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**NAVAL PERSONNEL AND TRAINING  
RESEARCH LABORATORY**  
SAN DIEGO, CALIFORNIA 92152

TECHNICAL BULLETIN STB 73-3

FEBRUARY 1973

**THE VALIDATION OF THE STRONG VOCATIONAL INTEREST BLANK FOR  
PREDICTING NAVAL ACADEMY DISENROLLMENT AND MILITARY APTITUDE**

Norman M. Abrahams  
Idell Neumann

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IN REPLY REFER TO:  
52:tr  
P43-07X.C4  
Ser: 57  
29 January 1973

From: Commanding Officer  
To: Distribution List

Subj: Research on the validation of the Strong Vocational Interest  
Blank for predicting Naval Academy disenrollment and military  
aptitude

Encl: (1) Technical Bulletin STB 73-3, "The Validation of the Strong  
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Abrahams, N. M., & Neumann, Idell. The validation of the Strong Vocational Interest Blank for predicting Naval Academy disenrollment and military aptitude. San Diego: Naval Personnel and Training Research Laboratory, February 1973. (Technical Bulletin STB 73-3, P43-07X.C4)

## SUMMARY

### A. Background and Problem

Despite rigorous selection procedures, approximately one-third of the officer candidates admitted to the Naval Academy disenroll before being commissioned. The present research sought to examine the usefulness of the Strong Vocational Interest Blank (SVIB) for improving the selection of Naval Academy midshipmen.

### B. Approach

SVIBs have been administered since 1967 to applicants and/or entering Naval Academy midshipmen and analyzed to determine their value in predicting disenrollment and military aptitude. Three separate interest scales were empirically developed to predict motivational disenrollment, academic disenrollment, and military aptitude. The scales were evaluated for both their individual predictive effectiveness and, where possible, for their contribution to existing selection procedures.

### C. Findings, Conclusions, and Recommendations

All three scales yielded significant and useful relationships with their respective criteria in cross-validation samples (pages 6, 13).

The empirically-developed scales also provided significant and useful cross-validated increments beyond the levels of predictive accuracy attained with the present composite (page 13).

It is recommended that the selection procedures for the Naval Academy be modified to take advantage of the unique contribution afforded by the SVIB.

UNCLASSIFIED

Security Classification

## DOCUMENT CONTROL DATA - R &amp; D

Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified

1. ORIGINATING ACTIVITY (Corporate author) Naval Personnel & Training Research Laboratory San Diego, California 92152		2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	
		2b. GROUP	
3. REPORT TITLE THE VALIDATION OF THE STRONG VOCATIONAL INTEREST BLANK FOR PREDICTING NAVAL ACADEMY DISENROLLMENT AND MILITARY APTITUDE			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final			
5. AUTHOR(S) (First name, middle initial, last name) Norman M. Abrahams and Idell Neumann			
6. REPORT DATE February 1973		7a. TOTAL NO. OF PAGES 27	7b. NO. OF REFS 3
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) STB 73-3	
b. PROJECT NO P43-07X.C4			
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Chief of Naval Personnel (Pers-A3) Department of the Navy Washington, D. C. 20370	
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DD FORM 1473 (PAGE 1)

140,445  
101-497-6801

UNCLASSIFIED

Security Classification

UNCLASSIFIED

**Security Classification**

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Vocational interests						
Selection						
Naval Academy						
Military aptitude						
Disenrollment						
Motivation						

DD FORM 1473 (BACK)  
(PAGE 2)

UNCLASSIFIED

**Security Classification**

AD

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FOR PREDICTING NAVAL ACADEMY DISENROLLMENT AND  
MILITARY APTITUDE

Norman M. Abrahams  
Idell Neumann

February 1973

P43-07X.C4  
Technical Bulletin STB 73-3

Submitted by

B. Rimland, Ph.D., Director, Personnel Measurement Research Department

Approved by

E. I. Jones, Ph.D., Technical Director  
F. L. Nelson, Captain, USN  
Commanding Officer

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Naval Personnel and Training Research Laboratory  
San Diego, California 92152

A LABORATORY OF THE BUREAU OF NAVAL PERSONNEL

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THE VALIDATION OF THE STRONG VOCATIONAL INTEREST BLANK  
FOR PREDICTING NAVAL ACADEMY DISENROLLMENT AND  
MILITARY APTITUDE

A. BACKGROUND AND PURPOSE

The U. S. Naval Academy is a major, as well as expensive, source of commissioned officers. Every year, over 800 midshipmen are commissioned at an average estimated cost of \$48,000 each. Consequently, it is imperative that the several thousand young men who seek admission each year be carefully assessed to insure appointments to those having the greatest likelihood of success at the Academy and as officers.

The Academy's primary screening device is a quantitative index referred to as the candidate multiple. It is a weighted composite of seven selection variables, including test scores, high school standing, high school activities, and recommendations. Those selectors reflecting an "academic" component, i.e., test scores and high school record, receive about two-thirds of the weight, while high school activities and recommendations receive the remaining one-third. Through the use of rigorous selection procedures that include the candidate multiple, only 20-25 per cent of applicants are given appointments. Despite the rigorous selection system, one of every three midshipmen fails to complete Naval Academy training. Thus, it would clearly be advantageous to improve the procedures currently used in selection.

During the last few years a considerable amount of research has been devoted to the development and evaluation of the Strong Vocational Interest Blank (SVIB) as an aid in selecting the most qualified applicants. The purpose of this report is to present information on the effectiveness of the SVIB in predicting success at the Academy and to evaluate its incremental value over present selection devices.

This report is concerned with two important criteria at the Academy, disenrollment and military aptitude. Although disenrollment occurs for a wide variety of reasons, such as academic, motivational, medical, conduct and aptitude, most disenrollments are academic and motivational. The second measure of success, military aptitude, is based on ratings of attitude, leadership, performance of duty, and bearing and dress. It is considered of special importance since it is closely related to subsequent performance as an officer. The present screening composite and its components have been found to predict military aptitude and academic attrition but not voluntary motivational disenrollment (Howland, 1971).

B. PROCEDURES

1. Subjects and Instrument

Beginning with the class of 1971, the 1966 edition of the SVIB has been administered to Naval Academy midshipmen. This edition contains 399 items covering school subjects, amusements, occupations, hobbies, etc., most of which require a response of "like," "dislike," or "indifferent." During

the first three years of this testing program, all midshipmen completed the SVIB within their first week at the Academy. In the fourth year, applicants were administered the SVIB on a voluntary basis as part of the application procedure. In the fifth year, for selection of the class of 1975, the SVIB became a required part of the application packet. At the time criterion data were collected, only the classes of 1971-73 had sufficient data to be included in the analyses. Consequently, the present report does not cover the 1974 and 1975 classes. Available SVIB and criterion data for the 1971-73 classes are shown in Table 1.

## 2. Analyses

a. Disenrollment. Analysis of disenrollment records indicated the two major categories of disenrollment to be motivational and academic. Of all disenrollments, motivational accounted for 53 per cent and academic for 30 per cent. The remaining 17 per cent are distributed among medical, conduct, aptitude, etc. Since it seemed reasonable to expect that different interest items would best predict each kind of disenrollment, separate item analyses of the SVIB were required. Because of limited sample sizes and low rates of disenrollment for other reasons, it was possible and practical to develop separate scales for only the two largest categories, academic and motivational. The general procedure involved contrasting the SVIB responses of remaining Naval Academy midshipmen with those of each of the two disenrollment categories separately.

The ideal procedure for scale construction would have been a comparison of the SVIB responses of graduates with those of members of each of the two disenrollment categories. However, as of March 1970, when the disenrollment information was obtained, none of the classes for which SVIB data were available had yet been commissioned. Thus, only the remaining midshipmen of the 1971 class were used, since they had the greatest likelihood of receiving their commissions.

For scale construction purposes, the remaining class of 1971 was divided into a key-development and a cross-validation sample, containing about 70 per cent and 30 per cent of the 934 cases, respectively. The academic and motivational disenrollees of the 1971 and 1972 classes who had disenrolled by March 1970 were each similarly divided into key-development and cross-validation samples. The resulting subgroups and sample sizes are provided in Table 2. Since disenrollment data from the later classes were far from complete, their SVIBs were not used in the validation samples. As the data become available, scales will be updated.

The response proportions of the remaining midshipmen were compared with the response proportions of each disenrollment group. All item responses with a percent difference of 10 or greater from each of the two item analyses were included in the academic and motivational disenrollment keys. Each of the two keys was then cross-validated on the disenrollment category for which it was developed, as well as on the other category of disenrollment. Further, the valid items of each scale were rationally clustered into homogeneous categories in an attempt to shed light on the nature of the differences between groups.

TABLE 1  
Sample Description

Class	SVIB Data		Criterion Data			
	N	Type & Time of Administration	Disenrollment (N) <sup>a</sup>			Military Aptitude (N)
			Motiv.	Acad.	Other	
1971	1354	Experimental - first week	242	139	63	1232
1972	1353	Experimental - first week	237	64	37	1154
1973	1369	Experimental - first week	135	29	14	1233
1974	1047	Application - volunteer	---	---	--	----
1975	1273	Application - mandatory	---	---	--	----

Note.--

<sup>a</sup>Disenrollment criterion is current as of March 1970.



TABLE 2

Key-Development and Cross-Validation Groups  
For Disenrollment Scales

Disenrollment Category	Key Construction		Cross- Validation	
	1971	1972	1971	1972
Motivational	169	166	73	71
Academic	92	50	47	14
Remaining Class	655	---	279	1026

b. Military aptitude. The second criterion, military aptitude, is a rating assigned at the end of every semester to each midshipman by the company officer from ratings made by the squadron leader, platoon leader, peers, and upper classmen, on the midshipman's attitudes, leadership, potential as an officer, bearing, and dress. The available aptitude ratings ranged from two semesters (one year) for the 1973 class, up to six semesters (three years) for the 1971 class. However, since the ratings have been found to be extremely stable across semesters (Howland, 1971), only first-year ratings for the 1971-73 classes were used to insure criterion comparability.

Military aptitude ratings are, to some extent, predictable from the existing selection composite, i.e., candidate multiple. Thus, each midshipman's actual aptitude rating may be symbolized as  $y_i = \hat{y}_i + e_i$ ,

where:  $y_i$  = actual aptitude

$\hat{y}_i$  = aptitude predicted from candidate multiple

$e_i$  = residual aptitude, or actual minus predicted aptitude ( $y_i - \hat{y}_i$ )

The procedures employed in evaluating the SVIB sought to determine its ability to predict the component of actual aptitude ratings that is not currently predicted by the candidate multiple--that is,  $e_i$ . To determine midshipmen's residual aptitude ( $e_i$ ) ratings it first became necessary to develop a regression equation for obtaining predicted aptitude ratings. After no significant differences were found between the classes of 1971 and 1972 on the selection composite, criterion scores, and regression equations, the classes were combined into a single group. From the total group, a single regression equation was derived to obtain predicted criterion scores from the "candidate multiple" selection composite. Next, each midshipman's

predicted aptitude rating was computed and subtracted from his actual aptitude rating, thus leaving the currently "unpredictable" portion of the criterion. In this way, midshipmen with positive residuals would be those with aptitude ratings higher than predicted, and those with negative residuals had aptitude ratings lower than predicted. These algebraic differences, or residuals, were then to be used as the criterion against which to validate SVIB items and scales.

Next, all midshipmen of the 1971-73 classes were scored on the recently developed "basic scales" of the SVIB (Campbell, 1971). Each of these scales measures interest in one type of activity or in closely related activities; thus, they cover homogeneous clusters of interests represented in the SVIB, such as science, mechanical, social service, medical, etc. Correlations between the 22 basic scales and the residual aptitude criterion were computed for each class to assess their individual validities. For the class of 1972 a multiple-regression analysis was also conducted.

In addition, since preliminary examination of the basic scale scores indicated predictive value, it appeared worthwhile to evaluate item response validity. In this way the many items not scored on the basic scales would also be examined for validity and all valid items could be included in a single scale. This scale could then be compared on cross-validation with a linear composite of basic scale scores.

To derive an empirical key, an item analysis of the SVIB was conducted using the residual criterion scores of the class of 1971. The SVIB items that correlated with the criterion were identified, and unit-weighted in accordance with Campbell's dimensionality procedure (1971) for cross-validation on the class of 1972. If this key correlated significantly with the residual criterion in a cross-validation sample, there would be little need to demonstrate its incremental validity through the usual multiple-regression approach.

Finally, an attempt was made to rationally cluster the items found to be correlated with residual aptitude. This approach sought to increase understanding of the predictive factors as well as to increase validity. It has frequently been shown that differential weighting of items provides little, if any, improvement over unit weighting. However, it was reasoned that differential weighting of item clusters might prove to increase validity as well as reveal possible inadequacies in the item pool. For instance, it might be found that a small cluster of homogeneous items has a larger beta weight than a larger but less valid cluster. The simple unit weighting of an empirical key, however, would effectively give more weight to the larger clusters simply because they contain more scored items.

### C. RESULTS AND DISCUSSION

#### 1. Academic Disenrollment

The item analysis conducted for differentiating academic disenrollees from remaining midshipmen provided 56 item responses with a percentage difference of 10 or more. The largest cluster of items discriminating academic drops from remaining midshipmen contains 10 science items, which

are endorsed less frequently by academic drops. This cluster is followed by two clusters, referred to as mechanical and achievement motivation, which contain six and five items, respectively. The items of all three clusters are liked more frequently by remaining midshipmen than by drops.

This scoring key, applied to the key-development sample, yielded a biserial correlation of .55. Cross-validation data on the academic disenrollment scale is provided for various disenrollment categories in the first column of Table 3. As shown in the table, the scale's validity for predicting academic disenrollment reduced to .24. Despite the considerable shrinkage from .55, the scale is significantly related to academic attrition. Further, it is moderately related to other categories of disenrollment. When motivational disenrollees are scored on this scale, their mean is intermediate between academic disenrollees and remaining midshipmen, indicating that the two drop categories are not entirely independent.

An expectancy chart, Table 4, was prepared to demonstrate graphically the magnitude of relation between the scale and academic disenrollment. This chart indicates, for example, that those scoring in the lower 40 per cent are twice as likely to drop out academically as those scoring in the upper 40 per cent. This chart also shows that midshipmen with scores in the lower 20 per cent are over twice as likely as those in the upper 20 per cent to disenroll for other reasons.

## 2. Motivational Disenrollment

The motivational disenrollment scale, constructed by comparing the item responses of remaining midshipmen and motivational disenrollees, contains 121 item responses. This scale correlated .72 with motivational attrition in the key-development sample and, as shown in Table 3, .36 in the cross-validation sample. In terms of group separation, the mean score of 123.9 for the motivational disenrollees is about six points (.6 standard deviation units) lower than remaining midshipmen mean of 130.4. When the motivational disenrollees were divided into early (during plebe summer) and later (after plebe summer) drops, their mean scores on the scale were 121.9 and 124.8, respectively. The scales' validities were .42 for the early disenrollees and .31 for the later disenrollees. These differences in means and validities suggest that early disenrollment is more predictable than later disenrollment because of an underlying continuum of motivation on which the early drops are lowest, later drops intermediate, and remaining midshipmen highest.

Although the disenrollment data for the 1973 class were far from mature, a comparison of their scores with the remaining midshipman sample yielded a biserial correlation of .27. When all disenrollees of the 1973 class were considered together, their mean of 125.6 on the motivational scale fell about five points lower than the mean of the remaining midshipmen, and was virtually identical to the mean of all disenrollees of the 1971 and 1972 classes.

The mean score of academic drops on this scale was intermediate between motivational drops and remaining midshipmen; again indicating a lack of independence in the disenrollment categories. Such an interpretation is further supported by the correlation of .48 between the two scales. The expectancy chart, Table 5, based on the motivational disenrollment scale,

TABLE 3

Means, Standard Deviations, and Cross-Validities of Two SVIB Empirical  
Disenrollment Scales for the 1971-1972 Naval Academy Classes

Criterion Group	N	Scale					
		Academic		Motivational			
		$\bar{X}$	S.D.	$r_b^a$	$\bar{X}$	S.D.	$r_b$
<u>HIGH</u>							
Remaining Class (1971)	279	105.33	5.83	---	130.41	9.65	---
<u>LOW</u>							
All Disenrollees	305	103.55	6.35	.18	125.56	11.01	.29
All Motivational	144	103.40	6.51	.19	123.88	11.46	.36
Early Motivational	62	103.32	6.61	.17	121.92	11.69	.42
Later Motivational	82	103.46	6.47	.17	124.78	11.24	.31
Academic	61	102.72	5.34	.24	127.44	10.03	.16

Note.--

<sup>a</sup>All biserials are computed on frequencies adjusted to reflect the correct ratio between each disenrollment category and remaining midshipmen.

TABLE 4

Expectancy Table Depicting Likelihood of Graduating or Disenrolling Associated With Scores on the SVIB Academic Disenrollment Scale for 1971-1972 Naval Academy Midshipmen

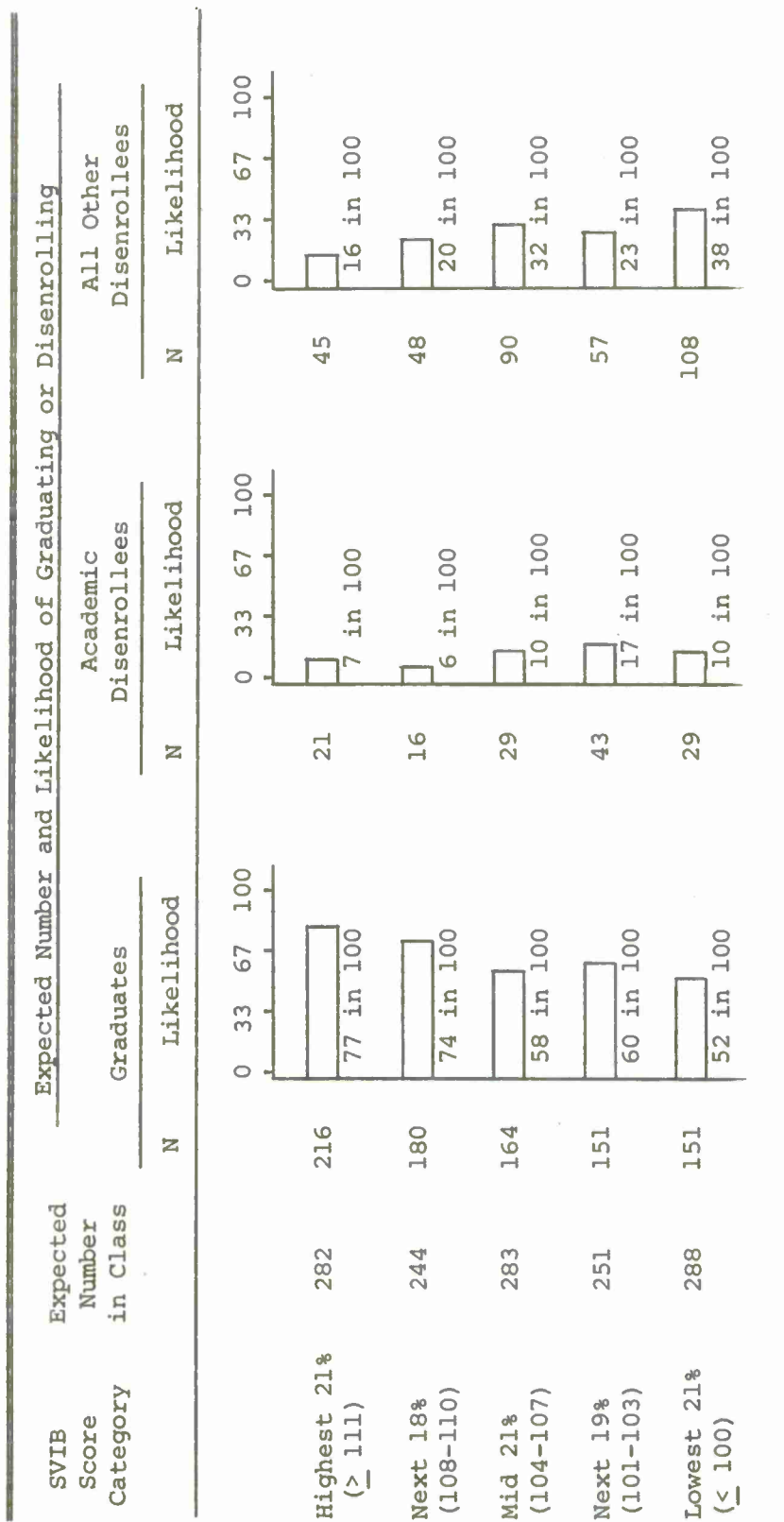
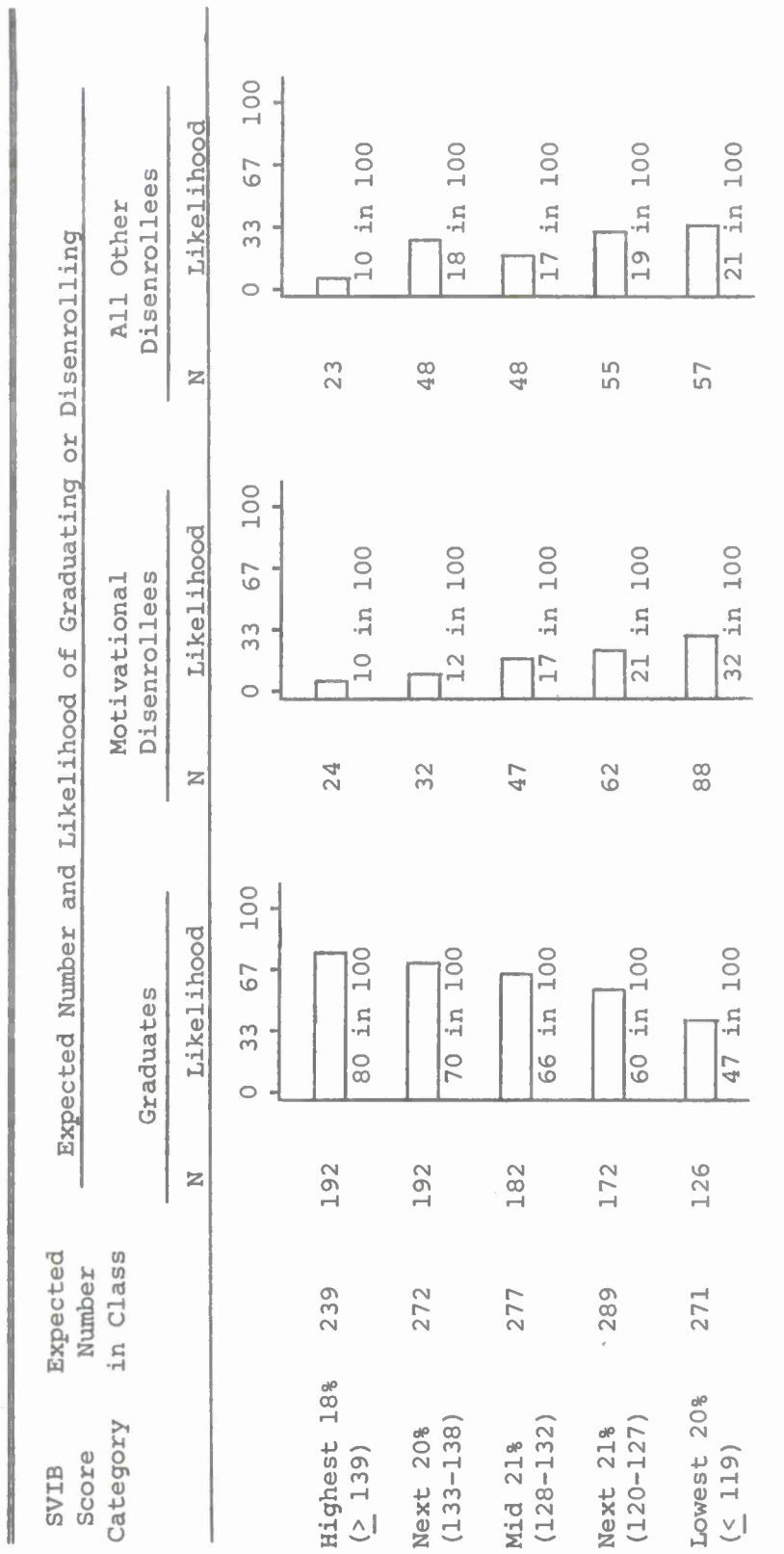


TABLE 5

Expectancy Table Depicting Likelihood of Graduating or Disenrolling Associated  
With Scores on the SVIB Motivational Disenrollment Scale for  
1971-1972 Naval Academy Midshipmen





shows a consistent relationship with the probability of motivational disenrollment. Those scoring in the bottom fifth are over three times as likely to disenroll as those in the top fifth. The scale is also valuable for identifying other drops, since 21 per cent of those in the bottom fifth versus 10 per cent in the top fifth disenroll for other reasons.

The largest cluster of items differentiating motivational drops from remaining midshipmen contains 11 items concerned with leadership activities. The next three largest clusters each contain six items reflecting military activities, sports and extraversion. The remaining midshipmen score higher than the voluntary disenrollees on all four of these clusters.

During the preparation of this report SVIBs administered to midshipmen entering the Academy in June of 1972 became available. By early September 1972, over 60 midshipmen had voluntarily disenrolled. These data provided the opportunity for a further assessment of the SVIB disenrollment scales.

In this final assessment the academic and motivational disenrollment scales were combined. The disenrollees were then scored on the combined scale. For comparison, a random sample of 100 midshipmen selected from the remaining midshipmen were scored on the combined scale. Table 6 shows the means, standard deviations, and the validity coefficient for the combined disenrollment scale. The obtained validity of .41 indicates considerable practical value for using the SVIB to identify those individuals most likely to disenroll.

These findings show excellent potential for determining the vocational interests of applicants prior to selection. It is surprising to note that a similar study (Spence, Sena, & Westin, 1971) among Air Force Academy cadets yielded negative results. The Air Force study compared three groups of cadets on 19 scales of the Kuder Occupational Interest Survey judged relevant to the Academy. One group consisted of cadets who disenrolled because of changes in career goals or problems in adjusting to a military environment; the second group consisted of cadets disenrolled for all other reasons; the third group consisted of the remaining cadets. From these comparisons the authors concluded that there was little hope of discriminating between disenrolled and remaining Academy cadets in terms of interests as measured by the Kuder Occupational Interest Survey. Some possible limitations suggested by the authors that could account for the negative findings include potential faking, the use of only 19 scores and the possible inappropriateness of their statistical analysis. A further possibility, of course, is that the scales used were inappropriate and that item analysis could have yielded a valid subset of items. In any case, it would be premature to conclude that the findings of the Air Force and present study differ because of the different instruments used.

### 3. Prediction of Military Aptitude

Table 7 presents the correlations between the 22 SVIB basic scales and the residual aptitude criterion for three classes. Only three of these scales, Recreational Leadership, Agriculture, and Music, are

TABLE 6

Validity Information for the SVIB Combined Disenrollment  
Scale on the Naval Academy Class of 1976

Criterion Category	Mean	Standard Deviation	Biserial r
Remaining Class <sup>a</sup> (N=100)	121.05	9.45	.41**
Early Motivational Disenrollees (N=66)	114.39	9.47	

Note.--

<sup>a</sup>Random sample of remaining midshipmen as of September 1972.

\*\*Significant beyond 1% level.

significantly related to aptitude across all three classes. The most consistently valid scale, with correlations ranging from .17 to .19, is Recreational Leadership. It contains, for the most part, items reflecting sports and athletic interests. The greater the midshipman's interest in this domain, the higher his military aptitude rating. "Outside work" and "physical activity" are the two most valid items on the Agriculture scale and they seem to tap an area of interest related to the Recreational Leadership item cluster. The negative correlations between the Music scale and the aptitude criterion indicate that the midshipmen expressing musical interests tend to have low military aptitude scores.

For the class of 1972, the SVIB basic scales were entered into multiple-regression analysis. The four scales that significantly increased the validity provided a multiple correlation of .227 with an estimated cross validity of .207. This multiple R is based on the following scales, presented in the order in which they entered the regression: (1) Recreational Leadership, (2) Teaching, (3) Mathematics, and (4) Technical Supervision.

a. Empirical scale. Validities of the empirical scale are shown in Table 8. In the 1971 class, which was used for item analysis, the empirical SVIB scale correlated .34 with the residual aptitude criterion. The first cross-validation, on the class of 1972, yielded a validity of .28 against the residual criterion, while the second cross-validation, using the 1973 class, provided a validity of .24. These validities exceed the basic scale



TABLE 7

Correlations of the SVIB Basic Interest Scales With The  
Residual Military Aptitude Criterion in the 1971,  
1972, and 1973 Naval Academy Classes

Basic Scale	Correlations With Residual Score		
	1971 (N=1232)	1972 (N=1154)	1973 (N=1233)
Public Speaking	-.06 <sup>a</sup>	-.02	.00
Law/Politics	-.01	.01	.01
Business Management	.00	.00	.00
Sales	-.04	-.02	-.04
Merchandising	.00	.02	-.01
Office Practices	.00	-.04	-.03
Military Activities	.01	-.01	.02
Technical Supervision	.02	-.02 (4) <sup>b</sup>	.01
Mathematics	.01	-.07** (3)	-.05
Science	-.08**	-.06	-.04
Mechanical	-.01	-.04	-.01
Nature	.02	.03	.01
Agriculture	.12**	.08**	.11**
Adventure	.02	.02	.03
Recreational Leadership	.19**	.18** (1)	.17**
Medical Service	-.03	.04	.05
Social Service	.02	.02	.03
Religious Activities	-.04	-.02	.01
Teaching	-.02	-.05 (2)	-.04
Music	-.13**	-.10**	-.08**
Art	-.06	-.01	-.06
Writing	-.10**	-.05	-.04
<u>R</u> (1972)		.227	.202

Note.--

<sup>a</sup>Decimal points are omitted from zero-order correlations.

<sup>b</sup>Number in parentheses indicates the order in which the scale entered the regression equation.

\*\*If  $r \geq .07$ ,  $p \leq .01$ .

TABLE 8

Correlations of the SVIB Empirical Aptitude Scale and Candidate  
Multiple with Military Aptitude Criteria

	Military Aptitude					
	Residual			Total		
	1971 (N=1232)	1972 (N=1154)	1973 (N=1233)	1971 (N=1232)	1972 (N=1154)	1973 (N=1233)
Predictor						
SVIB Scale	.34	.28	.24	.34	.31	.26
Candidate Multiple	-.01	.02	-.07	.31	.31	.27
Composite R	--- <sup>a</sup>	.28	.25	--- <sup>a</sup>	.41	.36

Note.--The coefficients reported for the 1971 class are key-development validities and those reported for the 1972 and 1973 classes are cross-validities.

<sup>a</sup>Since the SVIB empirical scale was constructed on the class of 1971, it is inappropriate to compute a multiple R for this class.

composite and can be regarded as purely incremental since the present selection composite is, by design, not correlated with the residual scores. The validities of the empirical aptitude scale against actual aptitude ratings in contrast to residual aptitude ratings, were .31 and .26 for the 1972 and 1973 classes, respectively. These are virtually identical to the validities of .31 and .27 for the candidate multiple on the same samples. A linear combination of the SVIB scale and the candidate multiple almost doubles the proportion of criterion variance accounted for, with multiple correlations of .41 and .36 for the 1972 and 1973 classes, respectively.

A theoretical expectancy chart is presented in Figure 1 to represent a multiple correlation of .41 based on the linear combination of the SVIB Military Aptitude Scale and the candidate multiple for the class of 1972. Thus, if an applicant scored in the top 20 per cent on the new composite, he would have 73 chances in 100 of earning a military aptitude rating in the upper 50 per cent of the class. In contrast, his chances of receiving a superior military aptitude rating would be only 27 in 100 if he scored in the lowest 20 per cent on the composite (Lawshe, et al., 1958).

Briefly, concerning the prediction of aptitude, it appears that the SVIB scale: (1) has about the same level of validity as the existing composite, (2) is virtually independent, statistically, of the existing composite, (3) provides a significant and practical improvement in predicting aptitude.

Examination of the items in this scale resulted in nine clusters of items, each relatively homogeneous in content.

The largest item cluster differentiating the high and low midshipmen on the residual aptitude criterion contains 13 items dealing with sports and physical activities which were endorsed more frequently by the high aptitude group than by the low aptitude group. The low aptitude midshipmen endorsed a relatively greater number of items concerning music and verbal linguistic activities, and a smaller number concerning social contact.

To determine whether differential weighting of the clusters would provide a higher validity than the empirical unit-weighted score, nine separate scores were computed. Since the 1971 class had been used in item selection, this analysis was performed on the 1972 class. The individual validities and multiple correlation for the 1972 class are given in Table 9. The multiple correlation itself, without correcting for shrinkage, did not exceed the validity of the empirical scale. While the rationale for differentially weighting item clusters is appealing, the empirical results are negative.

#### D. CONCLUSIONS

The results of this research clearly support the conclusion that the SVIB is a valid predictor of Naval Academy midshipman success. This conclusion is supported by the following findings:

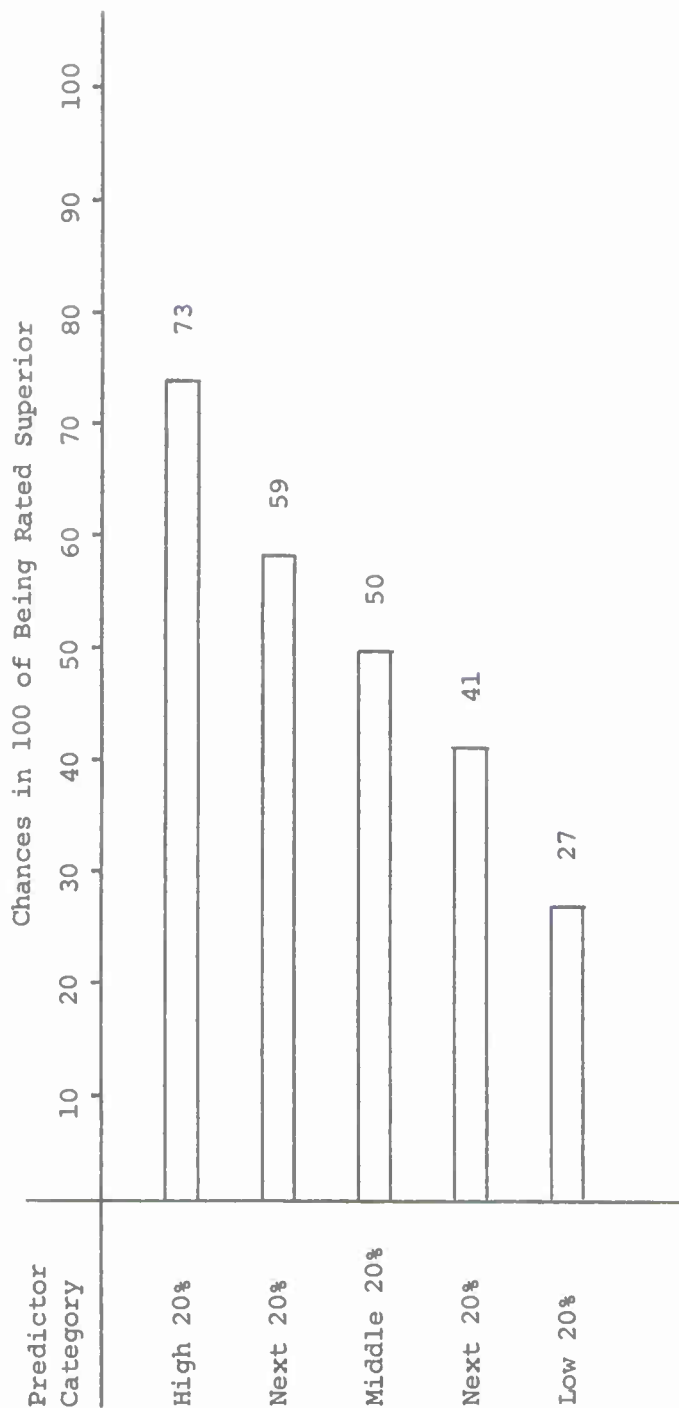


Fig. 1. Chances in 100 of being superior if selection were based on a linear combination of the existing predictor composite (candidate multiple) and the SVIB military aptitude scale.

TABLE 9

Item Clusters Derived From the SVIB Empirical Military Aptitude  
Scales and Their Correlations With the Residual  
Aptitude Criterion

Cluster	Correlation With Residual Score	
	1971 (N=1232)	1972 (N=1154)
Writing and communication	.15	.10
Intellectual	.20	.12
Music	.14	.12
Public speaking and dramatics	.15	.11
Physical and outdoors	.22	.20
Mechanical	.10	.02
Amusements	.15	.10
Methodical	.17	.12
Social contact	.16	.14
R (1972)	---	.275
Total Scale	.34	.28

Note.-- $r \geq .08$ ,  $p \leq .01$ .

(1) Scores on a specially derived scale are significantly related to military aptitude ratings of midshipmen.

(2) The magnitude of this relationship equals that obtained by the seven components of the candidate multiple.

(3) The SVIB scale, which is uncorrelated with the candidate multiple, provides a unique contribution to the prediction of military aptitude ratings. When the SVIB scale is combined with the candidate multiple, the proportion of criterion variance accounted for is almost double that provided by candidate multiple alone.

(4) Concerning the prediction of disenrollment, the SVIB scales significantly aid in identifying those candidates most likely to disenroll. In addition to identifying academic and motivational disenrollees, the SVIB scales are valid for predicting other categories of disenrollment.

#### E. RECOMMENDATIONS

On the basis of favorable results, it is recommended that:

(1) The SVIB be administered to Naval Academy candidates and scores derived from their responses be used by the selection board to identify candidates likely to disenroll or to obtain low military aptitude ratings.

(2) The SVIB be evaluated for potential use as a counseling tool to facilitate the curriculum choice process. This would entail developing keys capable of indicating the curriculum in which a midshipman would be most satisfied and successful.

(3) As with any selection device, a program for monitoring the SVIB validity should be instituted to assure its continued effectiveness.

(4) The SVIB, as well as components of the operational selection composite (candidate multiple), should be validated against long-range criteria such as officer fitness reports and retention.

#### REFERENCES

- Campbell, D. P. Handbook for the Strong Vocational Interest Blank. Stanford University Press, Stanford, California, 1971.
- Howland, R. W. Report of recruitment research study group. Memorandum for the Superintendent, U. S. Naval Academy, Annapolis, Maryland, 2 July 1971.
- Lawshe, C. H., Bolda, R. A., Brune, R. L., & Auclair, G. Expectancy charts. II: Their theoretical development. Personnel Psychology, 1958, 11, 545-560.
- Spence, W. E., Jr., Sena, D. A., & Risdon, J. W. A comparison of interests between cadets who leave and those who continue at the Air Force Academy. Paper presented at the Proceedings of the Forty-First Annual Meeting of the Rocky Mountain Psychological Association, Denver, Colorado, May 1971.

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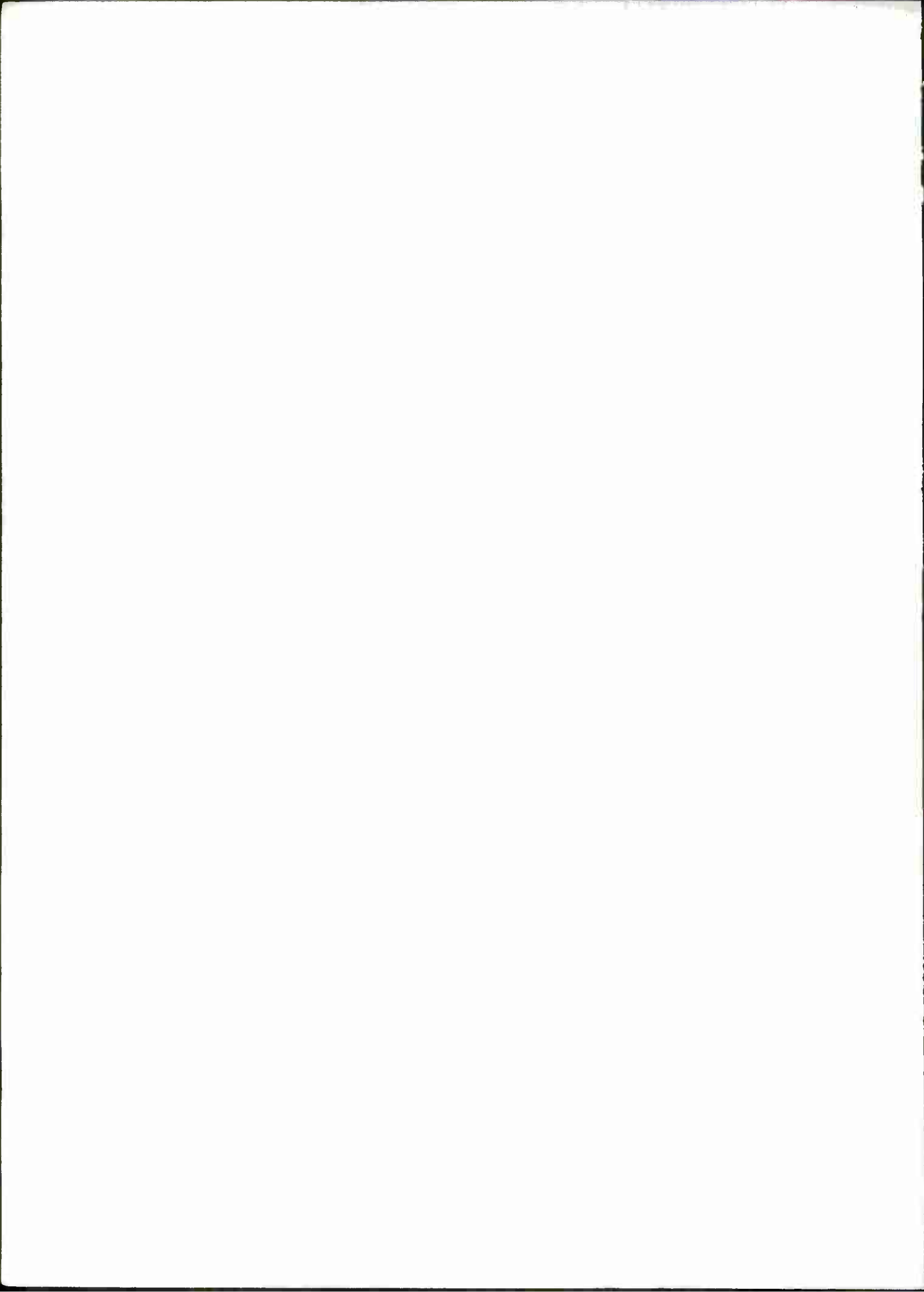
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