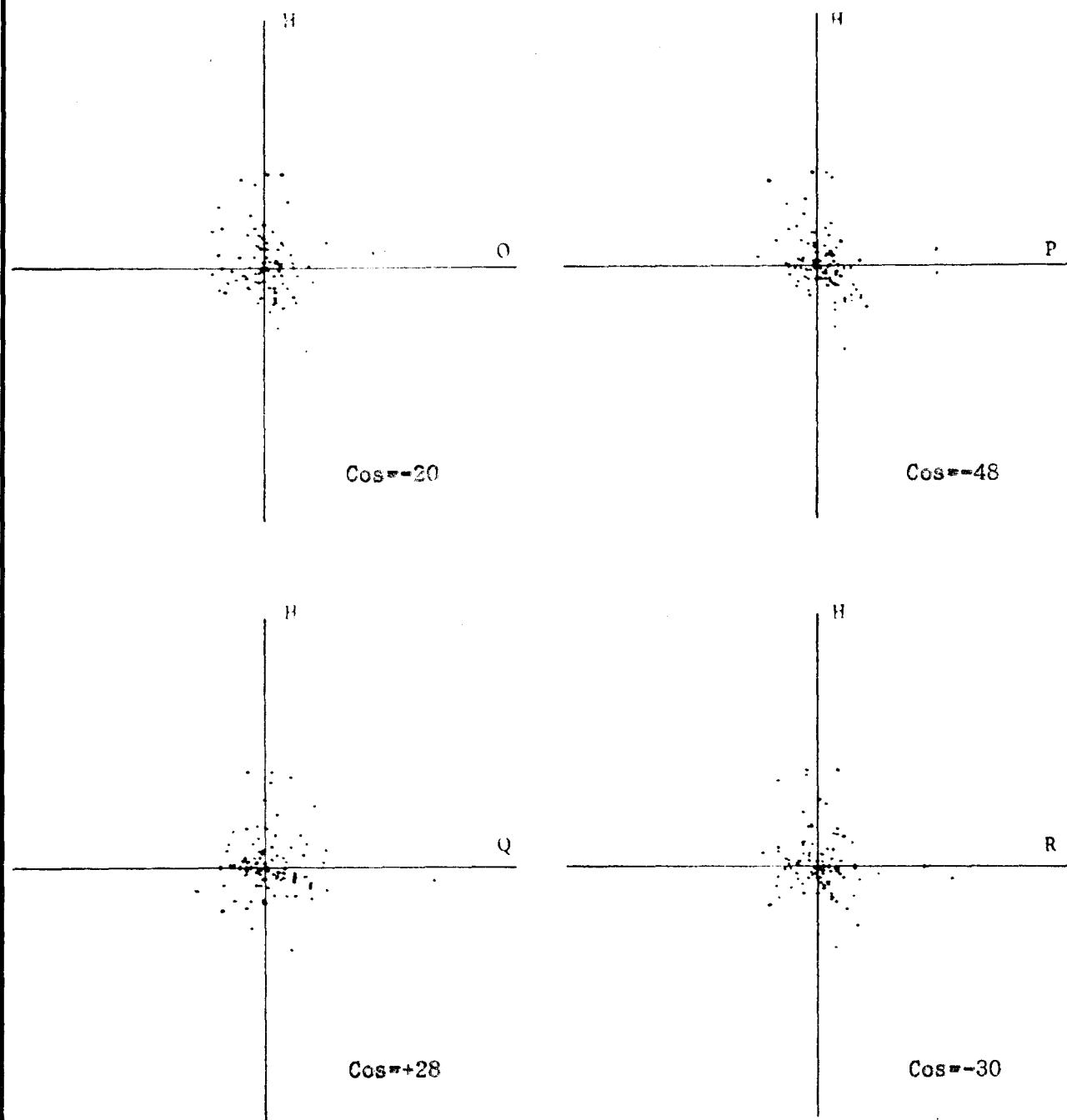


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

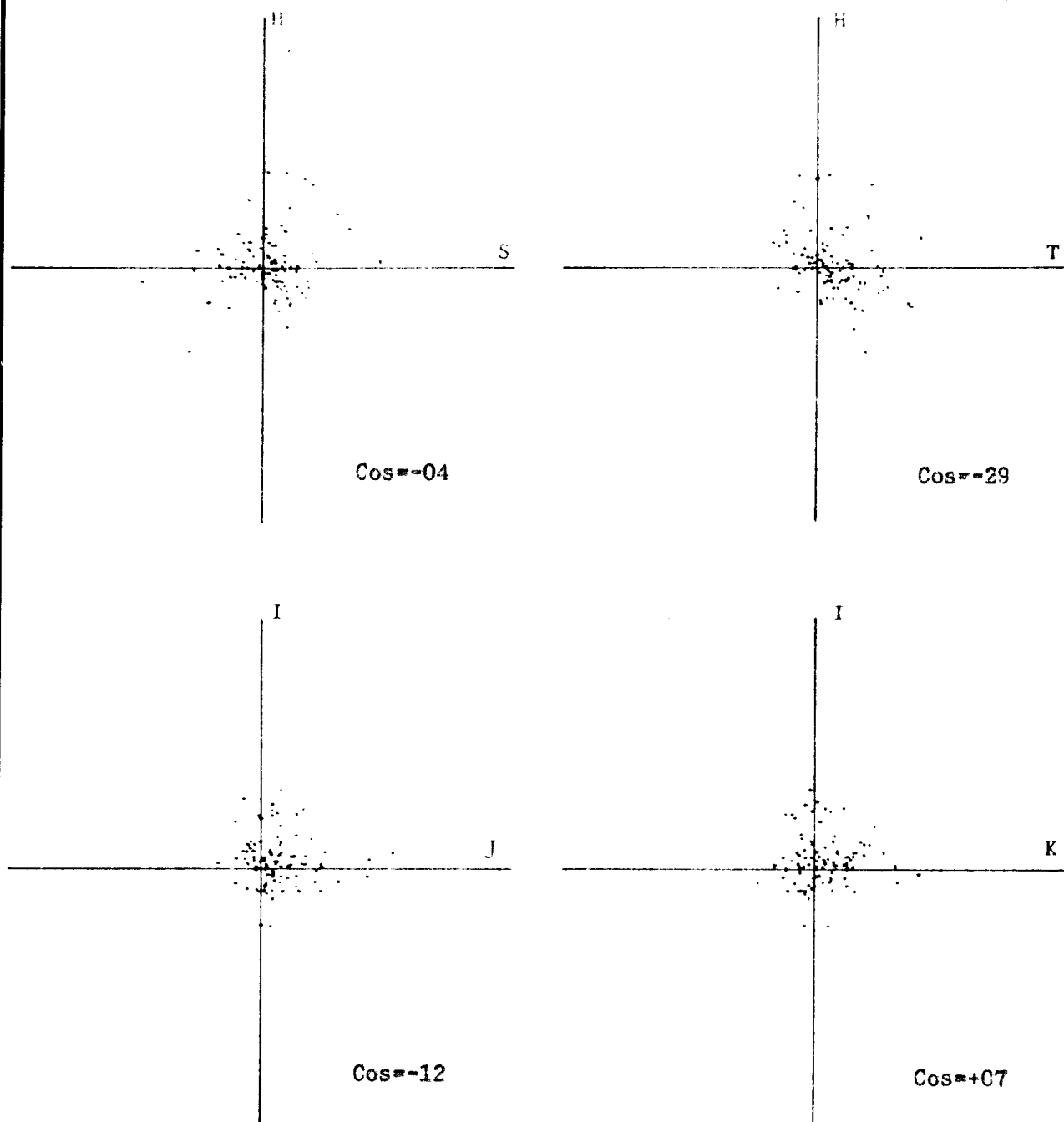


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

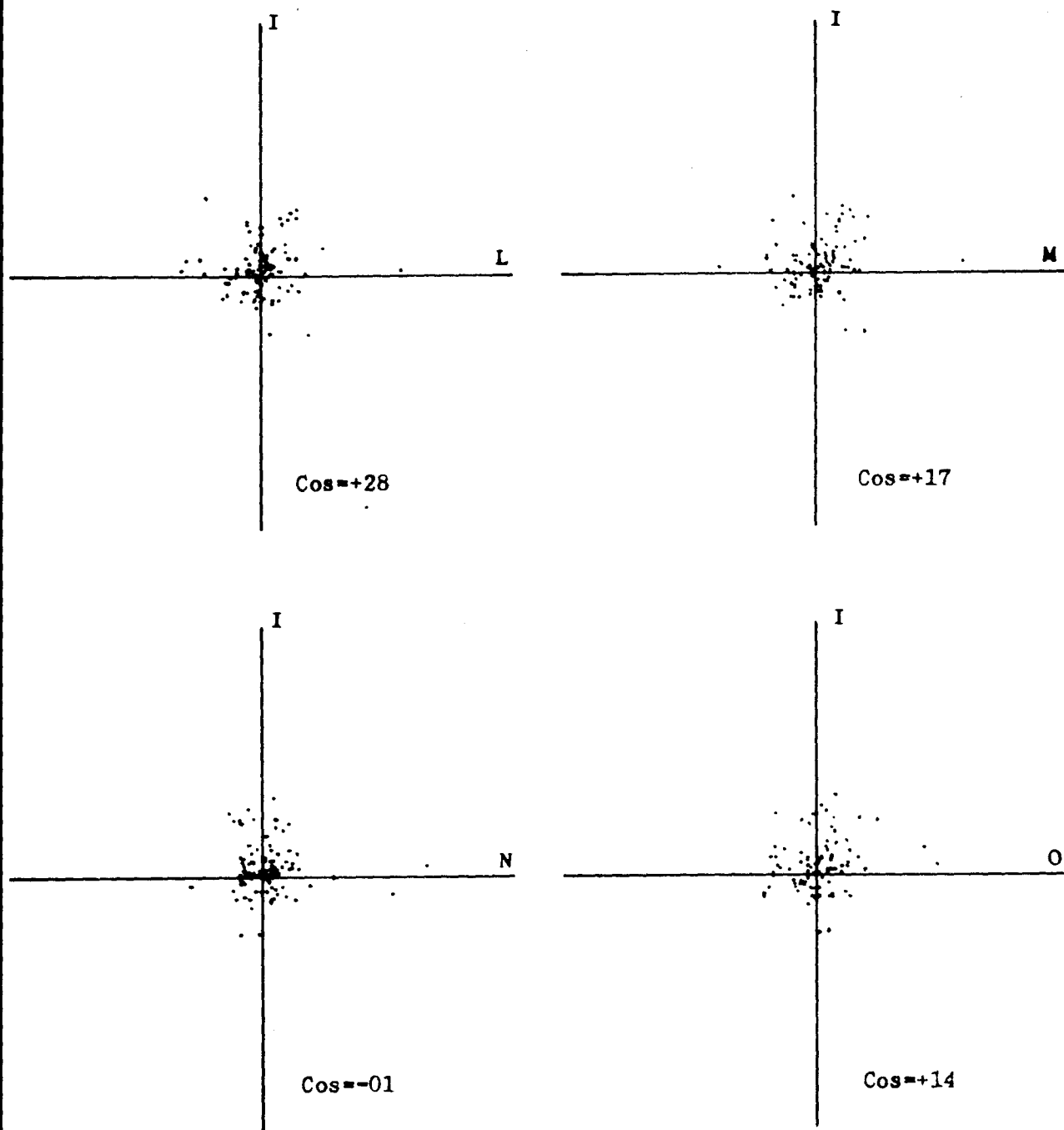


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

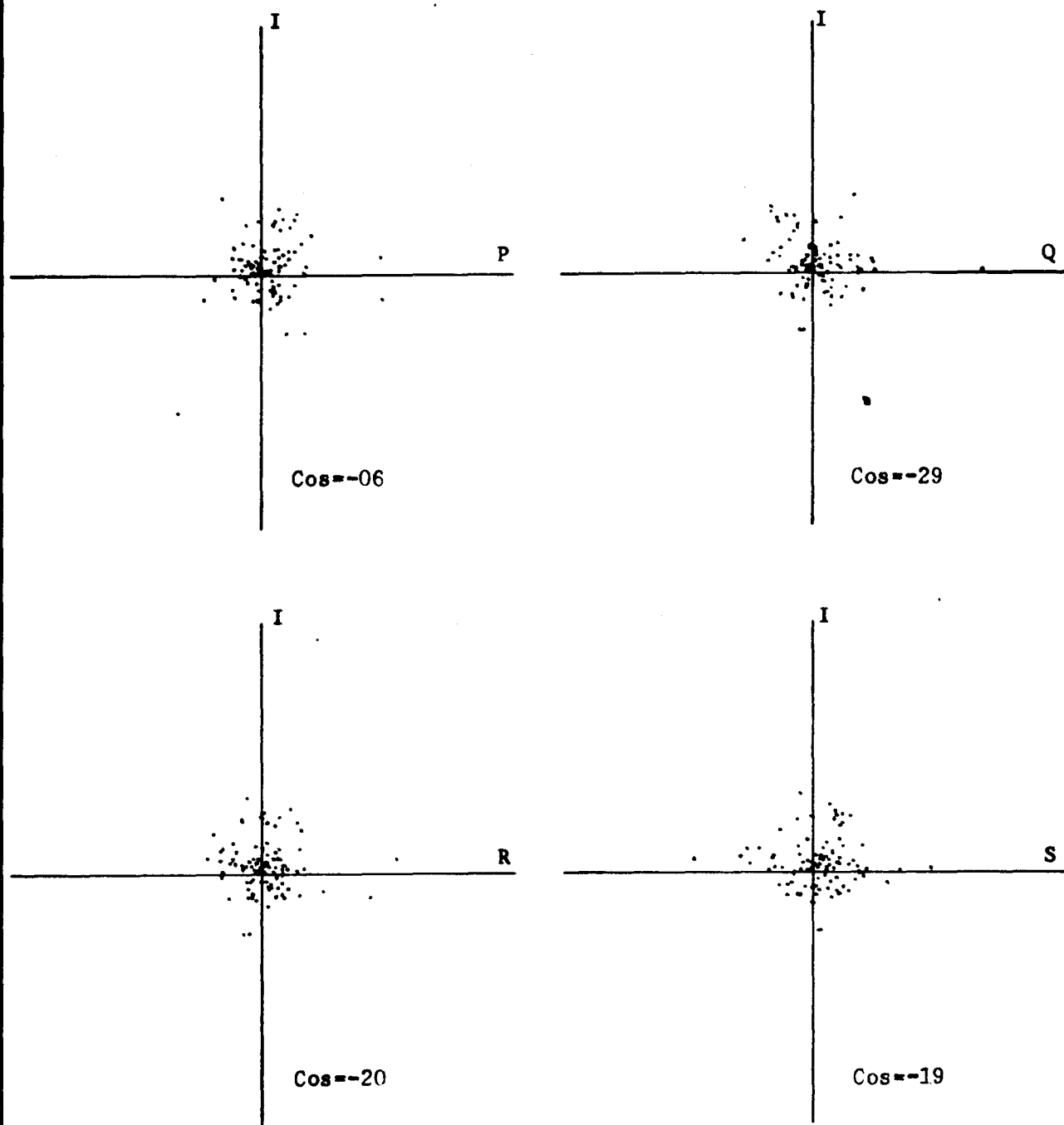


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX



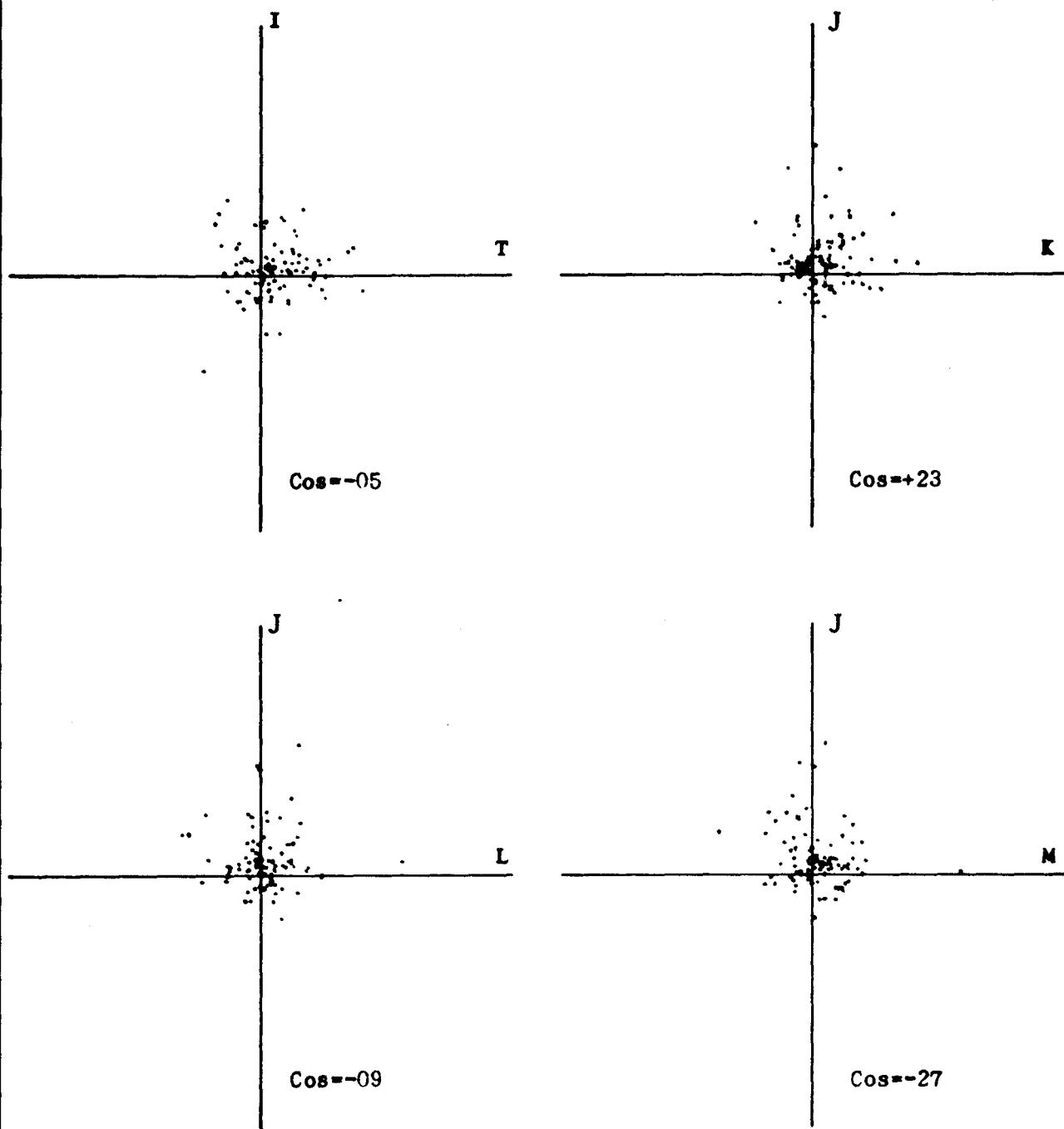


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

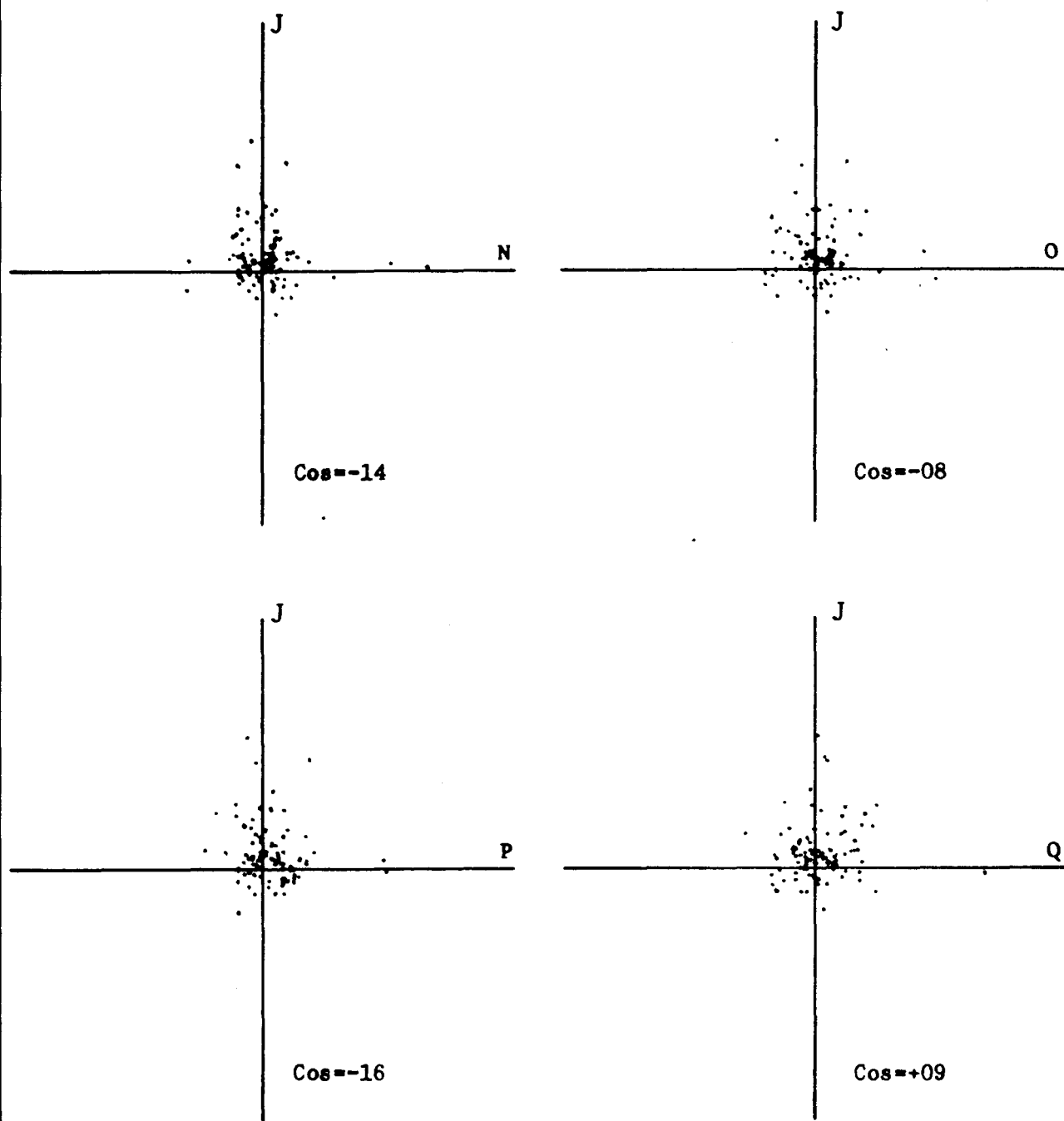


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

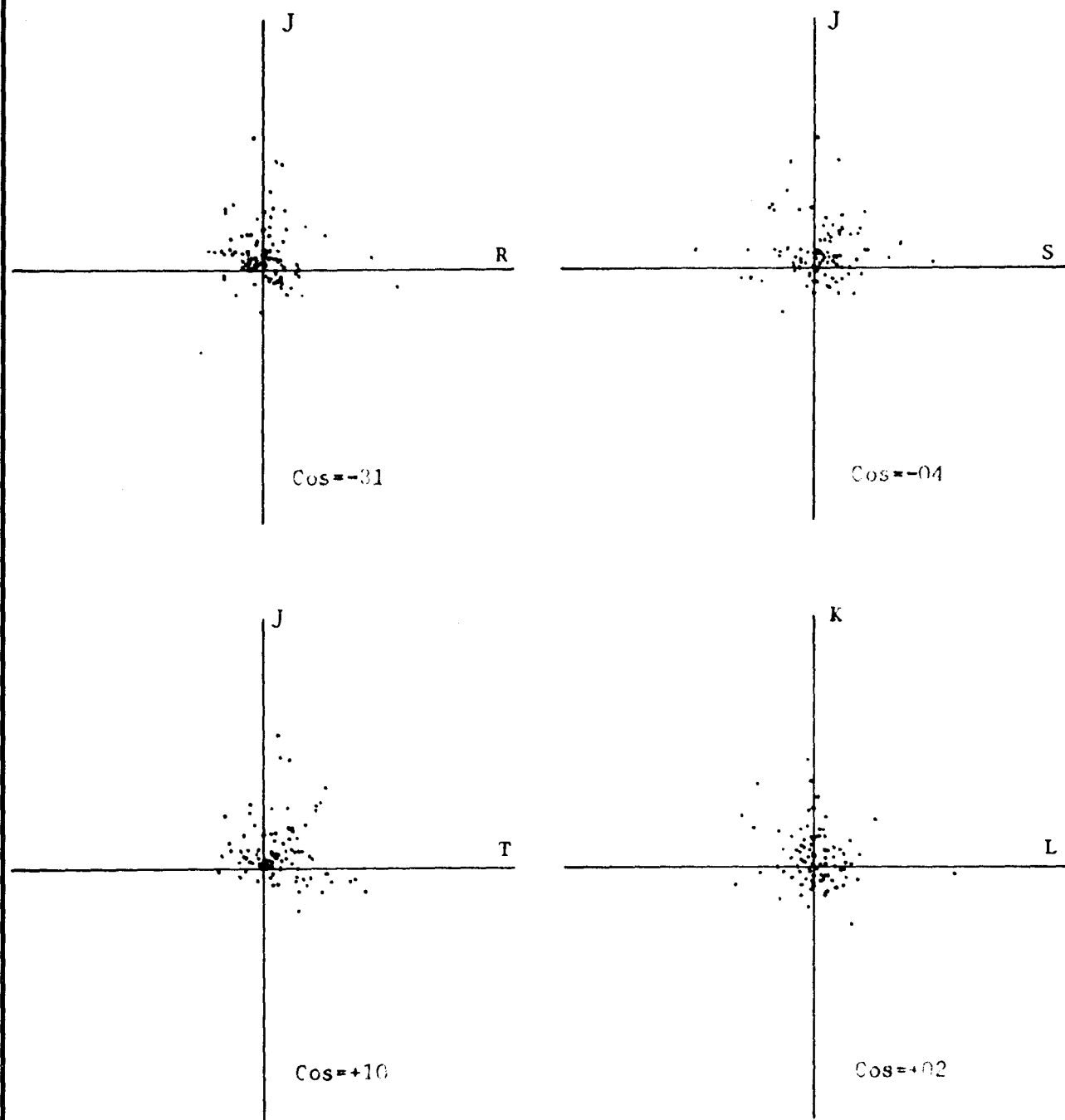


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

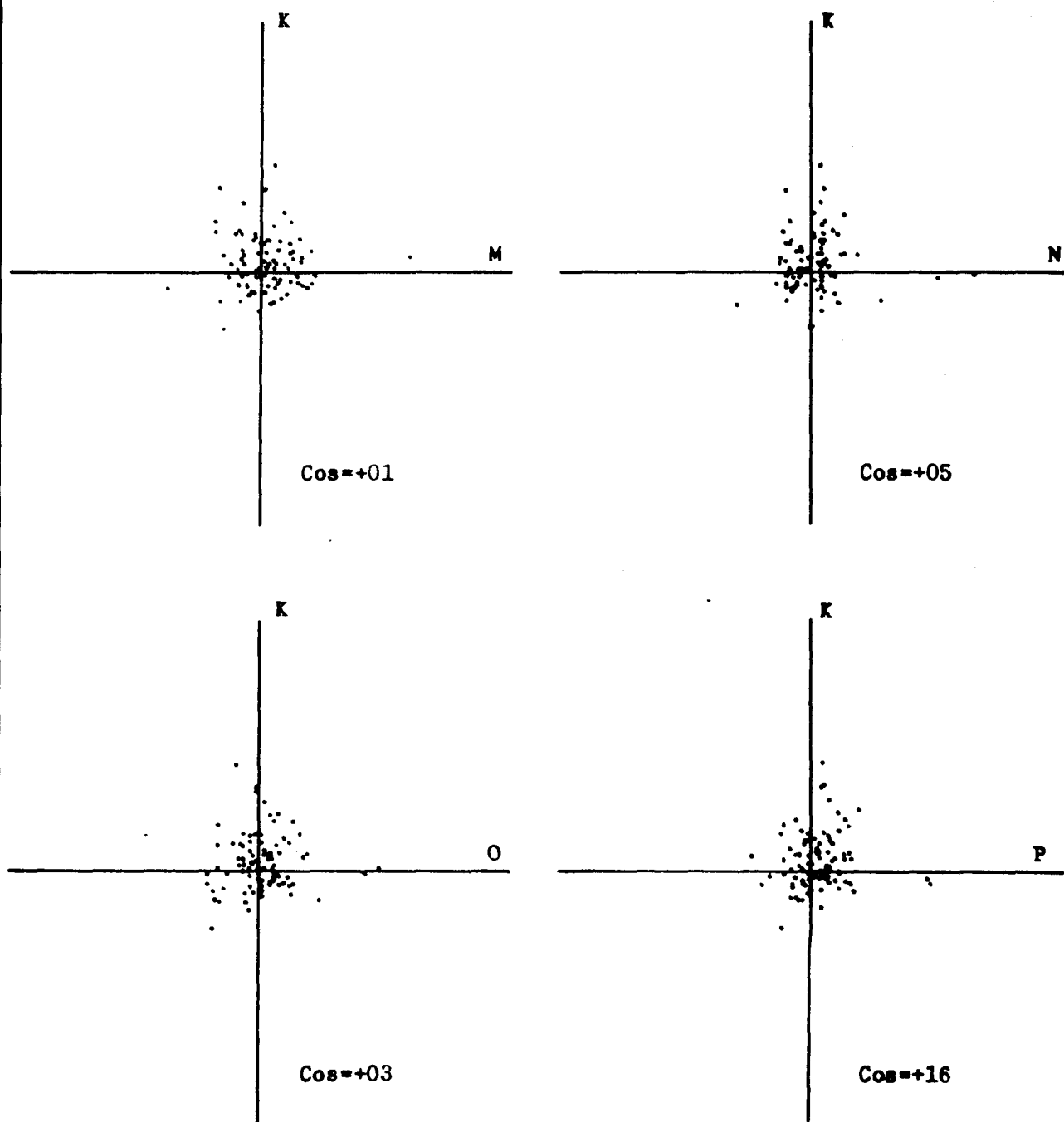


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

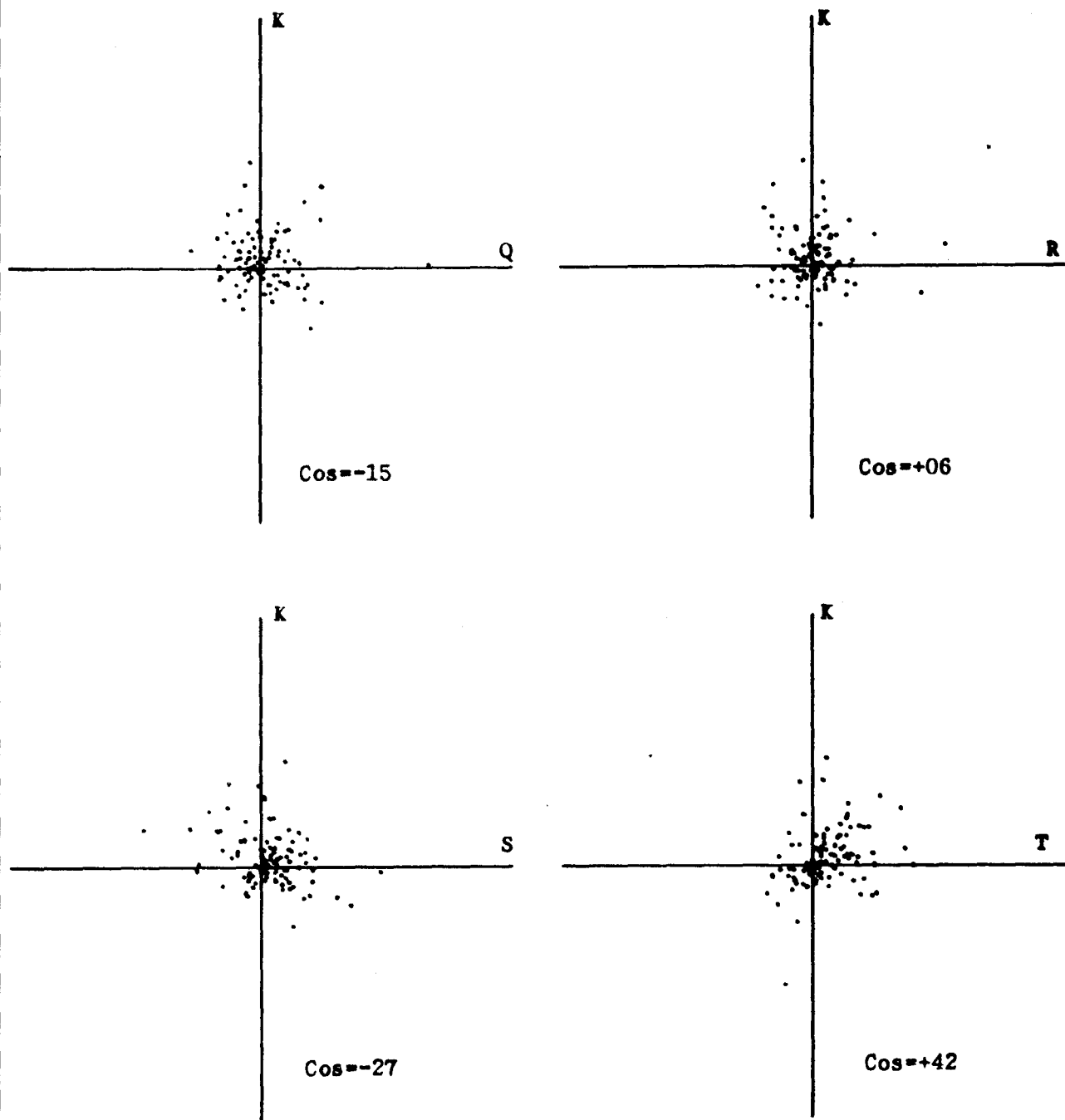


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

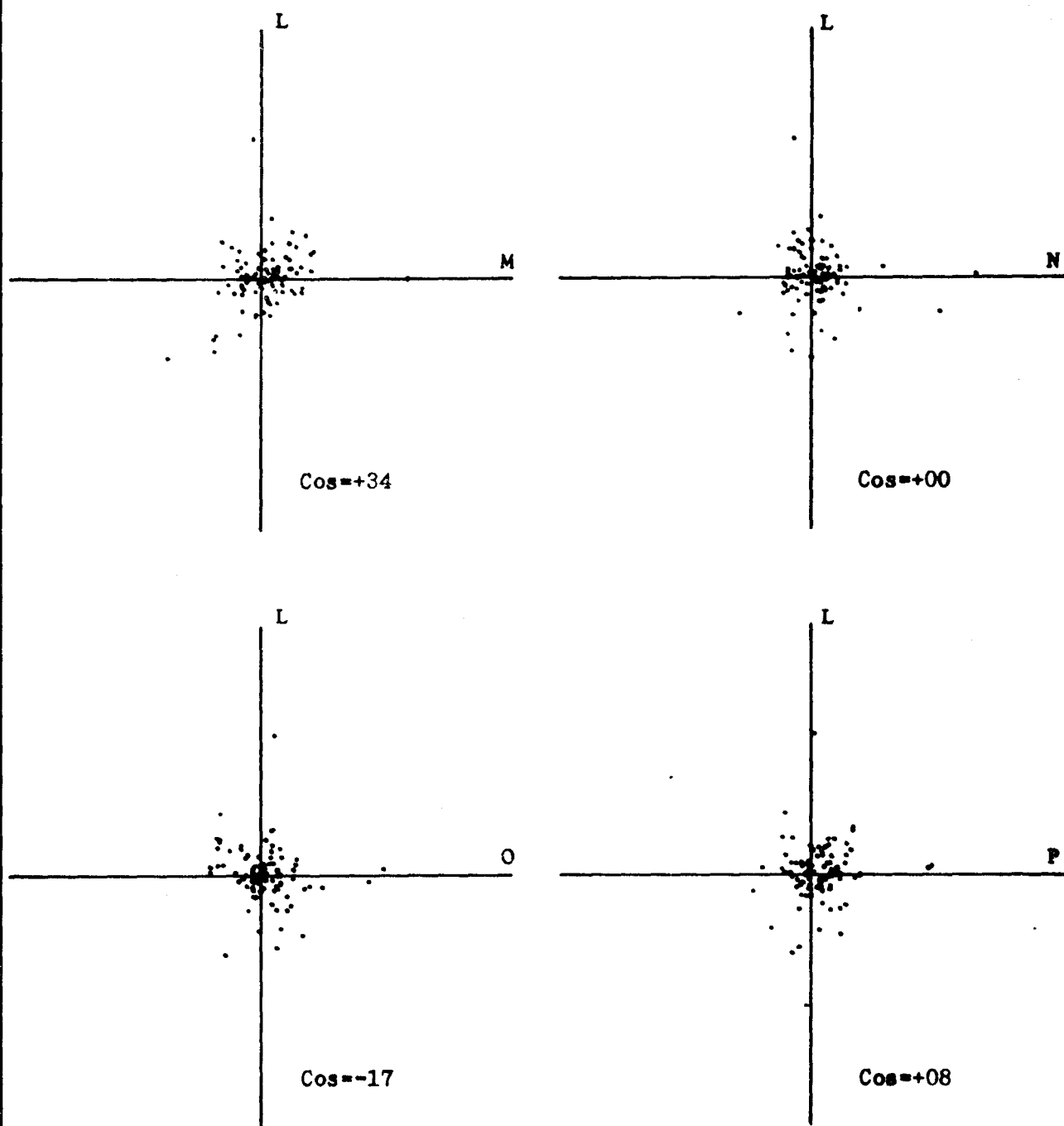


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

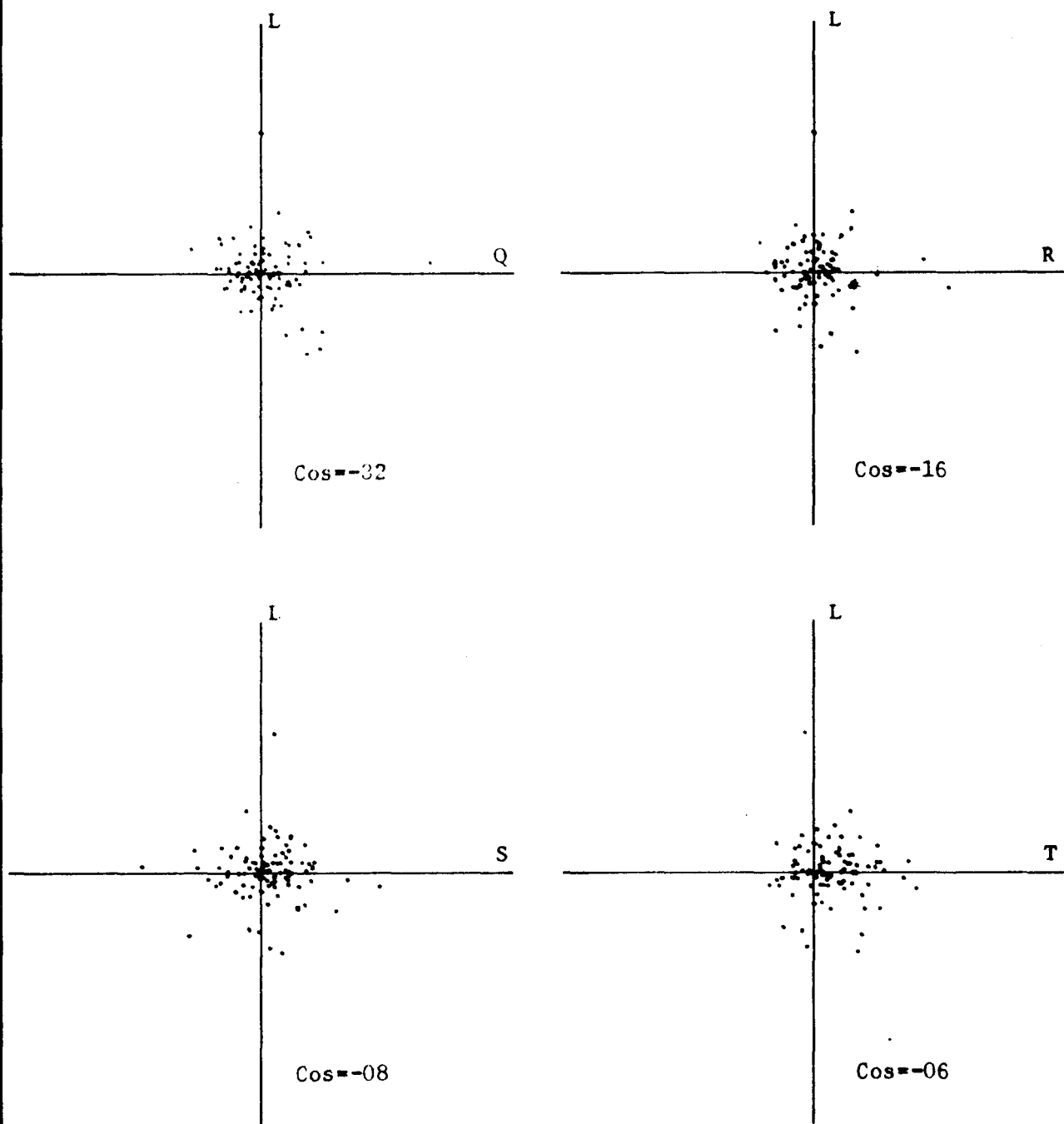


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

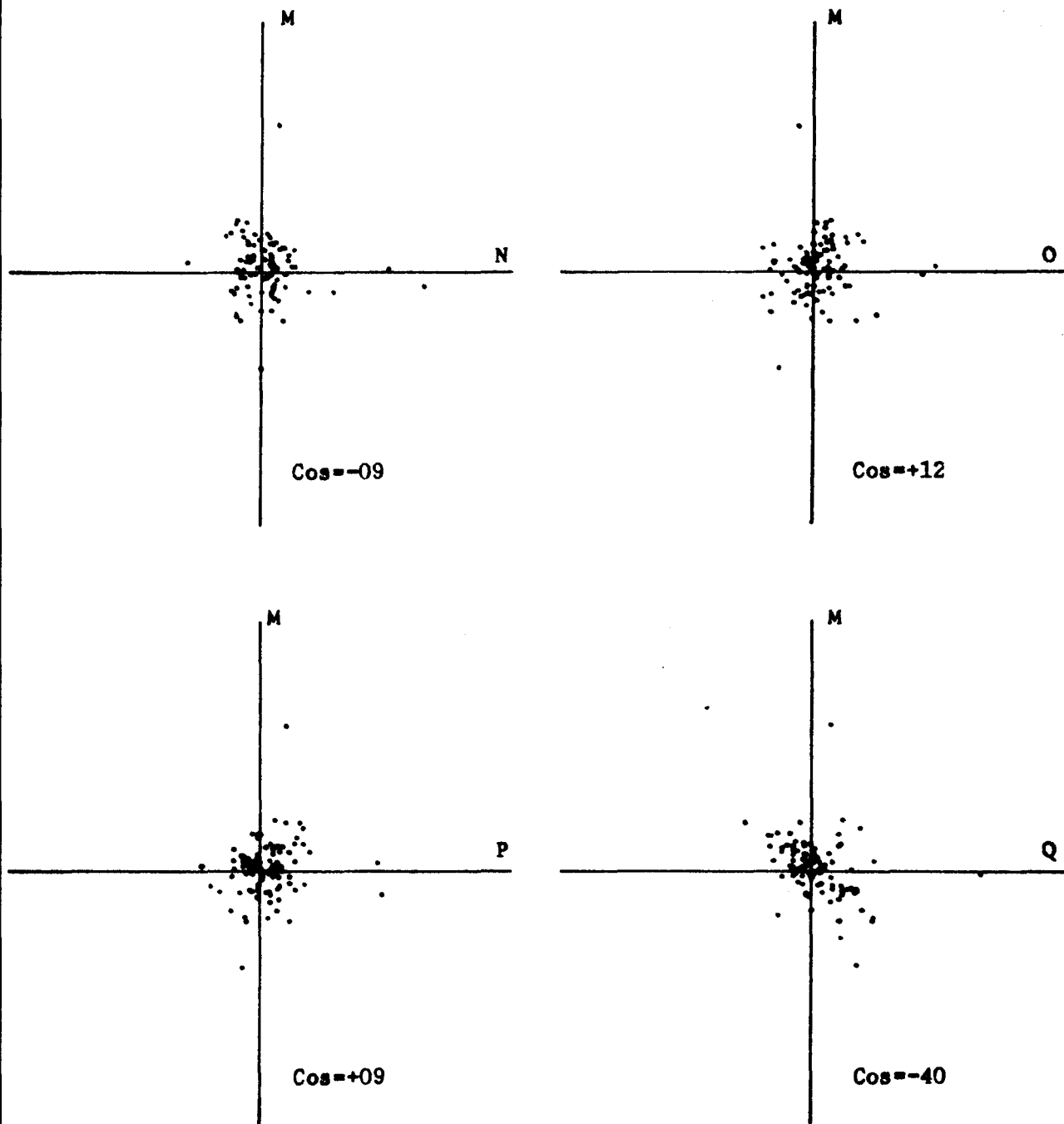


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX



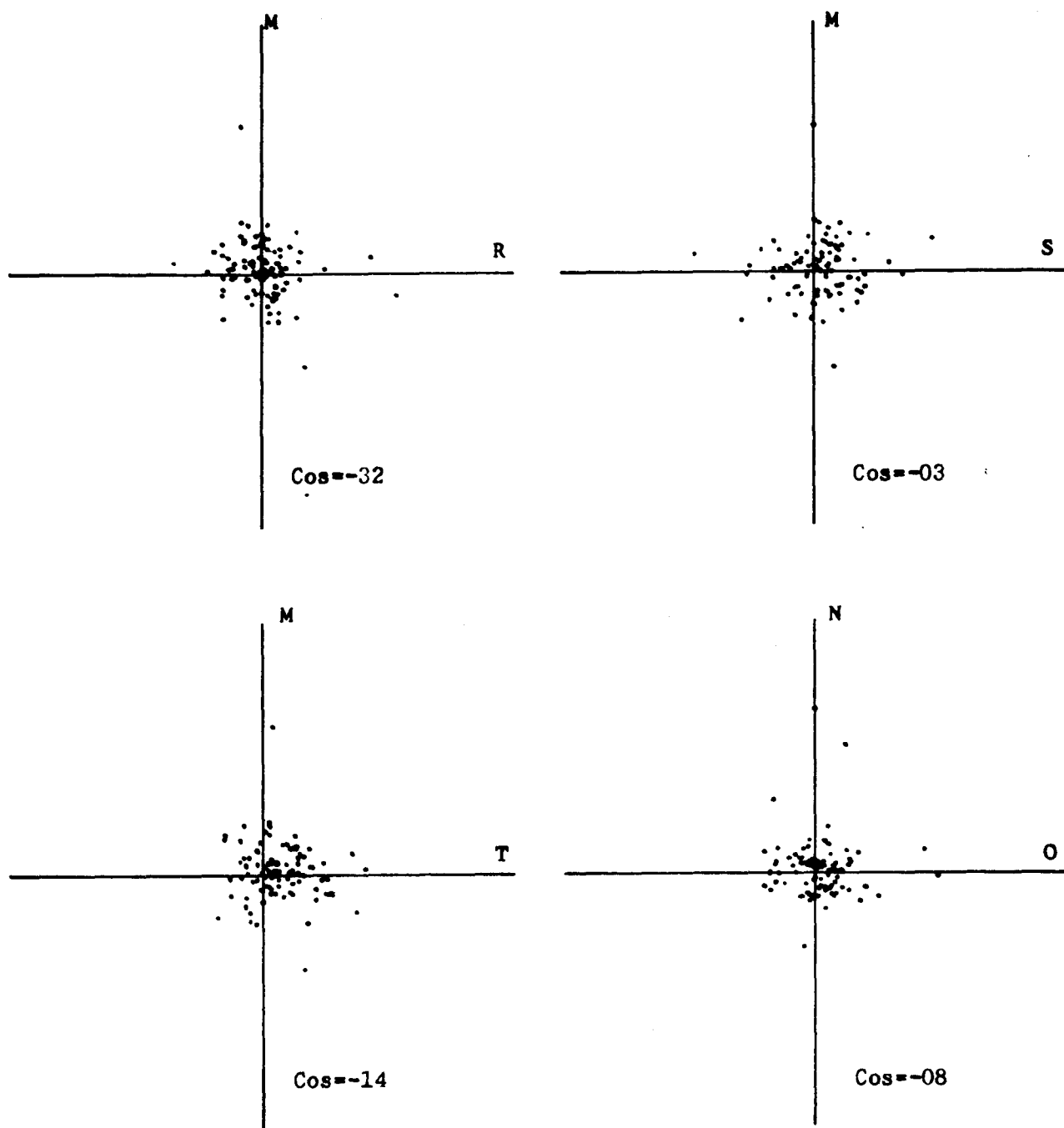


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

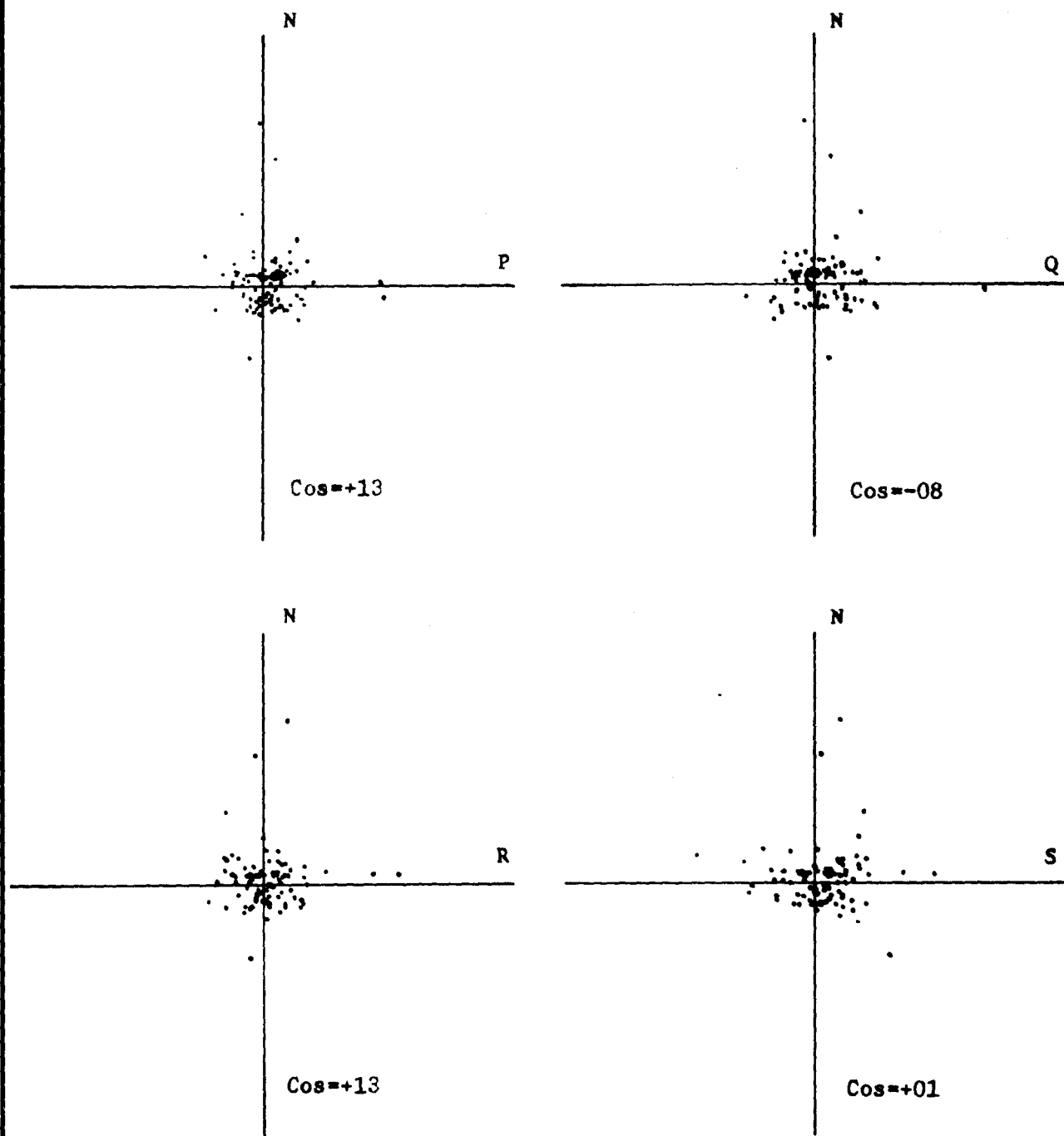


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

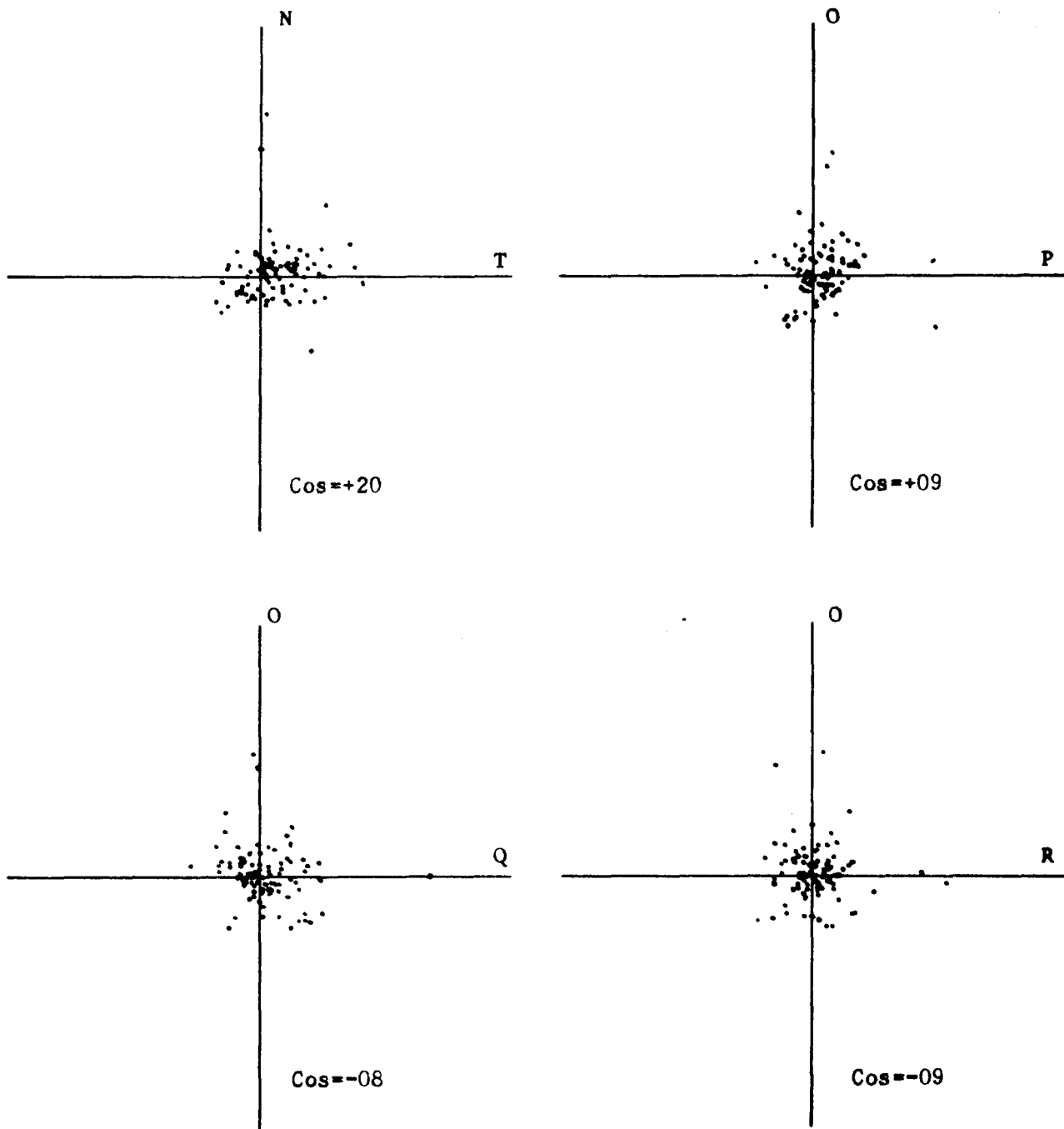


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

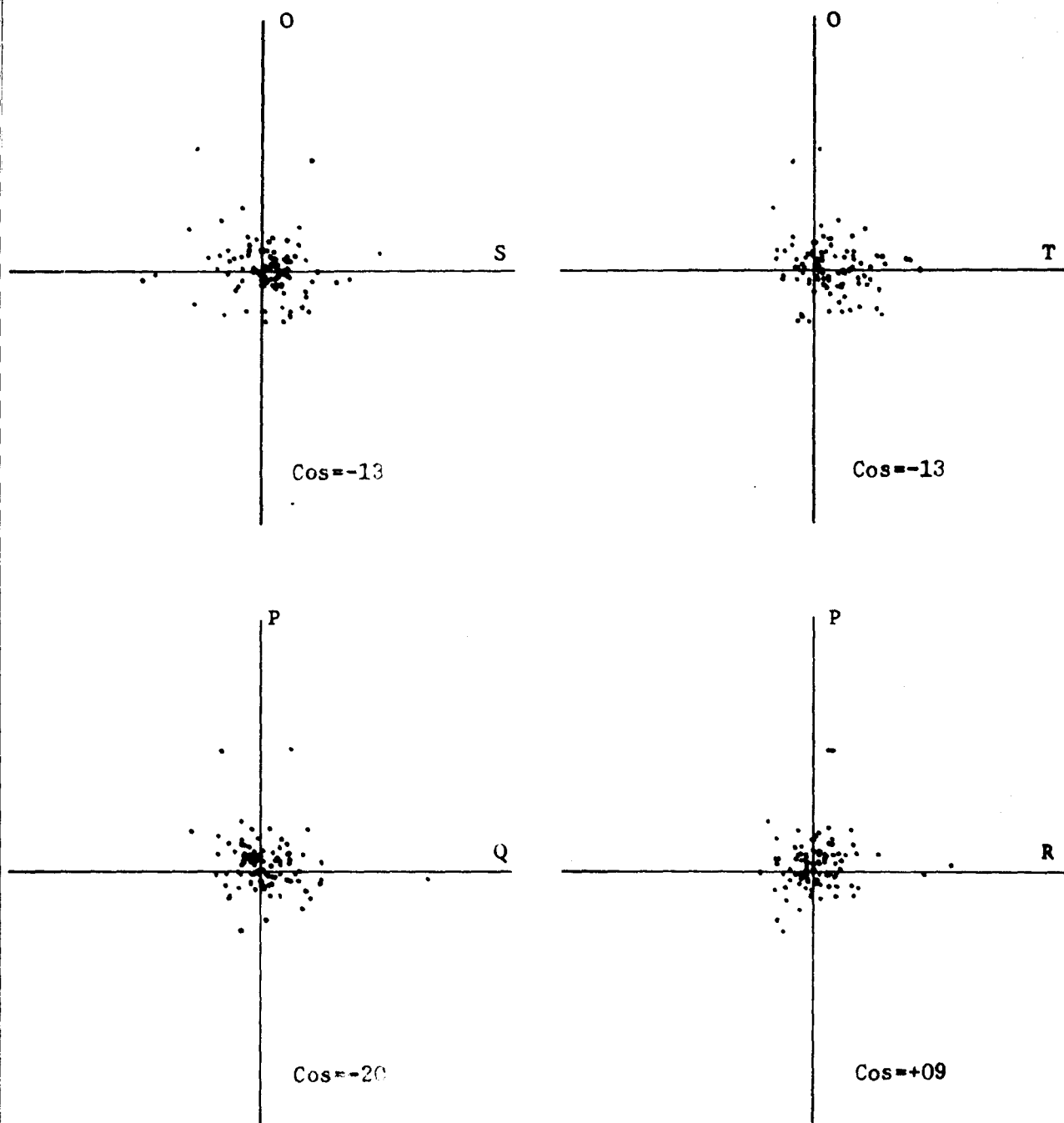


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

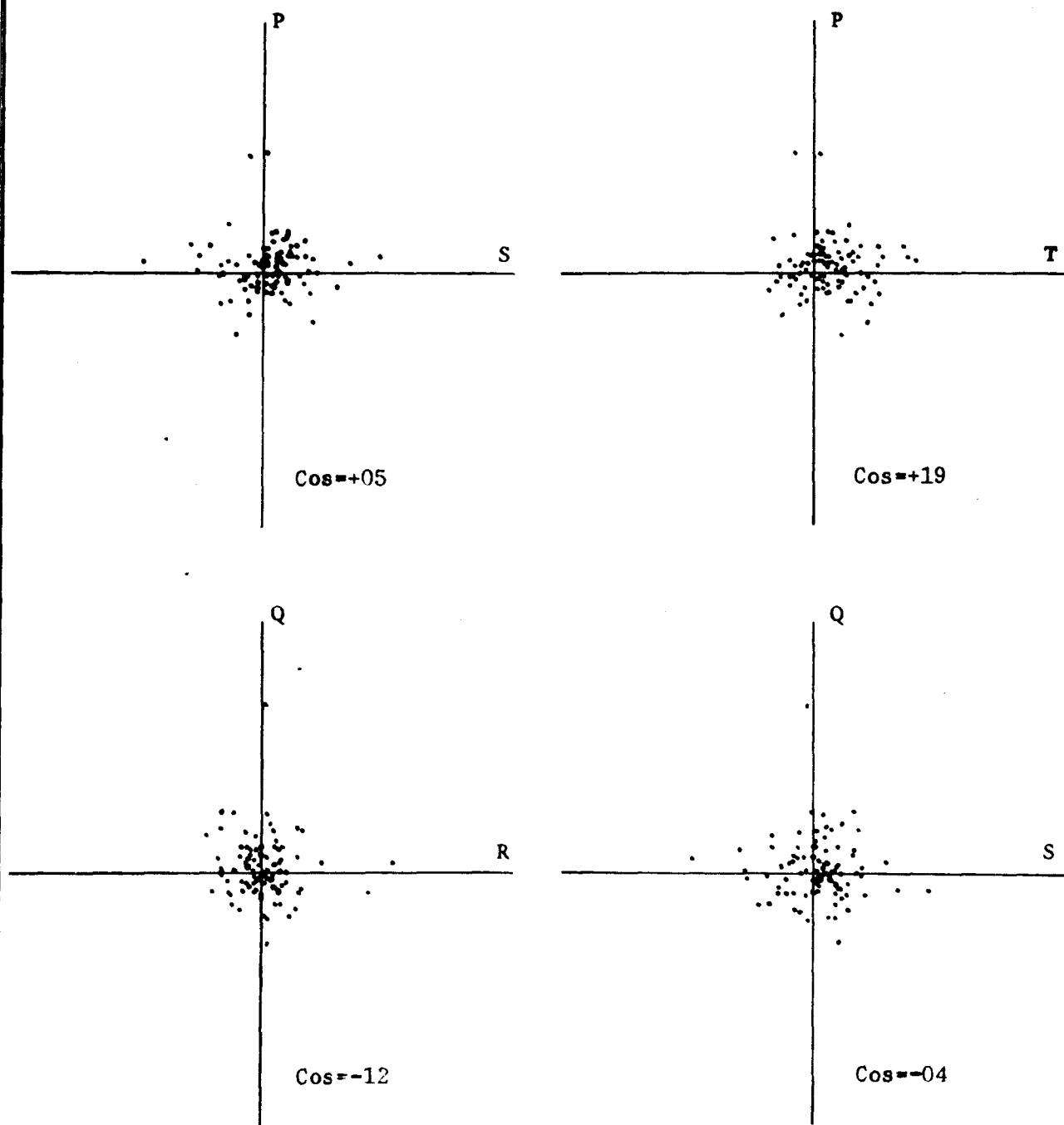


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

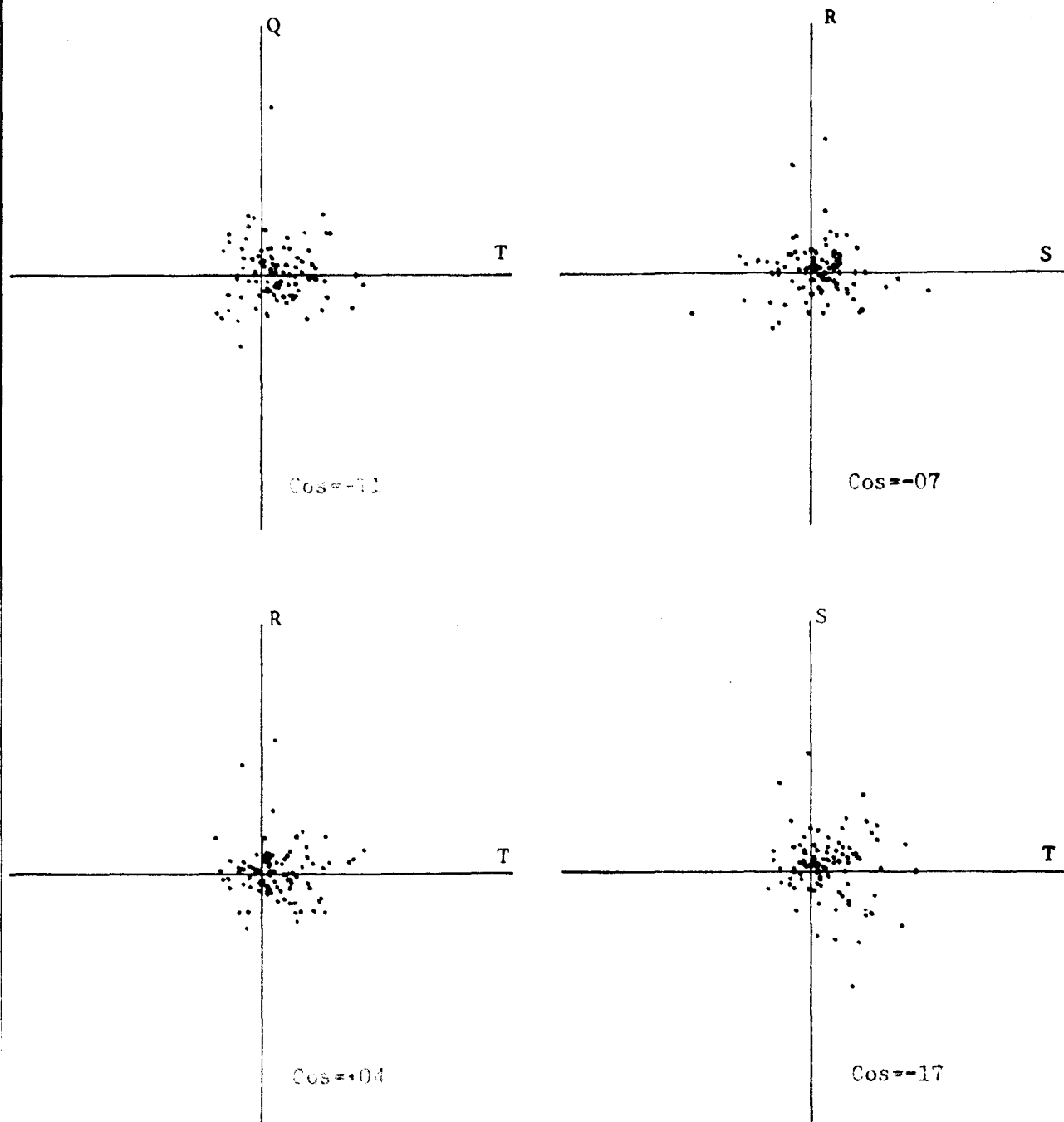


FIGURE 3 (continued)

PLOTS OF SUCCESSIVE COLUMN PAIRS FOR OBLIQUELY ROTATED FACTOR MATRIX

TABLE 49

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	10	15	17	18	19	21	25	31	32	34	35	39
10												
15	-05											
17	-09	38										
18	-13	02	20									
19	-16	26	27	22								
21	-02	-15	-65	00	-06							
25	-09	10	17	06	04	02						
31	24	01	-06	-02	-05	00	-33					
32	03	-09	00	01	-09	08	-07	13				
34	-14	26	54	20	24	-25	11	04	-09			
35	-13	30	21	23	35	-01	13	-11	-06	14		
39	-14	12	17	01	-02	03	21	-16	-05	-06	16	
42	-14	06	00	02	07	01	18	-30	-16	-09	14	17
43	25	-05	-07	-02	-12	03	-01	07	01	03	-03	-11
44	-24	13	25	30	28	00	11	-19	02	10	33	12
46	03	20	03	05	27	-16	01	-07	-13	22	20	-01
48	-02	12	04	02	01	-03	13	-25	-11	-14	13	08
50	-07	26	35	26	40	-18	11	-10	-05	29	29	12
51	-24	36	26	30	46	-07	18	-12	-08	34	47	22
52	-18	-10	09	-01	-08	-02	20	-18	-04	05	19	17
54	-22	07	12	03	04	-02	22	-14	-12	08	19	35
55	03	09	-10	-07	-05	20	01	05	12	-10	03	03
56	-12	27	37	31	38	-04	17	-11	-10	18	40	09
57	-11	26	19	25	31	-20	12	-04	12	-05	35	12
58	17	-03	-09	-06	-05	03	-03	20	17	-15	-14	-14
61	-17	-02	01	-02	-06	04	-06	-18	-03	-02	07	18
63	00	09	12	-01	07	-12	10	-16	-16	16	-09	-01
67	-23	18	20	25	36	-05	14	-20	-03	-08	35	16
68	-09	23	31	26	35	-08	07	-07	-03	15	37	20
69	-11	27	35	31	36	-11	13	-06	01	30	31	07
70	-11	25	25	09	29	-02	16	-15	-01	14	28	05
71	05	17	13	01	03	-09	17	-15	-16	13	16	08
78	-26	-01	10	07	05	07	23	30	-05	05	29	42
81	-05	24	10	10	17	-10	13	-07	-06	27	12	04
82	-14	20	19	11	28	-09	10	-03	-02	15	16	12
85	04	18	-15	15	24	00	15	-03	10	03	13	02
88	-01	08	05	-04	02	-02	22	-08	-05	07	05	09
89	-06	31	24	12	12	-20	19	-10	-06	02	19	08
91	-27	-02	07	03	-05	-03	10	-30	-10	-12	22	25
92	-12	30	33	26	43	-08	15	-17	-05	25	44	15

TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	10	15	17	18	19	21	25	31	32	34	35	39
95	-14	10	01	15	19	-02	12	-06	-07	-09	21	02
97	-15	09	29	31	31	-01	15	-06	-02	34	21	04
99	-18	10	01	02	01	-01	10	-21	-04	05	17	24
105	-17	-01	24	06	09	-08	15	-02	-05	23	20	00
107	-08	23	13	15	14	-12	11	-04	-07	-05	21	10
110	04	01	14	-02	09	-06	23	-12	-25	21	14	16
112	-15	09	08	04	02	00	15	-16	-04	03	13	20
117	-06	06	-06	03	14	01	11	-12	-21	04	16	05
118	-16	17	02	03	09	-01	21	-24	-07	00	14	20
123	15	-19	-17	-08	-11	08	-04	12	06	-01	-09	-10
125	-06	06	15	-08	17	-16	-08	-05	-08	27	01	-05
127	-08	24	32	42	28	-07	09	-10	-14	25	35	12
128	-25	06	13	12	14	-04	23	-14	00	-05	38	38
130	13	00	-03	-10	-05	07	-02	18	13	05	-09	-05
131	-01	-18	07	04	-03	-01	00	-01	-02	10	03	06
132	-12	16	16	08	15	-08	12	-10	00	28	16	11
134	-11	20	25	13	23	-22	18	-10	-03	20	44	27
135	-13	02	19	14	34	-07	27	-10	00	14	33	20
138	-06	28	20	30	25	-01	15	-11	00	22	33	16
140	-24	03	15	11	05	03	17	-20	02	06	33	47
144	-30	44	45	37	51	-15	23	-16	-04	21	57	21
145	-25	06	17	07	10	02	11	-22	-08	09	15	20
148	-11	14	35	34	27	-13	17	-11	-06	28	19	11
149	03	36	30	19	28	-10	14	-02	-01	35	35	06
150	-16	25	03	06	17	-02	15	-17	00	20	23	17
151	-15	19	35	30	52	-10	16	-10	-07	43	42	06
152	-07	08	-03	07	-03	13	20	-11	06	-09	03	12
153	03	15	11	01	11	-07	-05	00	-02	09	11	00
154	16	14	-06	-10	00	-05	00	14	08	02	-16	-20
156	29	-12	-04	-07	-10	-02	-03	10	-06	01	-14	-09
159	-18	09	08	11	16	-03	05	-10	-10	-10	24	11
161	-11	24	28	17	19	-10	08	-02	-09	14	14	07
162	-12	36	30	33	47	-18	26	-06	-03	01	50	12
172	-13	17	12	00	15	-08	22	-12	-11	02	19	17
174	09	-17	-13	-18	-12	03	-05	-02	-01	-16	-14	-12
179	-15	07	15	10	09	-03	00	-07	-03	-08	23	15
181	-08	10	08	00	13	-06	00	-06	-09	-18	10	06
182	08	11	09	05	06	02	02	16	09	00	03	-02
183	-06	00	08	00	00	-04	-01	01	-03	-10	04	-02
185	-12	25	18	07	22	-07	12	-13	-01	30	29	19



TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	10	15	17	18	19	21	25	31	32	34	35	39
186	13	10	-02	-07	-01	13	-04	17	12	04	-15	-07
188	07	-01	-07	-04	-02	09	-08	18	12	-02	-10	-12
189	-20	-05	04	06	03	01	52	-11	-03	-01	13	12
191	06	-16	-19	-05	-17	12	-07	11	10	-12	-19	-04
192	-16	-08	-08	00	-03	05	20	-17	-06	-07	14	32
195	-10	18	05	08	15	01	10	-08	-06	03	14	11
A	02	05	06	04	-04	-07	02	-05	-11	16	01	12
B	-10	14	08	09	05	-04	06	-10	-09	16	10	14
C	-12	05	13	10	01	-11	-06	-09	-02	-03	08	-01
D	-11	08	00	00	03	00	06	-14	-10	-06	11	14
E	-17	-04	06	00	-04	-01	17	-30	-19	05	17	35
F	-17	03	09	06	08	-03	03	-17	-08	14	18	21

TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	42	43	44	46	48	50	51	52	54	55	56	57
10												
15												
17												
18												
19												
21												
25												
31												
32												
34												
35												
39												
42												
43	-06											
44	08	-08										
46	12	-03	04									
48	20	-06	12	03								
50	09	-07	31	21	13							
51	15	-07	36	27	13	65						
52	09	-08	10	11	09	11	20					
54	15	01	17	18	08	13	26	24				
55	-08	04	04	-03	-09	-02	-11	05	11			
56	13	-04	28	24	05	32	43	09	16	05		
57	13	-12	36	22	13	55	57	13	21	-09	38	
58	-20	03	-11	-09	-16	-05	-20	-10	-14	14	-12	-03
61	08	-06	09	-04	10	00	02	06	27	-02	-02	-01
63	06	-03	-03	-01	17	-04	03	-05	02	-17	02	00
67	12	-10	44	25	11	42	49	14	26	-01	40	39
68	11	-05	30	20	01	43	51	10	11	-03	42	43
69	05	-11	27	24	04	49	56	10	24	-04	33	50
70	10	-02	19	29	16	15	38	14	17	10	41	23
71	20	02	-06	20	23	12	19	19	18	-13	10	00
78	24	-12	22	03	20	15	29	20	43	00	15	21
81	12	02	07	08	18	23	25	04	12	-05	13	28
82	00	-10	13	23	09	20	13	13	14	02	25	24
85	-06	-08	20	34	-03	37	37	00	10	06	11	32
88	10	00	-01	06	10	-01	-04	26	16	06	05	06
89	09	-01	14	19	28	12	46	12	13	-01	23	41
91	25	-09	17	04	23	-06	16	19	28	-07	07	05
92	01	-06	38	28	12	59	62	21	25	00	38	55

TABLE 49 (continued)

## TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS

Item	42	43	44	46	48	50	51	52	54	55	56	57
95	01	00	07	26	05	20	24	09	15	-04	30	29
97	03	-04	31	12	07	40	51	15	19	-04	26	33
99	17	-01	12	05	14	03	23	12	19	01	14	11
105	06	00	12	06	00	19	40	10	30	03	17	18
107	04	-07	18	15	06	30	62	13	24	-05	18	35
110	17	00	01	20	18	14	12	16	32	02	13	07
112	13	00	05	00	10	10	08	12	19	01	07	09
117	07	05	06	05	18	04	08	00	16	06	04	04
118	18	-08	08	17	12	15	26	19	21	-14	10	12
123	-11	17	-09	-14	-02	-13	-17	-06	-10	03	-12	-25
125	07	-03	04	42	04	13	20	-01	02	-03	15	07
127	12	-12	28	25	11	41	47	15	20	-04	38	38
128	18	-17	27	02	14	19	29	23	36	00	17	28
130	-24	12	-11	-10	-13	-05	-19	-10	-01	25	-06	-17
131	05	00	04	06	09	02	-05	07	10	03	02	-13
132	04	-03	26	10	03	11	25	10	32	02	27	17
134	11	-14	23	20	01	32	41	42	41	-02	18	20
135	08	-01	19	17	09	35	52	09	15	-08	29	42
138	14	-03	31	23	18	54	66	18	15	-05	39	69
140	21	-12	24	06	14	19	26	26	36	04	19	21
144	07	-19	32	28	07	59	66	20	29	-03	58	58
145	17	-17	07	08	11	21	26	12	19	-10	20	21
148	16	-08	27	10	10	33	37	11	08	-03	27	36
149	-02	04	21	14	12	39	45	16	16	-07	35	58
150	11	-10	18	18	14	19	34	19	21	02	21	23
151	12	-12	34	37	06	47	60	15	25	-09	46	37
152	04	03	12	-12	-01	00	01	04	04	06	03	06
153	03	-04	05	03	04	08	17	02	04	00	08	11
154	-10	19	-12	-09	-06	-12	-09	-12	-20	06	-11	-15
156	00	25	-16	-03	02	-10	-08	-05	-07	02	-08	-08
159	16	-26	22	12	08	19	22	07	21	-07	22	15
161	09	-06	14	17	05	16	23	03	19	01	12	20
162	06	-20	29	33	06	59	69	33	22	-03	39	56
172	13	05	15	24	09	12	23	19	40	11	27	17
174	-04	07	-14	-02	-04	-12	-30	-02	-04	03	-13	-23
179	15	-19	16	03	05	14	20	05	16	-02	07	15
181	08	-18	04	12	10	12	11	06	09	-05	09	16
182	-14	08	-03	-02	-11	12	08	07	04	09	-01	02
183	-02	-05	05	-04	00	-02	00	03	01	-03	00	-04
185	19	02	17	25	13	18	25	17	29	13	28	25

TABLE 49 (continued)  
TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	42	43	44	46	48	50	51	52	54	55	56	57
186	-19	07	-03	-06	-11	-10	-13	00	00	27	-03	-07
188	-12	05	-03	-02	-13	-02	-05	-06	-02	16	-05	-09
189	14	-20	16	02	07	11	19	08	08	-02	07	15
191	-18	02	-10	-29	-10	-22	-21	-03	-14	11	-17	-18
192	06	-07	12	07	15	-05	15	25	37	05	10	07
195	08	-07	16	12	05	10	16	10	11	05	13	17
A	13	-07	-01	04	13	09	13	-04	05	-07	-05	09
B	10	-09	09	10	14	08	18	05	10	-06	02	07
C	00	-08	01	-03	01	-05	-02	00	-01	-09	02	-03
D	13	-02	33	12	17	11	28	-25	14	-05	04	00
E	27	-09	08	06	28	04	16	21	39	-07	07	-05
F	17	-07	10	10	22	03	15	12	22	-03	08	04

TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	58	61	63	67	68	69	70	71	78	81	82	85
10												
15												
17												
18												
19												
21												
25												
31												
32												
34												
35												
39												
42												
43												
44												
46												
48												
50												
51												
52												
54												
55												
56												
57												
58												
61	-19											
63	-11	02										
67	-11	07	00									
68	-05	-05	-09	43								
69	-10	-07	-02	60	36							
70	-05	02	-04	29	23	29						
71	-20	26	18	04	-03	08	10					
78	-29	34	-23	23	06	15	18	18				
81	-02	06	10	20	13	27	16	34	12			
82	02	03	07	22	20	29	45	05	10	08		
85	-05	-08	-15	32	56	30	11	15	01	15	30	
88	01	-08	06	05	03	-03	08	37	14	12	-01	06
89	-04	-06	05	27	29	31	27	07	11	20	13	14
91	-35	49	05	13	02	06	08	-09	49	05	06	03
92	-12	07	-02	42	71	51	19	10	16	14	31	50

TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	58	61	63	67	68	69	70	71	78	81	82	85
95	-15	07	03	31	16	33	17	09	01	09	14	44
97	-08	-09	09	38	41	45	18	-01	10	16	23	41
99	-18	31	-02	11	05	02	14	-02	35	06	15	23
105	-15	-02	-10	19	19	16	15	10	19	10	23	18
107	-12	-03	03	19	23	29	19	10	11	16	21	29
110	-12	32	12	08	08	04	18	82	16	31	08	17
112	-21	25	-01	09	04	12	02	06	32	06	09	08
117	-12	06	09	15	00	05	08	25	14	29	10	15
118	-18	10	10	12	10	15	08	17	22	10	06	14
123	12	02	-04	-19	-09	-20	-15	-06	-09	-04	-12	-18
125	-16	-03	09	23	15	12	22	02	-08	02	21	17
127	-16	10	-01	40	32	44	25	11	21	17	20	22
128	-14	16	-01	23	09	23	20	08	49	19	20	-02
130	51	-18	-08	-13	-02	-07	-07	-22	-23	-07	-03	02
131	-07	16	-01	-04	01	-03	09	07	12	03	06	02
132	-04	11	02	20	19	24	26	06	18	04	08	05
134	-07	16	00	29	28	28	28	14	32	20	23	06
135	14	11	-06	34	29	51	21	16	26	18	02	15
138	-11	02	02	45	40	54	26	11	21	26	17	29
140	-30	30	-02	21	14	16	21	08	50	12	14	05
144	-12	14	-09	63	51	78	40	24	26	24	41	39
145	-20	17	11	22	10	28	15	00	24	12	07	19
148	-12	-03	09	32	27	39	17	02	26	09	18	-11
149	01	-05	00	46	47	49	28	15	04	13	16	38
150	-04	11	04	29	22	15	28	06	19	19	18	11
151	-22	00	09	46	44	52	29	15	25	17	31	28
152	09	-05	-04	08	04	05	06	-08	12	-05	-01	-12
153	03	03	02	11	00	14	15	08	02	-01	15	11
154	22	-19	-04	-18	-10	-18	-05	-01	-28	01	01	-08
156	10	-05	07	-15	-03	-14	-18	00	-13	06	-09	-06
159	-11	03	-03	30	21	26	10	03	20	04	14	11
161	-01	-09	09	17	11	22	11	02	13	04	15	11
162	-14	01	-11	48	68	61	32	23	26	23	37	69
172	-04	14	-02	24	17	16	23	25	26	30	15	25
174	08	04	00	-14	-10	-12	-05	-02	-09	-06	-04	-15
179	-24	17	-01	17	10	13	08	11	32	06	03	-09
181	-11	12	08	-50	05	06	06	03	09	06	09	-03
182	24	-08	-09	06	00	09	00	07	-09	03	01	00
183	-04	08	04	02	-08	-03	03	10	02	00	00	-01
185	-08	15	03	29	17	28	32	15	21	12	22	16

TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	58	61	63	67	68	69	70	71	78	81	82	85
186	39	-02	-11	-02	-04	-12	-03	-12	-12	-07	01	02
188	48	-16	-08	-05	-03	-06	-02	-14	-18	-06	02	00
189	-11	06	00	09	05	07	09	-05	19	07	09	05
191	30	-07	02	-13	-15	-11	-20	-17	-15	-06	-01	-02
192	-22	14	06	10	03	14	10	16	40	00	-02	03
195	-03	05	07	17	07	11	18	00	16	11	14	02
A	-17	09	14	01	-05	07	03	30	15	06	10	-01
B	-18	15	04	03	04	12	01	33	18	12	12	09
C	-06	08	05	08	06	07	-06	09	03	04	12	-04
D	-15	16	06	05	03	02	05	28	18	08	08	11
E	-40	61	13	10	-02	05	07	75	51	16	02	07
F	-23	10	05	09	00	05	08	27	24	09	08	11

TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

[illegible]



TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	88	89	91	92	95	97	99	105	107	110	112	117
95	01	15	-04	30								
97	06	32	10	50	23							
99	04	07	58	14	00	19						
105	07	13	27	01	34	-02	22					
107	09	21	12	36	09	45	14	36				
110	23	09	04	15	13	07	-02	11	14			
112	11	-01	51	17	02	07	36	08	08	08		
117	06	08	06	20	07	14	01	-02	05	29	07	
118	10	03	23	27	05	06	16	00	07	15	14	07
123	-10	-12	-09	-08	-18	00	-05	-01	-21	03	-07	23
125	-07	16	-02	14	21	08	05	12	07	00	-06	12
127	03	26	18	45	26	29	24	18	22	-04	17	11
128	14	07	33	21	10	26	26	23	18	17	20	10
130	00	-04	-28	-06	-11	-09	-17	-10	00	-08	-13	-04
131	03	-05	27	-08	00	-03	13	02	05	15	18	-01
132	05	11	10	17	05	16	09	13	17	21	10	16
134	19	20	23	24	14	11	28	32	34	21	07	08
135	-02	29	17	45	19	28	15	29	35	15	18	06
138	07	46	09	50	36	48	17	28	34	12	11	-02
140	07	06	47	25	06	16	40	20	17	10	27	05
144	19	44	16	60	52	53	17	15	47	24	16	14
145	04	10	27	25	21	13	29	10	14	09	12	05
148	06	18	06	33	16	20	12	28	13	13	05	03
149	10	41	00	42	18	32	06	29	24	04	01	-02
150	03	17	10	12	15	29	08	19	12	13	03	08
151	07	34	04	58	29	46	16	25	26	19	10	05
152	08	02	04	-36	-05	03	-08	-06	04	-03	03	01
153	01	04	10	10	-10	02	08	09	14	06	12	-01
154	-09	-06	-30	-16	-13	-06	-12	-35	-05	-09	-12	-04
156	-02	-03	-13	02	-02	-03	-12	-15	-07	00	-05	04
159	05	12	16	32	12	15	12	07	08	05	07	-04
161	14	06	02	17	04	18	08	11	06	00	08	15
162	16	42	17	68	29	51	24	29	42	19	11	09
172	18	15	16	17	16	15	08	11	13	48	12	36
174	-03	-09	-05	-26	02	-16	-09	01	-12	-04	-08	06
179	01	08	32	16	01	17	26	16	12	06	12	-05
181	00	19	16	15	11	08	19	02	15	13	08	05
182	09	04	-15	04	-01	03	-16	-02	-02	05	-05	00
183	-02	-05	09	-05	-04	-11	11	-14	-06	09	07	05
185	05	16	05	25	08	10	21	20	14	37	03	03

TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	88	89	91	92	95	97	99	105	107	110	112	117
186	06	-03	-18	-16	-06	-07	-12	03	00	-02	-07	-07
188	05	-05	-24	-02	-02	02	-20	-07	-04	-03	-12	00
189	-03	04	23	14	-06	11	18	11	15	01	06	02
191	-07	-11	-18	-13	-14	-12	-15	-13	-18	-10	-06	-02
192	17	03	26	21	-02	08	20	12	09	17	19	10
195	08	09	17	13	03	16	18	-10	07	08	10	03
A	06	-02	29	-05	05	11	23	06	-11	21	25	-04
B	11	06	29	01	06	07	31	-04	12	29	21	05
C	-06	04	09	08	05	-05	08	-04	-04	08	09	00
D	13	00	28	10	16	06	22	-07	12	25	20	06
E	20	-01	81	08	03	05	66	17	09	75	49	15
F	07	01	44	03	09	06	50	31	11	25	30	06

TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	118	123	125	127	128	130	131	132	134	135	138	140
95												
97												
99												
105												
107												
110												
112												
117												
118												
123	-11											
125	14	-05										
127	15	-13	23									
128	21	-19	-07	25								
130	-12	13	-12	-18	-11							
131	11	16	03	01	01	-10						
132	-01	-05	13	23	22	00	07					
134	20	-27	15	39	55	-13	-02	16				
135	25	-23	02	28	29	01	02	25	38			
138	16	-17	15	54	28	-07	-04	18	38	49		
140	24	-15	05	30	59	-20	14	17	49	28	22	
144	16	-34	13	57	39	-10	-07	35	51	74	61	37
145	70	-18	21	27	25	-14	07	02	29	05	28	25
148	18	-21	06	44	21	-14	-02	09	28	30	33	16
149	11	-22	28	31	20	-09	-21	16	52	36	53	11
150	10	-18	18	25	33	-02	01	26	33	14	30	34
151	16	-21	24	52	25	-11	-11	19	40	29	54	34
152	03	01	-19	04	15	10	-08	01	03	10	-04	14
153	13	00	07	12	07	-03	14	06	15	09	02	06
154	-12	25	-05	-23	-31	17	-04	-06	-25	-12	-19	-36
156	-02	20	-06	-19	-20	12	02	-08	-06	-06	-09	-17
159	14	-17	03	30	24	-11	09	14	25	14	22	21
161	13	-16	07	25	19	-01	-03	04	22	11	19	12
162	23	-25	18	52	30	-08	-02	26	41	52	60	24
172	09	-12	11	17	41	00	06	52	33	20	11	26
174	-10	09	-01	-20	-14	08	11	-01	-21	-13	-30	-08
179	15	-17	11	23	30	-23	07	13	28	19	22	36
181	12	-15	09	18	16	-14	11	08	17	15	21	13
182	-10	11	-12	-02	-04	24	-04	00	15	01	06	-06
183	05	11	04	02	00	-13	11	01	07	-04	-02	00
185	09	-05	08	24	40	-02	06	37	38	27	29	34

TABLE 49 (continued)  
TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	118	123	125	127	128	130	131	132	134	135	138	140
186	-15	03	-11	-13	-06	48	-06	00	-04	-11	-07	-14
188	-11	07	-11	-14	-07	46	-01	-02	-04	-20	-06	-15
189	15	-09	06	20	20	-12	08	10	23	01	13	24
191	-08	14	-21	-16	-11	21	-03	-13	-22	-15	-21	-18
192	14	-11	-07	09	30	-10	07	06	12	17	12	35
195	07	-08	16	19	13	-08	07	06	13	12	20	16
A	12	05	01	12	09	-28	16	05	14	-04	05	17
B	13	01	-01	12	14	-22	11	05	12	08	17	18
C	08	-01	01	13	11	-11	11	00	10	-08	02	06
D	16	-01	02	14	13	-14	06	-02	15	06	12	21
E	22	01	-02	22	34	-27	28	10	20	21	12	49
F	11	01	08	21	24	-23	16	07	19	08	12	31

TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	144	145	148	149	150	151	152	153	154	156	159	161
95												
97												
99												
105												
107												
110												
112												
117												
118												
123												
125												
127												
128												
130												
131												
132												
134												
135												
138												
140												
144												
145	28											
148	41	23										
149	61	16	13									
150	19	12	06	30								
151	65	30	36	49	27							
152	17	00	05	08	00	06						
153	22	17	11	12	-13	15	-03					
154	-17	-19	-14	-20	-26	-16	06	-01				
156	-21	-15	-17	-18	-17	-16	-04	-06	36			
159	24	25	21	30	20	22	06	25	-28	-36		
161	31	16	28	18	16	27	04	10	-16	-14	10	
162	70	23	44	61	18	57	-04	11	-19	-18	29	22
172	30	14	05	23	29	13	01	02	-13	00	16	07
174	-27	-17	-42	-13	-06	-27	-02	-08	13	22	-19	-20
179	20	29	20	16	20	25	07	10	-29	-32	28	08
181	16	18	21	13	16	15	-05	13	-18	-23	30	12
182	09	-13	03	06	-04	-03	03	-02	09	09	00	-01
183	-04	00	01	-11	01	-04	-01	02	08	00	18	-03
185	39	-02	27	32	41	21	05	04	-23	-16	29	17

TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	144	145	148	149	150	151	152	153	154	156	159	161
186	-06	-15	-05	00	-01	-15	09	03	11	12	-15	-02
188	-16	-15	-02	02	03	-13	02	-03	16	13	-09	03
189	16	25	12	07	15	14	09	13	-19	-23	32	10
191	-23	-12	-14	-15	-09	-23	03	-05	19	10	-13	-04
192	12	07	13	14	15	14	05	-02	-35	-07	17	02
195	14	09	15	04	10	23	05	06	-09	-03	07	15
A	11	-11	20	-10	-09	04	-09	21	-02	01	01	06
B	28	15	11	-13	06	10	-10	06	-10	-06	02	06
C	07	13	07	-07	02	05	-14	07	-09	-05	14	04
D	27	17	03	04	00	20	03	10	-03	02	08	08
E	15	22	15	-12	10	11	-09	10	-23	-07	13	01
F	07	12	11	02	09	07	-08	09	-12	-05	13	10

TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	162	172	174	179	181	182	183	185	186	188	189	191
95												
97												
99												
105												
107												
110												
112												
117												
118												
123												
125												
127												
128												
130												
131												
132												
134												
135												
138												
140												
144												
145												
148												
149												
150												
151												
152												
153												
154												
156												
159												
161												
162												
172	22											
174	-21	03										
179	18	10	-14									
181	21	06	-08	22								
182	00	03	01	-07	-05							
183	-11	-01	00	07	15	-01						
185	40	58	-06	27	20	06	04					

TABLE 49 (continued)

TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	162	172	174	179	181	182	183	185	186	188	191	192
186	-08	-02	10	-15	-15	22	-05	-12				
188	-15	00	11	-11	-08	21	-06	-11	39			
189	15	06	-07	30	22	-11	11	12	-12	-06		
191	-26	-16	05	-21	-14	10	-02	-26	20	21	-08	
192	18	22	-08	09	00	-03	01	26	-03	-10	12	-11
195	13	12	-05	14	10	-01	03	22	-02	-02	07	-03
A	06	-11	-14	16	19	-13	10	05	-21	-14	13	-06
B	11	07	-12	14	14	-06	16	10	-13	-13	11	-14
C	-01	-03	-07	08	12	-15	12	01	-10	-07	06	17
D	13	07	-01	07	07	-06	12	13	-11	-17	09	-15
E	18	25	-07	30	20	-17	12	24	-20	-27	17	-23
F	05	12	-07	15	12	-13	10	18	-13	-15	07	-13



TABLE 49 (continued)  
TETRACHORIC CORRELATIONS BETWEEN SIGNIFICANT INVENTORY ITEMS<sup>a</sup>

Item	192	195	A	B	C	D	E	F
186								
188								
189								
191								
192								
195	11							
A	-01	05						
B	04	11	52					
C	06	00	38	22				
D	08	09	27	45	04			
E	32	17	46	48	16	40		
F	23	20	43	43	12	14	85	

<sup>a</sup>Decimal points have been omitted for all entries.

TABLE 50  
THE CENTROID FACTOR MATRIX<sup>a</sup>

Item	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	-33	-15	-18	-06	17	10	-05	-12	14	-06	-06	04
2	34	-30	-27	04	-07	-06	20	-07	10	15	-19	21
3	43	-23	-30	21	-33	20	-16	21	18	20	11	-15
4	30	-23	10	14	-07	21	11	16	-08	03	-10	-02
5	41	-37	-11	13	02	-04	08	10	-16	-10	02	-09
6	-18	14	28	-17	07	-12	27	07	-19	-12	-13	15
7	32	08	05	-20	11	-22	16	18	16	13	14	-18
8	-31	-26	-04	-04	-19	27	-15	-07	19	-27	-05	-02
9	-17	-15	19	-08	-14	14	04	-06	04	-05	-02	07
10	29	-30	-34	13	-17	20	-36	34	-08	13	22	14
11	53	-14	08	-11	-06	03	05	-02	-06	-06	-19	-06
12	34	23	16	-20	-10	-02	02	15	07	-02	-05	01
13	29	24	-02	03	10	-14	04	02	-04	13	-11	-07
14	-19	-11	-13	-19	12	13	-07	07	-10	13	-05	04
15	42	-13	13	06	-12	05	16	14	-21	05	-16	-10
16	35	-20	-23	04	13	-20	-11	-18	-19	-14	15	06
17	27	19	-13	-05	18	-07	13	-06	05	21	-14	-09
18	52	-37	08	14	12	15	05	10	07	-12	-02	-02
19	72	-38	10	04	11	16	11	06	08	11	-06	-04
20	29	07	14	-26	-04	-09	-05	-03	09	10	15	-11
21	45	12	02	-32	-11	-12	-08	17	-01	-05	09	03
22	-10	-09	-02	-28	-21	-07	20	-01	-10	-06	01	05
23	48	-30	-04	-03	-03	-07	05	06	-18	06	-08	-11
24	55	-38	18	05	09	05	12	-11	19	10	-17	-08
25	-36	-34	-08	-22	-17	-06	30	05	23	-15	08	05
26	25	37	05	-18	-03	14	-15	08	-14	-14	-04	11
27	09	12	-25	20	12	-17	-03	12	03	20	10	04
28	55	-32	21	-09	11	-07	08	11	-18	04	-18	20
29	46	-43	13	-02	11	03	11	-06	-12	-04	-02	-13
30	57	-41	10	06	06	08	03	08	08	-08	04	05
31	42	-20	-19	-16	-11	-20	07	-15	-14	08	-05	-04
32	36	26	-48	-21	43	07	-22	12	32	-11	-14	13
33	49	32	20	-29	-21	15	-07	16	05	-06	-14	-16
34	31	-07	-18	-09	17	02	04	08	10	03	-13	01
35	35	-18	-14	-06	-14	-03	17	-17	-09	-07	14	03
36	36	-35	16	-18	37	12	19	-36	-18	-28	27	16
37	17	10	-13	-22	06	-12	06	07	22	12	08	08
38	37	-26	-04	-02	14	-08	07	-16	18	20	-10	-07
39	46	55	17	-13	-13	25	07	-10	-19	22	16	07
40	61	-39	17	09	20	12	11	10	-14	-27	18	-24

TABLE 50 (continued)  
THE CENTROID FACTOR MATRIX<sup>a</sup>

Item	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
41	32	-20	06	-03	22	-06	-04	-10	-10	-11	05	14
42	46	-30	12	02	16	08	13	11	-10	09	10	-09
43	42	31	06	-10	-12	24	12	-18	-21	16	15	15
44	34	-11	10	-23	-10	09	-27	-22	07	16	27	01
45	41	-20	11	-07	11	09	03	-09	15	09	11	-10
46	39	22	-52	-35	27	-02	-16	18	16	-22	-01	-04
47	31	23	04	-11	-06	24	12	04	-09	07	13	10
48	19	04	-21	-18	19	-10	09	13	-14	-10	-03	-11
49	37	22	10	13	17	-17	14	13	13	-15	18	08
50	-28	08	-16	-11	06	23	13	06	-16	-09	-10	-12
51	24	-15	-20	19	09	-22	-19	-21	-26	-04	14	13
52	60	-19	04	15	-11	09	04	02	-10	-02	-04	10
53	53	15	20	-23	-28	-08	-02	11	11	-06	-12	-01
54	-33	-33	-06	-30	-16	-10	22	16	12	-12	22	08
55	10	24	-15	-08	-09	18	07	-08	-13	-10	13	-12
56	34	-12	-11	-18	-19	-06	-11	08	-15	-07	-08	-15
57	60	-07	06	-18	-26	-06	-15	-08	22	-11	-04	14
58	50	-23	18	-18	13	15	-05	14	19	-05	05	-10
59	62	-36	15	05	13	07	06	-04	15	10	-14	11
60	55	27	24	-20	-25	02	-03	06	-07	-06	-06	08
61	82	-40	07	-06	05	04	11	09	10	-16	-04	06
62	45	18	21	24	09	-23	12	10	06	-12	21	20
63	47	-15	-02	24	-18	06	07	22	17	08	01	-06
64	50	-47	14	-08	05	-13	-15	-17	20	08	-08	16
65	40	-11	03	-14	-17	-31	-11	-07	-09	05	-14	08
66	66	-31	04	17	04	-04	-08	16	-09	-04	04	11
67	02	02	18	-16	-09	-16	19	20	10	13	-22	02
68	18	02	-11	10	-10	06	16	-08	12	-12	08	03
69	-36	-13	-28	-03	15	14	26	06	-06	06	-04	-09
70	-26	-09	-22	-17	28	19	02	15	-07	06	06	-04
71	41	07	13	15	-21	-17	10	-13	03	-20	-07	-11
72	30	-11	-07	14	-16	-10	08	12	06	03	11	12
73	73	-40	16	-08	17	08	08	-20	11	-12	13	-19
74	42	-03	-22	-45	-03	-29	-13	09	-12	-14	-09	-14
75	-27	08	-09	-22	10	-03	-07	-07	-16	-06	03	-07
76	39	19	16	13	-20	-02	-10	-08	06	-10	-11	02
77	30	18	-12	23	-16	-10	07	-32	21	-24	09	-26
78	-09	-25	-05	-19	-03	03	09	13	16	-08	-05	02
79	05	13	-11	08	-07	05	10	-06	-04	-09	-12	-08
80	50	-08	-21	-23	-26	-18	-16	-06	-08	-09	-18	-06

TABLE 50 (continued)  
THE CENTROID FACTOR MATRIX<sup>a</sup>

Item	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
81	-25	-26	-07	-30	-21	-04	21	11	14	04	13	18
82	-26	-27	-10	-18	-18	-12	25	10	07	-07	11	07
83	31	21	18	14	-15	-15	19	-10	10	-05	03	-17
84	-35	-02	06	-10	-10	06	25	13	09	-05	05	10
85	31	26	18	-24	-04	-08	-07	10	02	05	09	-08
86	26	02	-09	02	-10	-08	14	02	-11	07	04	03
87	26	33	-30	19	-02	38	10	-14	10	-05	-06	20
88	34	30	-25	10	06	29	16	-07	04	-09	-08	19
89	14	15	-08	17	-14	12	08	-08	04	-16	-02	06
90	29	23	-12	06	20	14	15	07	-07	-14	-14	20
91	56	73	-20	-28	08	35	-02	04	-05	-00	10	13
92	39	36	-19	-10	-07	25	02	-14	-12	18	14	15

TABLE 50 (continued)  
THE CENTROID FACTOR MATRIX<sup>a</sup>

Item	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	$h^2_j$
1	08	-13	11	13	13	-08	-14	-09	35
2	10	08	21	17	-09	-02	08	20	59
3	-06	26	18	08	-02	18	-18	-09	90
4	-20	-07	-06	-04	06	-04	01	-16	35
5	-08	03	06	02	-02	08	12	02	43
6	-07	-27	-08	-02	10	-03	23	06	50
7	-07	-08	18	-15	-21	03	-10	-09	51
8	09	-14	16	-15	16	-20	18	11	60
9	02	03	-02	-05	-12	02	-06	03	16
10	07	-12	10	-26	-05	05	00	06	83
11	-06	04	12	08	11	06	03	-05	16
12	07	-03	11	06	-10	-08	-13	01	32
13	04	-06	07	05	03	01	-02	-07	23
14	13	-04	06	00	10	-04	-03	-08	21
15	-02	-04	-08	-00	-02	14	-12	-02	41
16	02	-11	08	05	08	-03	-00	05	43
17	11	06	-11	05	05	-05	-05	-12	31
18	07	-10	-03	03	-06	10	-12	-02	55
19	19	-17	-07	-13	11	19	14	15	92
20	-11	03	-06	-07	21	-06	-14	12	34
21	07	-07	-07	-04	06	-06	-06	07	43
22	-02	-12	-01	08	02	-06	06	05	23
23	-15	04	07	09	06	05	10	-11	46
24	15	07	-13	06	-04	-14	-04	-02	67
25	09	03	-10	07	-08	15	-10	-05	58
26	15	16	-12	20	03	09	05	-06	44
27	05	08	-13	-04	-04	-05	-11	-06	28
28	-22	19	-13	-08	18	14	-12	19	81
29	-05	-07	12	10	06	07	-18	-01	56
30	-08	12	-12	-07	-03	-07	07	09	60
31	-05	10	11	-06	05	08	09	-01	43
32	-28	-08	-05	01	10	11	-03	13	1.00 <sup>b</sup>
33	12	-12	24	-09	21	-20	18	07	84
34	14	06	-10	-12	-03	-06	04	-08	27
35	-09	14	08	-16	-04	-12	-04	-06	37
36	-10	-19	10	-09	-15	-06	-14	12	94
37	-14	-10	11	06	04	-07	-11	10	28
38	10	04	-07	03	10	-12	06	-03	40
39	18	14	03	13	07	06	08	-02	85
40	08	04	-07	28	13	-14	-28	09	1.00 <sup>b</sup>

TABLE 50 (continued)  
THE CENTROID FACTOR MATRIX<sup>a</sup>

Item	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	$h^2_j$
41	-19	06	-14	-05	-03	-12	10	-20	39
42	07	-18	-12	-17	-14	-11	-03	06	54
43	19	-02	06	10	-02	-01	08	04	57
44	-13	-13	-07	-18	05	22	15	-27	65
45	17	-09	-05	-12	-05	03	12	04	38
46	-16	-15	-15	01	04	13	-01	-05	89
47	06	09	05	12	-04	-06	02	05	34
48	03	08	-07	-11	06	-15	07	-08	30
49	20	13	15	-09	17	04	-06	06	51
50	09	-06	-07	-14	17	08	-04	-06	34
51	15	02	03	-10	14	09	03	04	46
52	-03	-04	-04	04	16	-10	10	-15	54
53	08	05	-02	-10	-12	-13	-05	-07	58
54	11	-11	-02	12	-07	10	01	-06	57
55	05	-01	-03	-08	10	13	-05	-05	25
56	10	03	-11	-09	-14	04	12	15	37
57	10	08	13	-11	12	06	-12	-06	66
58	10	14	-06	20	-16	12	20	03	64
59	15	-16	-22	07	08	-07	03	-10	75
60	14	-03	07	-02	-07	-06	-10	-09	62
61	17	25	07	09	-22	-00	21	01	1.00 <sup>b</sup>
62	20	19	10	-12	20	07	15	-08	70
63	-18	-12	-04	06	14	-08	08	-08	52
64	05	05	10	08	07	09	-12	02	69
65	15	-10	-18	-10	-07	02	-11	-06	47
66	-06	-10	12	-02	08	-03	05	-07	66
67	-08	-07	20	-03	-17	09	07	-10	35
68	06	08	09	-02	10	12	01	12	20
69	10	12	16	-14	-06	07	03	10	47
70	23	08	06	-09	12	-12	-16	-09	44
71	-08	-03	-08	09	10	14	-03	12	44
72	-01	-06	06	01	02	-20	-06	-02	27
73	-14	-07	09	14	01	-05	01	05	95
74	12	07	-06	-04	-09	-10	-00	06	65
75	08	12	-03	-05	-07	12	-03	-11	26
76	10	-09	-06	05	04	11	08	03	36
77	17	-09	-14	22	-10	-12	21	-22	73
78	-01	-05	-05	07	05	04	-08	06	20
79	-03	07	-04	-05	03	11	-04	06	14
80	06	-14	-09	13	-15	-02	-11	13	63

TABLE 50 (continued)  
THE CENTROID FACTOR MATRIX<sup>a</sup>

Item	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	$h^2_j$
81	05	-11	-07	02	10	14	07	05	45
82	09	-12	-16	-03	03	08	-10	-02	40
83	05	-15	07	-22	-06	21	-04	-08	46
84	-07	14	-14	-13	04	-10	-08	-04	33
85	-05	-12	-07	08	10	-21	-10	18	42
86	06	-05	-03	06	02	-11	02	05	16
87	-06	-05	-02	-17	-06	-14	-10	01	60
88	-04	-09	-02	-03	-20	-04	02	06	51
89	-17	24	-16	-10	07	-10	-10	-08	31
90	06	-15	15	04	-14	07	-04	-08	41
91	-02	-10	-10	18	-01	13	06	-02	1.00 <sup>b</sup>
92	-09	-10	-15	-03	-01	03	04	13	56

<sup>a</sup>Decimal points have been omitted (except for some entries in the last column).

<sup>b</sup>Within limits of error.

TABLE 51  
THE OBLIQUE FACTOR MATRIX<sup>a</sup>

Item	A	B	C	D	E	F	G	H	I	J	K	L
1	-00	12	20	24	06	-11	-20	05	07	07	-08	11
2	16	11	19	-04	-07	06	-03	-06	02	17	-07	-31
3	00	01	45	-00	-01	05	03	-00	05	-03	12	02
4	13	-01	-12	-06	-04	-06	05	-07	25	04	-04	12
5	-03	-03	-08	-08	04	-06	12	-23	19	-10	02	-04
6	08	14	-44	-06	-08	03	05	-13	20	00	-08	-00
7	10	-04	00	07	01	-01	-06	07	03	-03	01	02
8	-05	07	05	01	06	-28	02	-02	-09	-01	-05	03
9	-07	13	04	-12	-06	-06	-01	13	-05	07	03	-02
10	05	-07	03	05	03	04	53	04	-06	02	-08	-05
11	-04	-01	06	05	-11	-04	-14	-01	23	04	04	08
12	06	03	00	09	-02	04	00	27	01	02	-04	-09
13	03	-15	01	09	02	08	-07	02	13	06	-06	-01
14	-00	06	06	03	-08	05	-08	-01	10	07	-01	10
15	-10	02	-03	-11	-10	06	08	01	22	13	06	-06
16	08	-06	-04	07	12	02	10	-09	04	-10	-12	04
17	02	-06	08	11	01	12	-23	01	07	26	15	02
18	-09	04	05	10	08	-09	13	09	12	20	-05	-03
19	-09	03	03	-04	-10	10	11	-11	03	43	-09	-01
20	16	-01	10	03	-24	10	-20	02	-22	03	05	19
21	08	11	-11	11	-05	10	10	17	-10	02	-03	04
22	12	30	-14	-10	-01	07	-01	-08	09	-04	04	00
23	07	-03	-03	-05	-05	-01	-04	-17	27	-07	01	14
24	04	-04	12	-06	01	-11	-16	13	-03	42	11	00
25	-08	59	08	02	09	-09	-08	03	-01	04	07	-02
26	-18	07	-05	11	01	24	05	15	-08	-05	-01	01
27	10	-09	00	06	09	08	07	03	-09	08	07	-07
28	04	-01	-04	-01	-52	-02	-06	-04	02	16	12	01
29	-01	02	12	-02	-10	-04	-12	-06	22	06	-01	11
30	06	-03	-07	-04	-07	-11	08	-03	-07	13	12	-01
31	02	02	08	-08	-08	03	-11	-14	11	-04	07	05
32	01	-08	10	80	-19	01	-04	-02	-12	04	-02	-02
33	04	-13	-02	02	-10	03	-08	07	08	03	-03	02
34	-07	01	01	14	03	-05	-03	07	01	24	15	-05
35	10	06	05	-16	04	00	-07	-07	07	-05	28	01
36	08	06	-08	-03	-01	05	02	-05	01	-02	01	04
37	28	09	08	24	-12	08	-11	02	-09	01	-04	00
38	12	-05	13	01	-01	-04	-23	-03	-05	31	05	11
39	04	-01	06	-23	-05	62	-06	-02	03	06	07	04
40	01	01	03	-02	03	02	-07	-04	04	01	05	00



TABLE 51 (Continued)  
THE OBLIQUE FACTOR MATRIX<sup>a</sup>

Item	A	B	C	D	E	F	G	H	I	J	K	L
41	11	-08	-24	05	07	-12	01	-00	11	-00	19	24
42	07	-07	-18	-17	03	04	19	-05	02	23	08	-04
43	12	06	00	-25	03	54	05	-04	05	11	02	-04
44	04	02	03	01	06	13	05	02	02	06	-02	56
45	-04	-02	05	-06	06	06	02	-03	-09	23	-06	07
46	-08	10	-06	69	05	04	05	-03	02	-05	08	08
47	11	05	01	-11	-04	38	01	-02	-00	02	12	-09
48	-04	-02	-18	09	02	-03	-06	-13	10	-05	22	-02
49	-04	-01	07	08	01	04	-06	05	-07	02	-02	-12
50	-24	15	02	04	-06	08	-09	-16	17	07	23	00
51	-05	-13	01	-07	07	04	14	-08	00	-02	-11	04
52	16	00	-11	-06	08	02	07	-00	23	16	11	14
53	00	02	-04	01	03	-10	03	38	02	11	11	-03
54	05	59	-11	01	15	-01	06	-01	04	-07	-03	05
55	-15	11	08	-00	05	25	-03	-13	10	-03	20	04
56	-17	-02	-10	-09	-01	00	21	-01	-08	-02	00	-14
57	-03	11	24	15	-05	-13	-06	36	-03	13	02	12
58	-12	06	01	06	03	05	02	00	-09	04	-10	05
59	12	06	-06	07	07	-04	01	16	07	52	01	14
60	-01	01	-02	-01	03	07	10	38	06	04	-06	-00
61	03	-01	-05	01	-01	-13	04	-05	07	-07	09	-06
62	-02	-02	-06	-06	10	02	01	02	04	01	-01	01
63	26	-00	-07	04	08	-01	09	-09	13	13	08	10
64	07	02	26	11	-15	-17	-13	24	-06	21	-22	15
65	-03	04	-09	00	05	-09	14	33	-01	22	-06	02
66	15	-11	-11	02	04	-09	20	-00	21	04	-09	09
67	04	07	-08	01	-03	-14	-03	10	21	-01	-11	-05
68	-07	14	17	00	01	10	-05	-11	-03	03	07	-12
69	-17	08	16	-13	-11	02	-12	-32	07	-03	16	-24
70	-08	08	14	05	-06	03	-17	-05	06	07	15	03
71	-06	01	02	04	02	-02	-01	02	02	02	-02	-06
72	29	05	-05	-04	12	-03	12	09	03	06	03	-05
73	12	-05	10	05	02	-02	-16	-12	01	02	-06	18
74	-10	03	-09	15	00	-09	03	12	-06	-10	00	-07
75	-21	05	02	-00	03	03	-06	-03	02	-17	04	08
76	-09	-06	-02	05	11	03	14	16	01	10	-16	-02
77	-03	00	-04	05	65	-00	-01	02	01	07	03	04
78	01	30	05	13	-08	-03	-05	04	-03	07	01	-00
79	-18	-01	09	03	-04	05	-05	-07	03	00	14	-14
80	-01	05	-05	15	07	-01	18	21	-03	04	-12	-14

TABLE 51 (continued)  
THE OBLIQUE FACTOR MATRIX<sup>a</sup>

Item	A	B	C	D	E	F	G	H	I	J	K	L
81	11	54	-04	-02	-06	10	01	-07	-04	10	00	08
82	03	52	-07	-01	05	-01	02	-01	05	12	12	04
83	-16	-02	04	-04	15	-02	03	06	11	07	-01	-02
84	07	27	-07	-09	-09	-06	-11	-00	-05	05	33	-01
85	25	-07	-11	05	-14	16	-02	10	-22	00	-04	03
86	16	05	-09	-12	05	15	06	-05	03	05	03	-09
87	07	-05	11	16	07	16	07	08	01	24	32	-22
88	02	-00	-04	15	11	20	17	02	06	17	20	-29
89	00	-00	05	03	01	-04	-08	04	-02	04	42	-02
90	-07	02	-06	23	12	08	13	10	31	07	-02	-1
91	02	08	-06	32	04	63	10	-01	07	03	09	01
92	16	01	-05	-01	-07	53	14	-11	-09	14	16	-03

TABLE 51 (continued)  
THE OBLIQUE FACTOR MATRIX<sup>a</sup>

Item	M	N	O	P	Q	R	S	T
1	01	-07	-18	00	15	-21	-16	-06
2	-37	-00	-14	-07	18	17	08	17
3	14	-07	12	-01	-18	02	-02	-09
4	14	-13	04	14	-17	01	09	-16
5	09	08	06	08	-06	16	10	14
6	-04	05	-02	11	-06	05	11	01
7	02	-01	49	08	-02	03	-26	02
8	-09	-05	-20	49	11	05	01	-07
9	-07	-11	-02	-01	13	06	01	-12
10	-02	02	01	04	07	-05	-03	-04
11	04	-03	-01	13	-08	07	09	09
12	06	-06	10	-04	00	01	-05	-09
13	02	03	12	-07	-09	-11	-02	06
14	-01	-04	-12	01	01	-10	-27	09
15	16	-11	18	-01	-14	-08	14	02
16	04	11	-15	-03	24	-10	16	24
17	-02	01	06	-11	-12	-11	-17	23
18	16	-02	08	-03	10	-02	05	-15
19	-05	10	12	18	03	05	10	06
20	12	-01	05	17	-03	-07	03	08
21	11	03	00	06	-03	-02	07	11
22	00	-09	-06	09	01	02	07	16
23	11	-05	02	07	-17	11	06	18
24	01	-09	-06	-02	04	08	-09	10
25	-01	02	02	-06	03	05	04	01
26	10	09	-20	-10	-12	08	09	-02
27	02	12	05	-23	-08	-12	-10	11
28	-03	06	-10	01	-00	10	18	11
29	21	-09	07	05	11	-06	00	02
30	02	06	-07	08	04	25	05	04
31	-15	03	03	07	00	07	11	38
32	-12	-04	-03	03	07	02	00	-07
33	04	01	06	48	-16	06	-05	02
34	-10	05	01	-01	-01	04	-18	21
35	-07	04	02	07	18	04	01	28
36	-01	-02	-00	-03	67	01	-02	03
37	-06	-05	06	-01	08	-03	-07	-01
38	-08	00	-08	03	-02	02	-10	25
39	02	13	-02	-04	-04	01	01	05
40	59	07	-06	10	07	-08	-00	03

TABLE 51 (continued)  
THE OBLIQUE FACTOR MATRIX<sup>a</sup>

Item	M	N	O	P	Q	R	S	T
41	04	03	-16	-10	07	15	-06	13
42	12	-06	20	03	11	00	-16	09
43	-07	04	-06	-04	15	-02	04	10
44	-02	-07	05	01	-00	00	05	-03
45	-06	04	13	08	11	09	-06	03
46	11	-03	08	02	-08	-03	00	12
47	03	04	-03	-02	05	08	-08	01
48	09	13	04	11	-12	05	-21	36
49	01	51	11	04	05	-03	02	-00
50	09	01	08	20	-08	-19	-13	14
51	-08	29	-17	-08	18	-16	19	26
52	11	04	-16	09	-10	-00	11	10
53	-00	-08	08	03	-07	08	02	04
54	07	04	00	-06	01	08	-03	03
55	12	06	13	13	-01	-16	04	13
56	-02	-08	06	11	-08	15	13	26
57	-11	08	-08	07	10	-04	17	00
58	07	04	01	-01	-08	43	-07	-08
59	04	-04	-16	-07	01	-03	01	05
60	04	-06	01	-02	03	-04	10	-07
61	-08	03	-03	02	04	53	05	05
62	-05	65	01	-01	-04	09	09	02
63	20	-05	04	16	-28	02	10	-08
64	-15	00	-18	-11	20	03	11	-05
65	-06	-09	-03	-19	02	-15	20	21
66	10	10	-05	04	01	02	08	-02
67	-17	-09	25	-06	-14	14	-07	-18
68	-07	19	04	13	08	00	17	03
69	-19	09	17	11	10	07	-29	19
70	08	11	-03	05	06	-16	-47	16
71	13	03	07	07	-07	-07	47	-01
72	06	04	-03	-01	02	-06	03	03
73	18	-07	04	17	19	14	05	01
74	02	-02	00	04	-03	10	-00	41
75	01	05	04	-10	03	-01	-12	14
76	-01	03	-03	03	-07	-02	35	-13
77	16	02	-00	00	-09	00	21	12
78	04	-08	-04	07	-02	02	02	-02
79	-02	01	10	07	-04	-06	14	06
80	03	-29	-05	-05	04	-06	30	20

TABLE 51 (continued)  
THE OBLIQUE FACTOR MATRIX<sup>a</sup>

Item	M	N	O	P	Q	R	S	T
81	-09	04	-06	04	-02	04	06	08
82	07	04	01	-01	-03	-12	06	13
83	-01	10	43	05	-01	-15	20	-09
84	01	05	-01	05	-06	04	-13	03
85	20	-09	01	10	-05	-05	02	02
86	03	03	-02	00	-01	-03	06	19
87	-18	-09	-01	03	24	-15	-01	-05
88	-19	-08	06	-05	23	02	03	-03
89	05	03	-09	04	-04	-03	09	05
90	-08	04	08	-16	17	-06	-05	-12
91	07	-03	02	-08	-02	-01	03	-05
92	-08	-10	-01	-03	11	-06	10	11

<sup>a</sup>Decimal points have been omitted for all entries.

TABLE 52

PROJECTIONS OF THE QUESTIONNAIRE ITEMS ON THE OBLIQUE REFERENCE VECTORS<sup>a</sup>

Item	Oblique Reference Vector																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	-00	+12	+20	+24	+06	-11	-20	+05	+07	+07	-08	+11	+01	-07	-18	+00	+15	-21	-16	-06
2	+16	+11	+19	-04	-07	+06	-03	-06	+02	+17	-07	-31	-37	-00	-14	-07	+18	+17	+08	+17
3	+00	+01	+45	-00	-01	+05	+03	-00	+05	-03	+12	+02	+14	-07	+12	-01	-18	+02	-02	-09
4	+13	-01	-12	-06	-04	-06	+05	-07	+25	+04	-04	+12	+14	-13	+04	+14	-17	+01	+09	-16
5	-03	-03	-08	-08	+04	-06	+12	-23	+19	-10	+02	-04	+09	+08	+06	+08	-06	+16	+10	+14
6	+08	+14	-44	-06	-08	+03	+05	-13	+20	+00	-08	-00	-04	+05	-02	+11	-06	+05	+11	+01
7	+10	-04	+00	+07	+01	-01	-06	+07	+03	-03	+01	+02	+02	-01	+49	+08	-02	+03	-26	+02
8	-05	+07	+05	+01	+06	-28	+02	-02	-09	-01	-05	+03	-09	-05	-20	+49	+11	+05	+01	-07
9	-07	+13	+04	-12	-06	-06	-01	+13	-05	+07	+03	-02	-07	-11	-02	-01	+13	+06	+01	-12
10	+05	-07	+03	+05	+03	+04	+53	+04	-06	+02	-08	-05	-02	+02	+01	+04	+07	-05	-03	-04
11	-04	-01	+06	+05	-11	-04	-14	-01	+23	+04	+04	+08	+04	-03	-01	+13	-08	+07	+09	+09
12	+06	+03	+00	+09	-02	+04	+00	+27	+01	+02	-04	-09	+06	-06	+10	-04	+00	+01	-05	-09
13	+03	-15	+01	+09	+02	+08	-07	+02	+13	+06	-06	-01	+02	+03	+12	-07	-09	-11	-02	+06
14	-00	+06	+06	+03	-08	+05	-08	-01	+10	+07	-01	+10	-01	-04	-12	+01	+01	-10	-27	+09
15	-10	+02	-03	-11	-10	+06	+08	+01	+22	+13	+06	-06	+16	-11	+18	-01	-14	-08	+14	+02
16	+08	-06	-04	+07	+12	+02	+10	-09	+04	-10	-12	+04	+04	+11	-15	-03	+24	-10	+16	+24
17	+02	-06	+08	+11	+01	+12	-23	+01	+07	+26	+15	+02	-02	+01	+06	-11	-12	-11	-17	+23
18	-09	+04	+05	+10	+08	-09	+13	+09	+12	+20	-05	-03	+16	-02	+08	-03	+10	-02	+05	-15
19	-09	+03	+03	-04	-10	+10	+11	-11	+03	+43	-09	-01	-05	+10	+12	+18	+03	+05	+10	+06
20	+16	-01	+10	+03	-24	+10	-20	+02	-22	+03	+05	+19	+12	-01	+05	+17	-03	-07	+03	+08
21	+08	+11	-11	+11	-05	+10	+10	+17	-10	+02	-03	+04	+11	+03	+00	+06	-03	-02	+07	+11
22	+12	+30	-14	-10	-01	+07	-01	-08	+09	-04	+04	+00	+00	-09	-06	+09	+01	+02	+07	+16
23	+07	-03	-03	-05	-05	-01	-04	-17	+27	-07	+01	+14	+11	-05	+02	+07	-17	+11	+06	+18
24	+04	-04	+12	-06	+01	-11	-16	+13	-03	+42	+11	+00	+01	-09	-06	-02	+04	+08	-09	+10

TABLE 52 (continued)

## PROJECTIONS OF THE QUESTIONNAIRE ITEMS ON THE OBLIQUE REFERENCE VECTORS

Item	Oblique Reference Vector																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
25	-08	+59	+08	+02	+09	-09	-08	+03	-01	+04	+07	-02	-01	+02	+02	-06	+03	+05	+04	+01
26	-18	+07	-05	+11	+01	+24	+05	+15	-08	-05	-01	+01	+10	+09	-20	-10	-12	+08	+09	-02
27	+10	-09	+00	+06	+09	+08	+07	+03	-09	+08	+07	-07	+02	+12	+05	-23	-08	-12	-10	+11
28	+04	-01	-04	-01	-52	-02	-06	-04	+02	+16	+12	+01	-03	+06	-10	+01	-00	+10	+18	+11
29	-01	+02	+12	-02	-10	-04	-12	-06	+22	+06	-01	+11	+21	-09	+07	+05	+11	-08	+00	+02
30	+06	-03	-07	-04	-07	-11	+08	-03	-07	+13	+12	-01	+02	+06	-07	+08	+04	+25	+05	+04
31	+02	+02	+08	-08	-08	+03	-11	-14	+11	-04	+07	+05	-15	+03	+07	+00	+07	+03	+11	+38
32	+01	-08	+10	+80	-19	+01	-04	-02	-12	+04	-02	-02	-12	-04	-03	+03	+07	+02	+00	-07
33	+04	-13	-02	+02	-10	+03	-08	+07	+08	+03	-03	+02	+04	+01	+06	+48	-16	+06	-05	+02
34	-07	+01	+01	+14	+03	-05	-03	+07	+01	+24	+15	-05	-10	+05	+01	-01	-01	+04	-18	+21
35	+10	+06	+05	-16	+04	+00	-07	-07	+07	-05	+28	+01	-07	+04	+02	+07	+18	+04	+01	+28
36	+08	+06	-08	-03	-01	+05	+02	-05	+01	-02	+01	+04	-01	-02	-00	-03	+67	+01	-02	+03
37	+28	+09	+08	+24	-12	+08	-11	+02	-09	+01	-04	+00	-06	-05	+06	-01	+08	-03	-07	-01
38	+12	-05	+13	+01	-01	-04	-23	-03	-05	+31	+05	+11	-08	+00	-08	+03	-02	+02	-10	+25
39	+04	-01	+06	-23	-05	+62	-06	-02	+03	+06	+07	+04	+02	+13	-02	-04	-04	+01	+01	+05
40	+01	+01	+03	-02	+03	+02	-07	-04	+04	+01	+05	+00	+59	+07	-06	+10	+07	-08	-00	+03
41	+11	-08	-24	+05	+07	-12	+01	-00	+11	-00	+19	+24	+04	+03	-16	-10	+07	+15	-06	+13
42	+07	-07	-18	-17	+03	+04	+19	-05	+02	+23	+08	-04	+12	-06	+20	+03	+11	+00	-16	+09
43	+12	+06	+00	-25	+03	+54	+05	-04	+05	+11	+02	-04	-07	+04	-06	-04	+15	-02	+04	+10
44	+04	+02	+03	+01	+06	+13	+05	+02	+02	+06	-02	+56	-02	-07	+05	+01	-00	+00	+05	-03
45	-04	-02	+05	-06	+06	+06	+02	-03	-09	+23	-06	+07	-06	+04	+13	+08	+11	+09	-06	+03
46	-08	+10	-06	+69	+05	+04	+05	-03	+02	-05	+08	+08	+11	-03	+08	+02	-08	-03	+00	+12
47	+11	+05	+01	-11	-04	+38	+01	-02	-00	+02	+12	-09	+03	+04	-03	-02	+05	+08	-08	+01
48	-04	-02	-18	+09	+02	-03	-06	-13	+10	-05	+22	-02	+09	+13	+04	+11	-12	+05	-21	+36

TABLE 52 (continued)

## PROJECTIONS OF THE QUESTIONNAIRE ITEMS ON THE OBLIQUE REFERENCE VECTORS

Item	Oblique Reference Vector																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
49	-04	-01	+07	+08	+01	+04	-06	+05	-07	+02	-02	-12	+01	+51	+11	+04	+05	-03	+02	-00
50	-24	+15	+02	+04	-06	+08	-09	-16	+17	+07	+23	+00	+09	+01	+08	+20	-08	-19	-13	+14
51	-05	-13	+01	-07	+07	+04	+14	-08	+00	-02	-11	+04	-08	+29	-17	-08	+18	-16	+19	+26
52	+16	+00	-11	-06	+08	+02	+07	-00	+23	+16	+11	+14	+11	+04	-16	+09	-10	-00	+11	+10
53	+00	+02	-04	+01	+03	-10	+03	+38	+02	+11	+11	-03	-00	-08	+08	+03	-07	+08	+02	+04
54	+05	+59	-11	+01	+15	-01	+06	-01	+04	-07	-03	+05	+07	+04	+00	-06	+01	+08	-03	+03
55	-15	+11	+08	-00	+05	+25	-03	-13	+10	-03	+20	+04	+12	+06	+13	+13	-01	-16	+04	+13
56	-17	-02	-10	-09	-01	+00	+21	-01	-08	-02	+00	-14	-02	-08	+06	+11	-08	+15	+13	+26
57	-03	+11	+24	+15	-05	-13	-06	+36	-03	+13	+02	+12	-11	+08	-08	+07	+10	-04	+17	+00
58	-12	+06	+01	+06	+03	+05	+02	+00	-09	+04	-10	+05	+07	+04	+01	-01	-08	+43	-07	-08
59	+12	+06	-06	+07	+07	-04	+01	+16	+07	+52	+01	+14	+04	-04	-16	-07	+01	-03	+01	+05
60	-01	+01	-02	-01	+03	+07	+10	+38	+06	+04	-06	-00	+04	-06	+01	-02	+03	-04	+10	-07
61	+03	-01	-05	+01	-01	-13	+04	-05	+07	-07	+09	-06	-08	+03	-03	+02	+04	+53	+05	+05
62	-02	-02	-06	-06	+10	+02	+01	+02	+04	+01	-01	+01	-05	+65	+00	-01	-04	+09	+09	+02
63	+26	-00	-07	+04	+08	-01	+09	-09	+13	+13	+08	+10	+20	-05	+04	+16	-28	+02	+10	-08
64	+07	+02	+26	+11	-15	-17	-13	+24	-06	+21	-22	+15	-15	+00	-18	-11	+20	+03	+11	-05
65	-03	+04	-09	+00	+05	-09	+14	+33	-01	+22	-06	+02	-06	-09	-03	-19	+02	-15	+20	+21
66	+15	-11	-11	+02	+04	-09	+20	-00	+21	+04	-09	+09	+10	+10	-05	+04	+01	+02	+08	-02
67	+04	+07	-08	+01	-08	-14	-03	+10	+21	-01	-11	-05	-17	-09	+25	-06	-14	+14	-07	-18
68	-07	+14	+17	+00	+01	+10	-05	-11	-03	+03	+07	-12	-07	+19	+04	+13	+08	+00	+17	+03
69	-17	+08	+16	-13	-11	+02	-12	-32	+07	-03	+16	-24	-19	+09	+17	+11	+10	+07	-29	+19
70	-08	+08	+14	+05	-06	+03	-17	-05	+06	+07	+15	+03	+08	+11	-03	+05	+06	-16	-47	+16
71	-06	+01	+02	+04	+02	-02	-01	+02	+02	+02	-02	-06	+13	+03	+07	+07	-07	-07	+47	-01
72	+29	+05	-05	-04	+12	-03	+12	+09	+03	+06	+03	-05	+06	+04	-03	-01	+02	-06	+03	+03



TABLE 52 (continued)

## PROJECTIONS OF THE QUESTIONNAIRE ITEMS ON THE OBLIQUE REFERENCE VECTORS

Item	Oblique Reference Vector																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
73	+12	-05	+10	+05	+02	-02	-16	-12	+01	+02	-06	+18	+18	-07	+04	+17	+19	+14	+05	+01
74	-10	+03	-09	+15	+00	-09	+03	+12	-06	-10	+00	-07	+02	-02	+00	+04	-03	+10	-00	+41
75	-21	+05	+02	-00	+03	+03	-06	-03	+02	-17	+04	+08	+01	+05	+04	-10	+03	-01	-12	+14
76	-09	-06	-02	+05	+11	+03	+14	+16	+01	+10	-16	-02	-01	+03	-03	+03	-07	-02	+35	-13
77	-03	+00	-04	+05	+65	-00	-01	+02	+01	+07	+03	+04	+16	+02	-00	+00	-09	+00	+21	+12
78	+01	+30	+05	+13	-08	-09	-05	+04	-03	+07	+01	-00	+04	-08	-04	+07	-02	+02	+02	-02
79	-18	-01	+09	+03	-04	+05	-05	-07	+03	+00	+14	-14	-02	+01	+10	+07	-04	-06	+14	+06
80	-01	+05	-05	+15	+07	-01	+18	+21	-03	+04	-12	-14	+03	-29	-05	-05	+04	-06	+30	+20
81	+11	+54	-04	-02	-06	+10	+01	-07	-04	+10	+00	+08	-09	+04	-06	+04	-02	+04	+06	+08
82	+03	+52	-07	-01	+05	-01	+02	-01	+05	+12	+12	+04	+07	+04	+01	-01	-03	-12	+06	+13
83	-16	-02	+04	-04	+15	-02	+03	+06	+11	+07	-01	-02	-01	+10	+43	+05	-01	-15	+20	-09
84	+07	+27	-07	-09	-09	-06	-11	-00	-05	+05	+33	-01	+01	+05	-01	+05	-06	+04	-13	+03
85	+25	-07	-11	+05	-14	+16	-02	+10	-22	+00	-04	+03	+20	-09	+01	+10	-05	-05	+02	+02
86	+16	+05	-09	-12	+05	+15	+06	-05	+03	+05	+03	-09	+03	+03	-02	+00	-01	-03	+06	+19
87	+07	-05	+11	+16	+07	+16	+07	+08	+01	+24	+32	-22	-18	-09	-01	+03	+24	-15	-01	-05
88	+02	-00	-04	+15	+11	+20	+17	+02	+06	+17	+20	-29	-19	-08	+06	-05	+23	+02	+03	-03
89	+00	-00	+05	+03	+01	-04	-08	+04	-02	+04	+42	-02	+05	+03	-09	+04	-04	-03	+09	+05
90	-07	+02	-06	+23	+12	+08	+13	+10	+31	+07	-02	-21	-08	+04	+08	-16	+17	-06	-05	-12
91	+02	+08	-06	+32	+04	+63	+10	-01	+07	+03	+09	+01	+07	-03	+02	-08	-02	-01	+03	-05
92	+16	+01	-05	-01	-07	+53	+14	-11	-09	+14	+16	-03	-08	-10	-01	-03	+11	-06	+10	+11

<sup>a</sup>Decimal points have been omitted for all entries.

Approval Sheet

The dissertation submitted by John Avner Plag has been read and approved by three members of the Department of Psychology.

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated, and that the dissertation is now given final approval with reference to content, form, and mechanical accuracy.

The dissertation is therefore accepted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

Nov 11 / 61  
Date

[Signature]  
Signature of Adviser