Technical Research Report 1173

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PSYCHOLOGICAL FACTORS MEASURED IN THE DIFFERENTIAL OFFICER BATTERY

William H. Helme, Louis P. Willemin,
and Roberta W. Day

BEHAVIORAL EVALUATION RESEARCH DIVISION

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William H. Helme, Chief

BEHAVIOR AND SYSTEMS RESEARCH LABORATORY

Office, Chief of Research and Development
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BESRL Technical Research Reports and Technical Research Notes are intended for sponsors of R&D tasks and other research and military agencies. Any findings ready for implementation at the time of publication are presented in the latter part of the Brief. Upon completion of a major phase of the task, formal recommendations for official action normally are conveyed to appropriate military agencies by briefing or Disposition Form.

FOREWORD

Early identification of officer leaders and development of officer leadership from cadet training through company and field grade assignments are of major concern in the management of the Army's manpower resources. The Behavior and Systems Research Laboratory (BESRL) conducts research to provide scientific means of identifying individuals with good leadership potential for officer training, selecting officers for commissioning, and evaluating their performance. The present series of publications records the conduct of a long-term experimental program to improve the basis for selecting and developing officer leaders in accordance with their capability to meet differing leadership requirements. Differential prediction and evaluation have become dominant objectives in the effort to channel officers into appropriate assignments and develop their potential so as to make best use of their abilities.

OFFICER PREDICTION research was undertaken by BESRL to meet the need for improving the selection and assignment of personnel for differential officer leadership positions. The program evolved responsive to requirements and recommendations of the Army Scientific Advisory Panel and the Deputy Chief of Staff for Personnel. Objectives of the research are 1) clearer definition of the behavioral demands of officers in different types of assignment and of the behavior which makes for success in those assignments, and 2) improved methods of identifying officers who can be expected to perform well in each of several broad domains of leadership. Analysis of duties performed by officers pointed initially to three groups of officer assignments--combat, technical, and administrative--which appeared to call for different patterns of leader behavior.

The basic research design was longitudinal. Experimental measures were obtained on officers immediately after their entry on active duty, and performance evaluations were obtained at subsequent points in the officers' careers. The Differential Officer Battery (DOB), an extensive set of experimental tests developed and refined for differential prediction of broad domains of leadership, was administered to two samples of officers entering on active duty, the first sample of 6500 in 1958 and 1959, the second of about 4000 in 1961 and 1962. From the sample of 4000, 900 officers were selected as representative of various branches of service to take part in an experimentally controlled three-day exercise at the Officer Evaluation Center (OEC) established for the purpose at Fort McClellan, Alabama. The scenario for the exercise presented the officer with 15 problems, 5 each in combat, technical, and administrative settings. The problem situations were designed to yield objective recorded data on specific details of each officer's performance, as well as judgmental evaluations of his style of behavior and effectiveness in aspects of each task and in each situation-task.

In addition to the evaluations of officer performance obtained at the OEC, ratings of all officers who had taken the DOB at entry on active duty were obtained. The first field rating was made by superiors and associates after the officers had been in their duty assignments for 12-18 months. In 1967 and 1968, evaluations of performance were obtained for officers of the original sample on duty in Vietnam (combat) and in combat-ready situations (Europe, Korea, CONUS).

Criterion data have been analyzed to yield information about the officers--the requirements of their jobs, the various ways in which they carry out their responsibilities as leaders, what general modes of behavior characterize good and poor accomplishment of various missions. Analysis of test and criterion data reveals characteristics of officers who are likely to succeed or to perform less well as officers.

The present Technical Research Report is one of a series of major publications marking the culmination of the OFFICER PREDICTION research program--and, in fact, the impact of the findings on BESRL's ongoing and newly formulated program on officer evaluation and career development. Technical Research Report 1173 presents the major psychological factors derived from officer responses to tests of the experimental Differential Officer Battery and describes the reduction of the measures obtained to a manageable number of experimental predictor scores. An earlier companion publication (Technical Research Report 1172) presents the important dimensions of officer leadership behavior derived from analysis of the specific actions recorded and observed or evaluated during the three-day OEC simulation.

Subsequent publications will examine the initial hypothesis of differential prediction, as tested by the extent to which DOB scores are associated with differential performance in the OEC exercise and success in combat and technical/administrative assignments. These publications will present the basis on which psychological instruments have been selected for operational introduction in officer training programs and evaluation at early career points. These analyses are expected to provide assessment not only of the usefulness of the DOB measures but also of the effectiveness of the various methods of performance evaluation by which criterion data were obtained.

The integrated research program just described evolved from BESRL research in two major areas: selection of cadets for officer training and operational evaluation of officer performance on active duty. Leadership selection research developed from the early World War II measures of cognitive abilities, designed to differentiate within the upper levels of general mental ability to determine whether individuals could learn the essentials of more demanding jobs. Personal attributes related to leadership ability were evaluated through standardized board interviews, self-report "personality" measures, and a few performance measures. Considerable experimentation was conducted on the self-report measures, utilizing the groupings of responses into relatively homogeneous clusters and the application of forced-choice technique to preclude social desirability response sets.

This earlier selection research program enhanced the value of interview procedures and provided useful measures of general verbal and quantitative ability at higher levels. Measurement of personal attributes yielded but modest predictive validity. The major contribution from the research findings was the realization that leadership behavior was highly complex and that the situation in which it was evaluated had to be fully taken into account.

BESRL research on operational evaluation of officers had its inception at the close of World War II when the problem arose of selecting career peacetime officers from the vast number commissioned during the war. The series of efficiency report forms from Form 67-1 in 1947 to Form 67-3 in 1953 were research-based instruments designed to yield a full range of Army standard scores. But the spread of scores on such instruments tended to narrow seriously with continued use, indicating that management rather than research questions had to be addressed. As with the selection problem, a major contribution of operational evaluation research was in defining more clearly the requirement for new evaluation approaches, particularly those emphasizing the situation in which leadership behavior was to be evaluated.

Meantime, changes in Army structure and technology raised the question of whether the traditional "generalist" principle of career development should be modified to recognize differing requirements of leadership in different areas of command. This concern, along with the finding that different individuals could meet leadership requirements in different domains through various leadership styles, led to establishment of the comprehensive Differential Officer Prediction program outlined above, with the comprehensive selection battery of the DOB and the comprehensive situational performance evaluations of the OEC.

As the longitudinal research has progressed to its conclusion with performance evaluations in the Vietnam conflict and concurrent evaluations worldwide, changes in the expected utilization of products and findings have come to pass. The Army is experiencing a period of transition with attendant shifts in the demands on officer leadership, unaccustomed concepts of the role of the Army, changed input of officer and enlisted personnel accompanying cultural changes in the society and the trend toward an all-volunteer military service. BESRL's current program in this area is a many faceted attack on major officer personnel problems--improved methods for selection, assignment, and promotion actions, continuing reevaluation of each officer's potential in terms of available career assignments, development of a new research-based system of performance evaluation responsive to particular Army needs for given personnel decisions. In place of concentrating on reducing the subjectivity and bias, inconsistency, and inflation apparent in official ratings, more diversified means of evaluating performance are under development. Brought to bear is BESRL's research experience with simulation of leadership problem situations at the OEC with its implication for adaptation of officer training exercises to individual measurement, the application of models for design and test of officer evaluation system and subsystems, and computer-assisted simulation and feedback.

Research on officer prediction has not only provided measures for precommissioning use. The dimensions of officer behavior delineated are shaping the constructs entering into the current research effort to develop an officer selection and evaluation system which can effectively serve the changing pattern of officer career development. Research methodology has been developed to support the measurement of performance by means which do not omit from consideration the elusive noncognitive and situational elements influencing performance.

The Officer Evaluation Center was the setting in which varying factors of environment, type of mission (combat or technical/administrative), interpersonal relationships, situational problem, stresses of various kinds, were all brought together. Add the officers with their differing capabilities and individual ways of dealing with problems interacting with these environmental and situational factors to influence the officer's performance and the observer's evaluation of that performance. Subject the results to searching analysis to distill the factorial composition of officer behavior. The product is not only reliable measures of well-defined aspects of performance but measures which generalize beyond the specific situations to major dimensions of leadership and officer performance behavior.

J. E. UHLANER, Director
Behavior and Systems
Research Laboratory

PSYCHOLOGICAL FACTORS MEASURED IN THE DIFFERENTIAL OFFICER BATTERY

BRIEF

Requirement:

As an essential step in research to improve Army officer selection and assignment, to identify and delineate major officer characteristics measured by the experimental Differential Officer Battery covering a wide range of abilities, interests, background, and judgmental and attitudinal responses.

Procedure:

Officer responses to over 1700 items in the Differential Officer Battery were subjected to a sequence of factor analyses in order to structure the content into a manageable number of reliable and scorable scales having potential for predicting the success of officers in combat and technical/managerial assignments as well as in general command duty. The first analysis was within major segments of the battery to arrive at reliable and homogeneous psychological scales. A factor analysis was then conducted across those scales to reveal major dimensions of the abilities, interests, and other personal characteristics measured.

Findings:

The analysis yielded 17 interpretable factors, of which the major ones were mechanical technology, combat leadership, administration, general knowledge, science, and managerial leadership. Factors relating to outdoor activity, personal adjustment, sports, aesthetic-intellectual, and supervision were moderately well defined. Identified also, but less well defined, were factors concerned with social-economic advantage, leadership readiness, authority and structure, easygoingness, strict command, and political orientation.

Utilization of Findings:

Scales based on these analyses constitute the experimental predictors of officer performance from which an operational battery for officer selection and career classification will be derived.

PSYCHOLOGICAL FACTORS MEASURED IN THE DIFFERENTIAL OFFICER BATTERY

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PSYCHOLOGICAL FACTORS MEASURED IN THE DIFFERENTIAL OFFICER BATTERY

A comprehensive research program for early identification and career development of Army officer leaders was undertaken by the Behavior and Systems Research Laboratory in response to requirements of the Deputy Chief of Staff for Personnel and recommendations of the Army Scientific Advisory Panel.

The program, longitudinal in design, was conducted in several phases, some partially concurrent. Necessarily preceding the other phases was the development of a series of psychological tests constituting a broad sampling of abilities, knowledges, opinions, self-report data, and physical performance. The battery, after extensive and thorough developmental procedures, was administered to a large sample of officers on entry on active duty. The present Technical Research Report deals with analysis of officer responses on these tests, primarily to identify the psychological factors measured. The scorable measures resulting are being evaluated for effectiveness in predicting officer performance in successive assignments and under varying circumstances of an officer's career.

The following evaluations of performance serve as criteria for an interrelated series of analyses:

1. Evaluations of job performance and estimates of potential for combat, administrative, and technical leadership positions made by supervisor, parallel superior, and two colleagues in the officer's first tour of duty 12 to 18 months after entry.

2. A sample of 900 officers from among those who had taken the experimental test battery on entry participated in an intensive three-day exercise in a simulated combat environment. The exercise, staged at the Officer Evaluation Center set up expressly for the purpose at Fort McClellan, Alabama, comprised 15 situational problems representative of officer duties in combat, administrative, and technical assignments presented as an integrated set of actions. Analysis of the observations and evaluative data obtained on these officers, yielding a structure of behavioral and personal factors in officer behavior, has been reported in BESRL Technical Research Report 1172.

3. Finally, evaluations of performance in combat situations in Vietnam and in combat-ready situations world-wide were obtained from superiors and colleagues of officers in the sample after four to six years of service.

POPULATION AND SAMPLES

The basic sample consists of 4000 lieutenants, 3500 who entered on active duty between June 1961 and March 1963 and an additional 500 tested on entry from January to March 1964. Included were graduates from the United States Military Academy Class of 1962 and Regular Army and Reserve officers commissioned from the Reserve Officers Training Corps. Composition of the officer input sample is shown in Figure 1. Findings are designed to apply to all Army officer input.

Source of Commission	USMA	ROTC-RA	ROTC-Res	TOTAL
Branch				
Infantry	177	143	196	516
Armor	64	91	322	477
Artillery	133	57	203	393
Air Defense	52	23	53	128
Engineer	71	37	245	353
Ordnance			1005	1005
Quartermaster		1	527	528
Signal			267	267
Adjutant General			186	186
Finance		1	110	111
TOTAL	497	353	3114	3964

Figure 1. Composition of the officer input sample administered the DOB by source of commission and basic branch (N = 3964)

OBJECTIVES OF THE PRESENT ANALYSIS

The Differential Officer Battery (DOB), as administered to the sample of newly commissioned officers, was designed to yield measures differentiating leadership potential in three domains--combat, administrative, and technical. The extent of differentiation attainable through the DOB scores was the principal concern of the present analysis which dealt exclusively with the internal structure of the battery itself. Specific objectives were:

1. To reduce the large number of responses--some 1700--to a manageable number of reliable and, where possible, homogeneous scales for later evaluation as effective predictors of performance.

2. To determine the degree to which psychological instruments varying in content, format, and in the task presented can contribute to differentiating the broad domains of officer characteristics.

3. To discover the number and nature pf psychological factors underlying the complex construct of military leadership, and the three domains hypothesized in the present research.

THE DIFFERENTIAL OFFICER BATTERY

Measures of varied type and content were retained in the Differential Officer Battery, after extensive tryout and revision based on administration of the initial experimental forms to approximately 6500 officers. Cognitive information tests in the battery cover a wide range of areas of knowledge from military tactics, technology, and logistics to mathematics, physical sciences, social sciences, and humanities. Two noncognitive self-description inventories included questions on attitudes and interests. The Personal Data Record is made up of questions on the individual's background and education. In another questionnaire, the Group Awareness Test, the officer estimated the proportions of men in three groups--recruit, noncommissioned officer, and ROTC cadet--holding certain views. In another, the Individual Understanding Test, he compared his own characteristics with those of the best and the poorest cadet he knew.

Problems of military leadership presented on film yielded indication of how the officer would deal with such problems. Finally, three physical proficiency measures were obtained. In all, about 1700 values were obtainable from officer responses to the battery--600 cognitive information, 1047 self-description and attitudinal, 44 responses on situational problems, and three physical proficiency scores. How the various sets of questions were divided among the 11 booklets comprising the DOB[1] is shown in Figure 2. The arrangement avoided having the officers work for several consecutive sessions on problems of the same type.

[1] Instruments and PT numbers of the booklets and forms of the DOB are given in BESRL Technical Research Report 1134, Prediction of Officer Performance. March 1964.

Form and Question Type	Number of Items
COGNITIVE INFORMATION TESTS	
Booklet 3	150
Military Tactics	50
Organized Sports	29
Nature Sports	15
Farm Facts	18
Biology-Medicine	19
Psychology-Psychiatry	19
Booklet 5	150
Technical Service Hardware	50
Mechanics	25
Physics	17
Chemistry	16
History, Philosophy, Science	15
Mathematics	27
Booklet 8	150
Supply, Warehousing	50
Games	16
Art	18
Music	16
Entertainment	18
Literature	32
Booklet 9	150
Finance	55
World Affairs, Politics	31
Socioeconomic Facts	22
Quantitative Miscellany	16
Qualitative Miscellany	26
SELF-DESCRIPTION MEASURES	
Booklet 1	
Differential Inventory-A	212
Background	18
Job Interests	54
Working Conditions	16
Self-Description	69
Activity Preferences	55
Booklet 7	
Differential Inventory-B	330
Self-Description	330
Booklet 6	
Personal Data Record	55
Background (General)	30
Education	25
OTHER QUESTIONNAIRES	
Booklet 2	
Group Awareness Test	225
Attitude Estimate (Recruit)	75[a]
Attitude Estimate (NCO)	75[a]
Attitude Estimate (ROTC)	75[a]
Booklet 4	
Individual Understanding Test	225
Self-Description	75[b]
Best Officer Prospect as Cadet	75[b]
Poorest Officer Prospect as Cadet	75[b]
SITUATIONAL MEASURE	
Booklet 10	
Speeded Practical Judgment Test	44
Competing Requirements	4
Consideration for Recruit	4
Promotion Conflict	4
Insufficient Personnel	4
Location of Facility	4
Performance vs Compassionate Need	4
Insubordination Conflict	8
Overdriving of Men	4
Combat Emergency	4
Combat Discipline	4
PHYSICAL PROFICIENCY	
Booklet 11 — Measures:	
Two-Hand Coordination (Speed-accuracy)	
Kneeling Basketball Throw (distance)	
Endurance Crawl (speed)	

[a] Same items for each group. [b] same items for each estimate.

Figure 2. Composition of the Differential Officer Battery

ANALYSIS

Each major content area was first analyzed separately, using the test records of 900 officers stratified by branch, to define the measures to be obtained in terms of homogeneous content and to derive a manageable number of reliable scores. These analyses resulted in 149 scores based either on factors identified in the analysis or on related content. The three physical proficiency scores were included in the 149 (See Table 1 of the Technical Supplement for a list of these factors.).

From this long list of scores, 23 factors were statistically identified as yielding optimum differentiation and identification for meaningful interpretation. Further analysis focusing on the psychological dimensions measured by the information tests, the self-description and background data, the situational responses, and the three physical proficiency measures resulted in a set of 17 factors. The Technical Supplement gives a detailed account of the successive analyses by which these factors were defined.

Factors resulting from the analyses are listed below accompanied by a brief interpretation:

Factor I. Mechanical Technology. This factor is clearly one of ability and interest in mechanical-technological activities. Major contributors are measures of mechanical interest, knowledge of (and interest in) manual crafts, interpretation of mechanical or electrical diagrams, practical skills, and technological operations.

Factor II. Combat Leadership. This factor reflects a combination of outdoor skills, physical and manual confidence, and combat leadership orientation. Lesser components are physical proficiency, knowledge of and interest in military tactics, and personal characteristics supporting the overall pattern.

Factor III. Administration. In marked contrast to Combat Leadership, this factor related to administration knowledge and orientation. A bipolar scale involving white-collar versus manual interests is reflected in a direction directly opposite to the weighting of the extremes in Factor II.

Factor IV. General Knowledge. This factor may well represent a general knowledge or mental ability factor across diverse areas of information. Although some scientific and technical areas are represented, the core of the factor appears to be verbal rather than quantitative, and more in practical arts, social science, and humanities than in mathematics and the physical sciences.

Factor V. Outdoor Activity. This factor reflects the self-concept of one who is practical, active, rugged, and self-reliant, able to survive and function under difficult physical conditions.

Factor VI. Personal Adjustment. Expresses positive personal adjustment, denying symptoms, attitudes, and feelings of a dysphoric nature. Reflects self-confidence and decisiveness.

Factor VII. Sports. This factor is clearcut and well-defined, representing a wide range of measures--self-descriptive, physical performance, and information--all relating to sports.

Factor VIII. Social-Economic Advantage. Defined by responses to factual questions on childhood and family environment and experiences, along a dimension of income, social status, educational and cultural background.

Factor IX. Leadership Readiness. Content of this factor consists in avoiding the temptations and pitfalls of evading leadership-command responsibilities. Components are negative responses to indecision, reluctant leadership, and mediation alternatives presented in the Speeded Practical Judgment Test based on leadership situations.

Factor X. Supervision. The core of this factor is face-to-face supervision, the orientation of a foreman or line supervisor. As such, it is differentiated from the administrative orientation of Factor III and the managerial leadership of Factor XVI below.

Factor XI. Science. This factor is rather large, a splitoff from Factor I. It is clearly the more mathematical, conceptual level of knowledge and orientation in physical science and engineering as compared to the more mechanical, concrete level of Factor I.

Factor XII. Aesthetic-Intellectual. Reflects appreciation of aesthetic and abstract interests and activities. A component of interest in military intelligence may indicate the view that such military staff functions offer an outlet for this orientation in the Army.

Factor XIII. Authority and Structure. The core of this factor seems to be a methodical drive for results in which the needs of the organization are primary and the system rather than the individual takes precedence. Concern for order is a major component.

Factor XIV. Easygoingness. The laissez-faire quality is paramount. Factor shows almost the opposite orientation to that of Factor XIII.

Factor XV. Strict Command. This factor appears to contrast with both the preceding factors. As opposed to Authority and Structure, Factor XIII, this factor involves person-to-person directiveness rather than operation through organizational structure. In contrast to Easygoingness, Factor XIV, Factor XV expresses directiveness which leaves little room for initiative by subordinates. The individual takes full responsibility for his actions.

Factor XVI. Political Orientation. This rather marginal factor may indicate a somewhat intellectualized power drive, possibly related to concern with policy making and interactions such as senior advisors or liaison officers might have in the course of their duties.

Factor XVII. Managerial Leadership. As distinguished from Administration, Factor III, this factor reflects a strong directive drive to lead others by organizing and mastering the situation. As distinguished from Supervision, Factor X, Factor XVII reflects a higher managerial level, requiring decision making rather than effective execution of decisions. Where the administrator employs a given structure and the supervisor uses direct relations with his subordinates to accomplish given goals, the manager initiates structure and defines his own job.

APPLICATION OF FINDINGS

Differential Officer Battery scales measuring these factors either singly or in combination are being evaluated for effective relationship to the several criterion measures of officer performance obtained as a part of the research. Through analysis of these relationships, determination is to be made of the measures that will be operationally useful in the differential selection and classification of officers for career-oriented assignment and in the selection of applicants for officer cadet training.

TECHNICAL SUPPLEMENT

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ANALYTIC PROCEDURES

Officer responses on each major instrument of the Differential Officer Battery--except for the three physical proficiency tests--were analyzed separately. Responses of a sample of 900 officers stratified by branch were used in the analysis to reduce the battery content to reliable and homogeneous scales of manageable length. Separate factor analyses were conducted on the 600 information items, the differential inventories, the Personal Data Record (background and education items), and the Speeded Practical Judgment Test. Similarly, factor analysis was applied to each of the separate response sets on the Individual Understanding Test (self, best cadet, poorest cadet) and to estimated percentages of three groups (ROTC cadet, NCO, recruit) responding in a given way on the Group Awareness Test. These analyses, reported in earlier publications[2,3,4], resulted in the derivation of a series of scales based either on factor structure or on related content not included in the factor scales. With the three physical proficiency scores, 149 scores were thus obtained. Table 1 is a list of these scales.

The 149 variables were intercorrelated and factored by the principal components method. The first 30 factors were rotated to simple structure by the varimax method. Inspection and comparison of sets of rotated factors numbering from 5 to 30 led to selection of the 23-factor rotation as yielding optimum differentiation and identification of factors for meaningful interpretation.

It was observed that 10 factors were entirely determined by variables from the Group Awareness Test, that another factor was largely so determined, and that another was largely determined by the Individual Understanding Test as a result of the parallel scales across difference response sets (See Table 1, Individual Understanding Test). A second factor analysis was therefore conducted omitting the Group Awareness Test and the scores estimating best and poorest cadet in the Individual Understanding Test. The purpose was to allow for greater factor differentiation in the information and self-description measures to emerge in the factor structure. The present report, then, focuses on the psychological dimensions measured in the information tests, the two differential inventories, the Personal Data Record, the self-description scales of the Individual Understanding Test, the Speeded Practical Judgment Test, and the three physical proficiency measures.

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[2] Smith, Kay H. Internal analysis of personal inventory for the Differential Officer Battery. BESRL Research Memorandum 68-5. April 1968.

[3] Helme, William H. Factor analysis of leadership inventory for differential prediction of officer performance. BESRL Research Memorandum 68-8. July 1968.

[4] Smith, Kay H. Internal analysis of the Group Awareness Test for the Differential Officer Battery. BESRL Research Memorandum 68-10. September 1968.

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Table 1

VARIABLES DERIVED FROM ITEM ANALYSIS OF DOB INSTRUMENTS

INFORMATION TESTS

Factored Scales		Residual Content Scales	
1	Practical Skills	11	Military Tactics
2	Technology Operations	12	Outdoors
3	Math and Physical Science	13	Human Sciences
4	History and Politics	14	Technology Content
5	Literature and Arts	15	Math and Science Content
6	Entertainment	16	History and Literature
7	Finance	17	Supply
8	Organized Sports	18	Intellectual Entertainment
9	Intellectual Games	19	Finance Content
10	Medical and Chemical	20	Political Science
		21	Economics and Sociology
		22	Quantitative Miscellany
		23	Qualitative Miscellany

SELF-DESCRIPTION INVENTORIES

Differential Inventory--A		Differential Inventory--B	
24	Decisive Leader	38	Mechanical Interest
25	Administrator	39	Administrative Interest
26	Combat Interest	40	Aggressive Self-assurance
27	Manual Crafts	41	Frustration Tolerance
28	Outdoor Interest	42	Scientific Interest
29	Social Advantage	43	Outdoor Skills and Combat Leadership
30	Aesthetic Interest	44	Verbal or Social Leadership
31	Emotional Control	45	Athletic Interest
32	Construction Interest	46	Concern for Order
33	Easy-going Disposition	47	Freedom from Neurosis
34	Sports Interest	48	Easy-goingness
35	Nature Endurance	49	Civil Engineering vs Electronics
36	Sociability	50	Active Supervision
37	Achievement Need	51	Military Intelligence
		52	Administrative Supervision
		53	Combat Engineering
		54	Capacity for Detail
		55	White-collar vs Manual
		56	Administrative Leadership
		57	Freedom from Anomie
		58	Diagram Interpretation
		59	Physical Leadership

Table 1 continued

SPEEDED PRACTICAL JUDGMENT TEST

60	Taut Ship	64	Combat Discipline
61	Indecision	65	Mediation
62	Reluctant Leadership	66	Considerate Fairness
63	Buckpassing	67	Command Responsibility

INDIVIDUAL UNDERSTANDING TEST

(Responses included own attitudes and estimated attitudes of best and poorest cadet known to respondent. Resultant scale scores were self-attitude sum across items of the scale and ratio sum which placed self in relation to best and poorest cadet)

Self	Scale	Ratio
68	Combat Leadership	77
69	Mechanical Orientation	78
70	Aesthetic-Intellectual	79
71	Healthy Self-Acceptance	80
72	Concern for Order	81
73	Administration Orientation	82
74	Scientific Orientation	83
75	Strict Discipline	84
76	Management Drive	85

GROUP AWARENESS TEST

(Responses consisted of estimating percentage of each of three groups--NCOs, enlisted recruits, and newly-commissioned ROTC graduates--agreeing with a given statement. Correct percentages were obtained by actual test of these groups. Thus there were six scores on each scale: "perception" scores for each group as estimated, and "accuracy" scores representing the sum of absolute distances from the correct percentages)

Perception				Accuracy		
NCO	RCT	ROTC	Scale	NCO	RCT	ROTC
86	94	102	Good work habits	110	118	126
87	95	103	Leader-follower relations	111	119	127
88	96	104	Fighting man's code	112	120	128
89	97	105	Marriage and family	113	121	129
90	98	106	Cynicism	114	122	130
91	99	107	Non-involvement	115	123	131
92	100	108	Personal integrity	116	124	132
93	101	109	Varied activities	117	125	133

Table 1 continued

PERSONAL DATA RECORD

(One section covered a variety of items on personal and family background. Another section listed school subjects, respondent indicating if he had taken them, his attitude and level of performance in them. The "skill and interest" scales were derived from the school subjects responses)

134 Math-Science Skill and Interest
135 Economic-Cultural Level
136 Language Skill and Interest
137 Manual Skill and Interest
138 Urban vs Rural Background
139 Business Skill and Interest
140 Political Science Skill and Interest
141 Social Science Skill and Interest
142 Versatile Activities
143 Social Responsibility
144 Frontiersman Orientation
145 Practical Concreteness
146 Quiet Life Orientation

ANALYSIS ACROSS ALL DOB MEASURES

Thirty factors accounted for almost 55% of the total variance in the DOB intercorrelation matrix (Table 2). After extraction of the 23d factor, however, the additional factors were dyads or further fractionation of factors from the Group Awareness Test. The first 23 factors accounted for just over half the total variance and for almost 93% of the common variance found in all 30 factors. As noted, 10 of these proved to be entirely based on the Group Awareness Test and another was primarily based on it. Table 3 shows the percentages of the variance accounted for by each of the 23 rotated factors. Of the common variance in the 23-factor matrix, the Group Awareness Test variables accounted for about 42%. The self-description measures--the two differential inventories, the Personal Data Record, and the Individual Understanding Test--accounted for 31%. Those factors that included a combination of self-description, information, situational judgment, and physical proficiency accounted for 27%. The purely information factor is also included in this last total.

Table 2

PERCENT OF VARIANCE ACCOUNTED FOR BY DOB FACTORS

Factor	% Var.	% Cum. Var.	Factor	% Var.	% Cum. Var.
1	7.99	7.99	16	0.99	45.15
2	6.57	14.56	17	0.92	46.07
3	5.55	20.11	18	0.88	46.95
4	4.06	24.17	19	0.84	47.79
5	3.55	27.72	20	0.81	48.60
6	3.02	30.74	21	0.78	49.38
7	2.04	32.78	22	0.76	50.14
8	2.01	34.79	23	0.73	50.87
9	1.73	36.52	24	0.63	51.50
10	1.49	38.01	25	0.61	52.11
11	1.43	39.44	26	0.59	52.70
12	1.28	40.72	27	0.54	53.24
13	1.22	41.94	28	0.53	53.77
14	1.15	43.09	29	0.51	54.28
15	1.07	44.16	30	0.49	54.77

Table 3

PERCENT OF VARIANCE ACCOUNTED FOR BY EACH OF
23 ROTATED FACTORS OF THE DOB

Factor	Content	% Var.	Factor	Content	% Var.
I	Group Awareness	2.88	III	Self-Description	4.40
VI	" "	2.24	IV	"	3.40
VII	" "	2.42	IX	"	2.13
VIII	" "	2.26	X	"	1.60
XI	" "	2.66	XII	"	1.32
XV	" "	1.57	XIV	"	1.80
XVI	" "	1.39	XVII	"	1.16
XVIII	" "	2.13			
XIX	" "	1.33	V	Information	3.51
XXI	"" "	1.51			
			II	Self-Descr (Info)	3.48
XXIII	Gp Aware (Self-Descr)	1.10	XX	" " "	3.52
			XXII	Self-Descr, Phys, Info	1.67
			XIII	Pract Judg (Gp Aware)	1.37

Principal Content	% Cum. Var.	% of Common Var.
Group Awareness	21.49	42.26
Self Description	15.81	31.09
Self Descr, Info, Other	13.55	26.65

ANALYSIS OF SELF-DESCRIPTION, INFORMATION, SITUATIONAL, AND PHYSICAL MEASURES

In order to differentiate better among the factors common to the self-description, information, situational, and physical measures of the DOB, further factor analysis was conducted among these measures only. Estimated communality among these measures amounted for about half the total variance; the first 21 factors accounted for 49% plus. Table 4 shows the variance accounted for by each factor. Comparison of the factor structure for each successive set of factors led to selection of the first 17 as the set yielding maximum meaningful differentiation. Table 5 presents loadings of DOB variables on each of the selected 17 factors, rotated to simple structure by the varimax method. The interpretation of these factors was presented in the text of the present report.

Table 4

PERCENT OF VARIANCE ACCOUNTED FOR BY FACTORS BASED ON DOB SELF-DESCRIPTION, INFORMATION, SITUATIONAL, AND PHYSICAL MEASURES

Factor	% Var.	% Cum. Var.	Factor	% Var.	% Cum. Var.
1	10.16	10.16	11	1.23	42.47
2	7.89	18.05	12	1.17	43.64
3	6.02	24.07	13	.89	44.53
4	4.78	28.85	14	.80	45.33
5	2.90	31.75	15	.75	46.08
6	2.71	34.46	16	.69	46.77
7	2.19	36.65	17	.61	47.38
8	1.68	38.33	18	.55	47.93
9	1.58	39.91	19	.55	48.48
10	1.33	41.24	20	.51	49.99
			21	.47	49.46

Table 5

LOADINGS OF DOB VARIABLES ON 17 ROTATED FACTORS

Variables	Source	Loading
Factor I -- Mechanical Technology		
Mechanical Orientation	IUT	.83
Mechanical Interest	DI-B	.82
Manual Crafts Interest	DI-A	.67
Manual Skill and Interest	PDR	.60
Diagram Interpretation Interest	DI-B	.57
Practical Skills Information	Info	.51[a]
Technology Operations Information	Info	.49[a]
Construction Interest	DI-A	.49
Combat Engineering Interest	DI-B	.46[a]
Scientific Orientation	IUT	.38[b]
Technology Content Information	Info	.34[b]
Outdoor Interest	DI-A	.33[b]
Scientific Interest	DI-B	.30[b]
Factor II -- Combat Leadership		
Outdoor Skills and Combat Leadership	DI-B	.77
Combat Interest	DI-A	.73
Manual vs. White-collar Interests	DI-B	.66
Combat Leadership Orientation	IUT	.64
Nature Endurance Interest	DI-A	.57
Physical Leadership	DI-B	.55
Combat Engineering Interest	DI-B	.45[a]
Endurance Crawl	Phys.	.34
Military Intelligence Interest	DI-B	.32[b]
Military Tactics Information	Info	.31[a]
Outdoor Interest	DI-A	.31[b]
Aggressive Self-Assurance	DI-B	.31[b]
Factor III -- Administration		
Finance Information	Info	.68
Business Skill and Interest	PRD	.67
Administrative Interest	DI-B	.66
Administration Orientation	IUT	.60
Administrator Interest	DI-A	.56
Administrative Leadership	DI-B	.43[b]
Capacity for Detail	DI-B	.42[b]
White-collar vs Manual Interest	DI-B	.41[b]
Administrative Supervision	DI-B	.37[b]

Table 5 continued

Variables	Source	Loading
Factor IV -- General Knowledge		
Entertainment	Info	.72
History and Politics	Info	.67
Medical and Chemical	Info	.60
Practical Skills	Info	.51
Technology Operations	Info	.50
Supply	Info	.50
Literature and Arts	Info	.48
Technology Content	Info	.46
Human Science	Info	.44
Economics and Sociology	Info	.43
History and Literature	Info	.41
Finance Content	Info	.40
Qualitative Miscellany	Info	.40
Intellectual Entertainment	Info	.39
Political Science	Info	.38
Military Tactics	Info	.37[a]
Finance	Info	.34[b]
Intellectual Games	Info	.34[a]
Math and Science Content	Info	.34[b]
Outdoors	Info	.33
Math and Physical Science	Info	.31[b]
Quantitative Miscellany	Info	.28
Factor V -- Outdoor Activity		
Rural vs Urban Background	PDR	.65
Outdoor Interest	DI-A	.58
Frontiersman Orientation	PDR	.39
Practical Skills Information	Info	.35[b]
Factor VI -- Personal Adjustment		
Freedom from Neurosis	DI-B	.73
Freedom from Anomie	DI-B	.70
Emotional Control	DI-A	.69
Healthy Self-Acceptance	IUT	.68
Frustration Tolerance	DI-B	.54
Decisive Leader	DI-A	.30[b]

Table 5 continued

Variables	Source	Loading
Factor VII -- Sports		
Athletic Interest	DI-B	.79
Sports Interest	DI-A	.76
Kneeling Basketball Throw	Phys	.64
Organized Sports Information	Info	.48
Endurance Crawl	Phys	.29[b]
Factor VIII -- Social-Economic Advantage		
Economic-Cultural Level	PDR	.74
Social Advantage	DI-A	.70
Factor IX -- Leadership Readiness		
Ready Decision-Making	SPJ	.61
Readiness to Lead	SPJ	.59
Resistance to Mediator Role	SPJ	.48
Factor X -- Supervision		
Active Supervision	DI-B	.77
Administrative Supervision	DI-B	.74
Administrative Interest	DI-B	.41[b]
Combat Engineering Interest	DI-B	.37[b]
Factor XI -- Science		
Scientific Interest	DI-B	.85
Math-Science Skill and Interest	PDR	.79
Scientific Orientation	IUT	.78
Math and Physical Science Information	Info	.76
Diagram Interpretation Interest	DI-B	.59[a]
Capacity for Detail	DI-B	.50
Technology Operations Information	Info	.45[a]
Math and Science Content	Info	.39
Intellectual Games Information	Info	.36[a]
Social Reticence (non-Sociability)	DI-A	.36[a]
Combat Engineering Interest	DI-B	.33[b]

Table 5

Variables	Source	Loading
Factor XII -- Aesthetic-Intellectual		
Aesthetic Interest	DI-A	.64
Aesthetic-Intellectual Orientation	IUT	.51
Language Skill and Interest	PDR	.44
Military Intelligence Interest	DI-B	.43
Social Science Skill and Interest	PDR	.34[a]
Political Science Skill and Interest	PDR	.26[a]
Quiet Life Orientation	PDR	.26
Factor XIII -- Authority and Structure		
Concern for Order	IUT	.38
Concern for Order	DI-B	.36
Achievement Need	DI-A	.34
Practical Concreteness	PDR	.24
Factor XIV -- Easygoingness		
Easygoingness	DI-B	.53
Easygoing Disposition	DI-A	.40
Non-concern for Order	IUT	.31[b]
Factor XV -- Strict Command		
Strict Combat Discipline	SPJ	.40
"Taut Ship" Command	SPJ	.39
Command Responsibility	SPJ	.36
Non-lenient Relation to Men	SPJ	.24
Factor XVI -- Political Orientation		
History and Politics Information	Info	.34[b]
Political Science Skill and Interest	PDR	.33[a]

Table 5 continued

Variables	Source	Loading
Factor XVII -- Managerial Leadership		
Verbal-Social Leadership	DI-B	.70
Decisive Leader	DI-A	.69
Strict Discipline	IUT	.60
Administrative Leadership	DI-B	.54
Aggressive Self-Assurance	DI-B	.45
Physical Leadership	DI-B	.43[b]
Sociability	DI-A	.41[a]
Military Intelligence Interest	DI-B	.41[b]
Combat Leadership	IUT	.39[b]
Management Drive	IUT	.36

[a] Approximately equal loading on another factor

[b] Appreciably higher loading on another factor

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13. ABSTRACT - Continued

were defined is given in the Technical Supplement to the report. Scales based on these analyses constitute the experimental predictors of officer performance from which an operational battery for officer selection and career classification will be derived.

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13. ABSTRACT

The present Technical Research Report is one of a series of major publications marking the culmination of the OFFICER PREDICTION research program and the impact of the findings on BESRL's ongoing and newly formulated program on officer evaluation and career development. In the first publication in the series (Technical Research Report 1150), important dimensions of officer leadership behavior derived from analyses of more than 2000 single observations and judgments by trained military staff on each officer participant during a three-day OEC simulation are presented. In the present study, the major psychological factors derived from officer responses to tests of the experimental Differential Officer Battery (DOB) are identified and delineated; the experimental predictor scores resultant from a reduction of the large number of measures obtained are described.

The DOB, as administered to the sample of newly commissioned officers, was designed to yield measures differentiating leadership potential in three domains--combat, administrative, and technical. The extent of differentiation attainable through the DOB scores was the principal concern of the present analysis which dealt exclusively with the internal structure of the battery itself. The first analyses of each major content area in the DOB including three physical proficiency scores resulted in 149 scores. From this long list, 23 factors were statistically identified as yielding optimum differentiation and identification. A further analysis conducted across these scales yielded a set of 17 interpretable factors, of which the major ones were mechanical technology, combat leadership, administrative, general knowledge, science, and managerial leadership. A detailed account of the successive analyses by which these factors

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Leadership selection research						
*Leadership behavior						
*Evaluation methodology						
Computer-assisted simulation						
Psychological scales						
OEC evaluation						
Career development						
*Differential behavior						
Performance variables						
Military personnel management						
Manpower systems						