DOCUMENT RESUME

ED 050 338 AC 010 328

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TITLE Peer Ratings as Predictors of Success in Military

Aviation.

INSTITUTION Human Resources Research Organization, Alexandria,

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SPONS AGENCY Office of the Chief of Research and Development

(Army), Washington, D.C.

REPORT NO Prof-P-1-71

PUB DATE Nar 71 NOTE 19p.

EDRS PRICE EDRS Price MF-\$0.65 HC-\$3.29

DESCRIPTORS *Aviation Technology, *Peer Groups, *Performance

Tests, *Predictive Validity, *Rating Scales

IDENTIFIERS Potential Aviator Rating

ABSTRACT

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Peer Ratings as Predictors of Success in Military Aviation

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Presentation at Alabama Psychological Association Annual Meeting Destin, Florida May 1970

March

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Prepared for

Office of the Chief of Remarch and Development Department of the Army Washington, D.C. 20310

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Prefatory Note

The research reported in this paper was performed by HumRRO Division No. 6 (Aviation), Fort Rucker, Alabama, under Work Unit PREDICT, Prediction of Training and Operational Performance of Army Aviators. The paper was presented at the 1970 Alabama Psychological Association meeting held in Destin, Florida, May 1970.

Reference is made herein to a paper given by Wiley R. Boyles and James L. Wahlberg titled, Prediction of Army Aviator Performance: Description of a Developing System, which preceded the present paper on the program, and is now in preparation as a HumRRO Professional Paper. The two papers constitute a portion of the current research on prediction of aviator success conducted by HumRRO Division No. 6.



PEER RATINGS AS PREDICTORS OF SUCCESS IN MILITARY AVIATION

James L. Wahlberg, Wiley R. Boyles, and H. Alton Boyd

Peer evaluations, in the forms of ratings, rankings, and nominations, have been used to predict performance in many academic, business, and military settings. While this is not intended as a literature review, several examples will illustrate the uses of this technique.

Weitz (1) reported a validity coefficient of .40 between peer nominations among life insurance agents and later success in supervisory positions. He concluded that peers can identify differentiating characteristics for supervisory personnel at the time they are all in subordinate positions.

Rodman (2) utilized a peer rating in an industrial setting to identify future top executives. Waters and Waters (3) have recently described a small but significant relationship (r = .31) between peer nominations and performance of salesmen.

The U.S. military services have had a great deal of success in using peer ratings as predictors of military performance. McClure, Tupes, and Dailey (4) concluded that there is a higher relationship between peer ratings in Officer Candidate School (OCS) and later on-the-job proficiency ratings than between OCS academic or military grades and proficiency ratings.

Hollander (5) discussed the use of four forms of peer ratings to predict officer performance in the Navy. Although all forms afforded substantial and significant prediction, the "success as a future officer" nomination form was the best predictor of tuture officer performance when correlated with officer fitness reports covering three years or more of duty (r = .40). In Hollander's study, the third training week peer nomination validity was as high as that resulting from the 12th training week administration.

Mediand (6), in studying identification of potential noncommissioned officer (NCO) leaders, found that peer ratings (r = .80) were more reliable than cadre ratings (r = .57) in either intact or reorganized groups.

Recently the Army incorporated a "Contemporary Evaluation Form" (CEF) into the training program for Aviation Warrant Officer Candidates at the U.S. Army Helicopter School (USAHS). The CEF is a USAHS-produced device on which all trainees are required to evaluate their squadmates on the basis of potential officer qualities. It is then used by training administrators in the counseling and further evaluation of trainees. Concurrently, for reasons to be described, HumRRO developed three experimental peer rating forms for use in research in prediction of the aviation training performance criterion—completion/attrition from the training program.

The purpose of this paper is to describe the construction of the three HumRRO peer ratings, termed the "Potential Aviator Rating" (PAR Forms 1, 2, and 3), and to compare the validity of these forms with the CEF used by the U.S. Army Helicopter School.

The subjects were 108 Army Aviation Warrant Officer Candidates in Rotary Wing flight training class 1976-23. The students in this class were all volunteers, as are all Army flight students. Their ages ranged from 18 to 39 years with a mean of 20.4 years. The class was divided into three flight sections; each section originally contained four



squads. For both the CEF and PAR administrations, a peer group consisted of one squad, with a mean N of nine candidates. The members of each squad were in their fourth week of preflight training at the time of the first CEF administration, and were in their fifth training week (first flight training week) when the three PAR forms were administered.

The three PAR forms and the CFF are contained in the Appendix. PAR Form 1 contains a ranking, rating, and training success dichotomy answer sheet. From an alphabetized list of his squad members' names, each student first crossed off his own name, then ranked his squadmates by writing their names in blanks provuded in order of "best potential aviation warrant officer" to "worst potential aviation warrant officer." As the second step, each student rated his squadmates on a seven-point scale, using "1" for "best potential aviation warrant officer" and "7" for "wcrst."

Each of the seven ratings is composed of a one-line title, which is a general description, and three more specific descriptor sentences. These descriptors were developed, in part, from critical incident descriptions during research previously reported by Boyles, Prunkl, and Wahlberg (7) concerned with development of a combat aviator criterion and, in part, from Behavior and Systems Research Laboratory's basic training peer rating scale, the Leadership Potential Rating (LPR).

In addition to ranking and rating his peers, for each of his squadmates, each student answered "yes" or "no" to the question, "Do you think this man will complete flight training?"

PAR Form 2 is identical to PAR 1 except that the PAR 2 ratings are shortened, being composed only of the one-line "title" descriptors. PAR Form 3 is a shorter, one-page form, on which the student need not rewrite his squadmates' names to rank them. After each squadmate's name in the alphabetical listing, a numerical (1) rank and (2) rating from the scale (identical to the ccale on PAR Form 2) is assigned, and (3) the question of whether each squadmate will complete training is answered.

The CEF presently in operational use yields (a) a ranking score, (b) a four-point rating for each of the 19 characteristics or traits shown on the form, and (c) a narrative "description of performance." A CEF on each of his squadmates is completed by every trainee. Thus far, only CEF mean ranks have been compared with PAR scores.

The basic comparison between PAR and CEF was aimed at discovering whether differences in validity existed between the absolute scale and ranks. An objective in administering the PARs was to develop a short, simple form amenable to group administration. CEFs are given to the members of a company with instructions to complete them in their quarters within a cc ple of days.

The CEF is administered during the 4th, 12th, and 16th weeks of training. To parallel these administrations as closely as possible, the PARs were administered during the 5th, 13th, and 17th weeks, four squads receiving each form. It was found that each of the three PAR forms could easily be administered during a half-hour group session. No significant differences existed between the times taken to complete PAR Form 1 and PAR Form 2. More errors were made by respondents on PAR Form 3, both in terms of inadvertent duplication of ranks and omission of ranks. Because of these findings, PAR Form 3 was dropped from further use. Since times to complete PAR Forms 1 and 2 were equal, it was decided to administer only PAR Form 1 on the second and third administrations.

Table 1 shows correlations between the ratings and ranking on the PAR experimental forms, and between these and the rankings from the CEF. They are generally quite high. These values are acceptable even as coefficients or reliability. However, sufficient difference exists to make determination of relative validity of interest.



Table 1
First Administration of PAR Experimental Forms

PAR Rating vs. PAR Ranking	PAR Rating vs CEF	PAR Ranking vs. CEF
Form: 1 = .94	Form 1 = .87	Form 1 = .91
Form 2 = .95	Form 2 = .91	Form 2 = .90
Form 3 = .93	Form $3 = .84$	Form 3 = .83
Total = .92	Total = .81	Total = .86

In Table 2, the data from the first administration are compared with the complete/attrite criterion through the completion of primary helicopter training (20 weeks). The CEF "groups" shown in this table are composed of the CEF scores of those students receiving the respective experimental form of the PAR. The PAR Groups were groups of opportunity.

The first four squads tested were given PAR Form 1, the second group of four squads Form 2, and the last group Form 3. Point biserial correlations and their biserial equivalents are shown for each of five scorings of the PAR, mean ranks, mean ratings, and frequency of negative responses to the "will be complete" question were obtained as a first step. A mean for ranking-plus-rating was also computed, to derive a fourth score. To this score was added the number of "no" responses to the question that asks whether squadmates will complete flight training, to derive a fifth PAR score, which considers mean ranks, mean ratings, and frequency of "no's." The last two scoring methods are purely arbitrary. Additional scoring methods will be studied in the future.

Within groups there is very little difference among CEF and PAR coefficients. All total PAR and CEF validity coefficients were significant at the .01 level.

Because of the small subgroup Ns, the slight differences in addity coefficients, and the surprising differences in attrition among groups, we cannot yet draw conclusions on comparative predictive strength. A chi-square computed among the three groups' attrition data yielded a value of 10.4 (df = 2), which is significant at the .01 level.

Table 3 also consists of data from the first administration. However, the criterion evidenced in this table is pass/fail through the 20 weeks of primary training rather than complete/attrite. A pass/fail criterion includes only those individuals who fail the program because of inadequate flight, academic, or military performance. Deleted from this type of analysis are those students who did not complete the course because of factors other than poor performance, such as medical problems, voluntary resignation, or personal problems.

It was expected that the validity coefficients would increase when the sample was limited to students who actually failed the program because of a flight, military, or academic deficiency. A comparison of Tables 2 and 3 will show that this expectation was not confirmed.

In most cases for Group 1 (PAR Form 1) and Group 2 (PAR Form 2), the validity coefficients decreased. In Group 3 (PAR Form 3) the validity coefficients increased considerably.

We believe the difference in the coefficients among PAR groups is a function of the differences in attrition between these groups. A chi-square among the pass/fail criterion groups yielded a value of 5.96 (df = 2, p < .10).



Table 2

Validity Coefficients and Attrition Data

Note: 4th week (CEF) and 5th week, (PAR) With Attrition Through Completion of Primary Helicopter School

Mean Ranking Mean Rating Mean Rating Number of "NOs" TNOs" Rating + Ranking http Rating + Ranking http Rating + Ranking http Rating + Ranking http Mean Rating http Mean Rating http Mean Rating http Mean Rating http Rating http Rating http Rating http Hour http Mean Rating http Rating http Hanking http Rating http Hanking http Rating http Hanking http Hanking http Rating http Hanking http Han		PAS	Score 1	FAR S	core 2	PA7.S	core 3	PARS		PAR S	core 5			
1 40 52° 35 49° 43 56° 40 52° 46 60° 6 2 22 27 27 34 18 22 24 30 21 25 3 35 47° 44 58° 27 36 37° 34 42° 31 40°		R CON		Meen	Rating	Number (Rating +		Rating + Ra	sking + NOs		Meen F	Sanking
1 40 52* 35 43* 43 56* 40 52* 46 60* 2 22 27 24 36 27 36 30 21 25 3 35 47* 44 58* 27 36 39 52* 32 43* PAR 32 44* 29 37* 34 42* 31 40*		£	e	£	e	£	e	£		ę	Đ		dq	rpb rb
22 27 21 34 18 22 24 30 21 25 35 47° 44 58° 27 36 39 52° 32 43° AR 32 40° 35 44° 29 37° 42° 31 40°	Form 1	04 .	.52•	**	.49*	.43	-9 5.	0\$.	.52*	.46		CEF Group 1	8	.30
AR 32 A0° 35 A4° 29 37 34 A2° 31 A0°	Form 2	72	T	T	34	.18	77	.24	.30	.21		CEF Group 2	34	.43*
35 ,44° 23 .37° 34 .42° .31 .40°	Form 3	.35	.47*	4.	-88-	77	36	82.	.52*	.32		CEF Group 3	.42	-26*
	Total PAR	æ	•04.	35	3	R	.37•	ঙ্গ	•Z4·	13.		Total CEF	ಜ	.41*

"Biserial Coefficients which are significant from zero (p<.01).

Attrition Data-Class 1970-23

Total A	8 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	
Attrited	12 18 25 55	
Completed	24 10 53	
	Group 1 (Form 1) Group 2 (Form 2) Group 3 (Form 3) Totals	

Table 3

Validity Coefficients and Attrition Data

Note: 4th week (CEF) and 5th week (PAR) taith failure Through Cumpletion of Primary Helicopter School

Form 1 28 Age Age </th
PAR Score 1 PAR Score 2 PAR Score 3 PAR Score 4 PAR Score 5
PAR Score 1 PAR Score 2 PAR Score 3 PAR Score 4 PAR Score 5
PAR Score 1 PAR Score 2 PAR Score 3 PAR Score 4
PAR Score 1 PAR Score 2 PAR Score 3 PAR Score 3 PAR Score 3 PAR Score 5 PAR Score 5
PAR Score 1 PAR Score 2 PAR Score 3 PAR Score 3
PAR Score 1 PAR Score 2 Mean Reting Too Too Too Too Too Too Too Too Too To
PAR Score 1 PAR Score 2 Mean Reting Too Too Too Too Too Too Too Too Too To
PAR Score 1 Mean Ranking Mean Rating Mean Rating 1 38 49° 36 2 16 21 21 2 16 21 21 2 53 68° 57 PAR Score
1 38 49° 1 53 53 58° 1 53 53 58° 1 54 55 58°
PAR Score Mean Rentil TOD 1 38 2 16 2 16 2 53
1 2 2 2 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Form 1 Form 2 Form 3

*Biserial Coefficients which are significant from zero (ho<.01).

Pass/Fail Data-Class 1970-23

Trytal N	35 28 33
Failed	11 8 15 35
Pessed	24 10 55
	Group 1 (Form 1) Group 2 (Form 2) Group 3 (Form 3) Torals

The attrition rate ranged from 33.3% for the group that received Form 1 to 71.4% for the group that received Form 3. This difference in attrition among the groups was not expected. In the recent past, flight classes have produced a mean attrition rate of an roximately 20%. For the first quarter of fiscal year 1969, for example, the attrition rate for classes ranged from 12% to 26%. Thus, for this class, and specifically for Group 3, it was easier to predict attrition because it was more prevalent in this group than in any other previous sample.

We have been cognizant of the fact that there are situational variables within certain companies and squads that would yield higher attrition rates within these groups. PAR Group 3 is an example of this situation. Ten of the 15 candidates who resigned from this class were initially in this group which produced the 71% attrition rate. (One candidate resigned from PAR Group 1 and four candidates resigned from PAR Group 3.)

The fact that this situation occurred for the present sample, though unexpected, was not extremely surprising. It did, however, a fect the validity coefficients for these groups. It could be assumed that this situational variable, in turn, affected morale, and thus produced a higher failure rate within this group.

As this class progresses through training, more attrition data will become available. On the basis of the absolute difference between PAR validity coefficients and those of the CEF, we will administer the PAR to additional classes for cross validation. Statistical comparisons between values of point biserial correlations are risky. The appropriate test of comparative usefulness of the relatively and absolutely scaled forms will have to be the stability, as well as the relative size, of their validity coefficients.

The original validity coefficients are sufficiently high to cause us to anticipate that the use of peer ratings may increase predictive accuracy in the multivariate system which Boyles has discussed. The biserial equivalents of the total scores are, in most cases, above .40. These values compare quite favorably with the validity coefficients of other predictor variables available prior to actual training in the aircraft.

Our goal is the earliest possible identification of poor risks in aviation training. Peer ratings are expected to increase the probability of achieving that goal.

¹Wiley R. Boyles and James L. Wahlberg. "Prediction of Army Aviator Performance," HumRRO Professional Paper in preparation.



LITERATURE CITED
AND
APPENDIX



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Appendix

POTENTIAL AVIATION WARRANT OFFICER RATING FORM

This is an opportunity to use some of the skills you may need later as an Aviation Warrant Officer. In the future you may have the duty of evaluating other aviator, and subordinates. Today you are going to evaluate your fellow squad members in terms of how you believe they will persorm later as Aviation Warrant Officers.

We urge you to be completely honest and to follow instructions carefully as the purpose of this rating form is to determine whether your ratings will be a useful addition in developing a predictor for selection of future candidates.

This rating form is for OFFICIAL RESEARCH FURPOSES ONLY and WILL NOT be placed in your personnel records or be made available to your commanders or supervisors.

We welcome any commen's on the format or text that can be used in improving these ratings. Feel free to write your comments on any available blank space in this booklat.

This "Peer Rating" is concerned with how you think your fellew squad members will perform as Aviation Warrant Officers. Your evaluations will be held in strict confidence and will be seen by research personnel only.



INSTRUCTIONS

Complete each of the following steps carefully.

A. BACKGROUND INFORMATION:

- (1) PULL OUT THE ANSWER SHEET AND TURN IT TO SIDE 1. FILL IN ALL THE INFORMATION ON THIS SIDE.
- (2) TURN THE ANSWER SHEET OVER TO SIDE 2.

B. RANKING:

- (1) DRAW A LINE THROUGH YOUR OWN NAME-DO NOT RANK YOURSELF.
- (2) STUDY THE REMAINING LIST OF NAMES AND DECIDE WHO WILL BE THE BEST AVIATION WARRANT OFFICER. WRITE HIS NAME IN THE TOP BLANK DESIGNATED "BEST." THEN CROSS HIS NAME OFF THE LIST.
- (3) STUDY THE REMAINING LIST OF NAMES AND DECIDE WHO WILL BE THE WORST AVIATION WARRANT OFFICER. WRITE HIS NAME IN THE BOTTOM BLANK DESIGNATED "WORST," THEN CROSS HIS NAME OFF THE LIST.
- (4) PICK FROM THE REMAINING LIST OF NAMES THE ONE WHO WILL BE THE BEST AVIATION WARRANT OFFICER. WRITE HIS NAME IN THE "NEXT BEST" BLANK, THEN CROSS HIS NAME OFF THE LIST.
- (5) FROM THE REMAINING NAMES, PICK THE ONE WHO WILL BE THE WORST AVIATION WARRANT OFFICER, PUT HIS NAME IN THE "NEXT WORST" BLANK, THEN CROSS HIS NAME OFF THE LIST.
- (6) CONTINUE TO CHOOSE THE BEST AND WORST POTENTIAL AVIATION WARRANT OFFICERS UNTIL ALL THE NAMES ARE CROSSED OUT. WHEN YOU ARE THROUGH, YOU SHOULD HAVE EVERY MEMBER OF YOUR SQUAD RANKED FROM BEST TO WORST. IF THERE ARE FEWER THAN 15 MEN IN YOUR SQUAD, THERE SHOULD BE BLANK SPACES IN THE MIDDLE OF THE RANKING.

C. RATING:

Study the descriptions of Aviation Warrants on page 3. Use these descriptions to rate each of the men you have just ranked. Your "Best" choice does not necessarily have to be rated "1," neither does your "Worst" have to be rated "7." Use the number for each man which you feel best describes what kind of Aviation Warrant Officer he really will be.

Rate your squadmates in the same sequence that you ranked them. First, rate your "Best" choice, then rate your "Worst," then "Next Best," then "Next Worst," and so on, until you have assigned description numbers to all the men in your squad.

Do not give a man a description number higher than that of a man you renked above him. Do not give a man a description number lower than that of a man you ranked below him. Use any description numbers as many times as you think appropriate.

- (i) NOW, PUT THE MOST APPROPRIATE DESCRIPTION NUMBER IN FACH OF THE BOXES NEXT TO THE NAMES OF EACH OF THE MEN YOU HAVE RANKED.
- (2) FINALLY, PUT "YES" OR "NO" FOR EACH MAN IN THE COLUMN WHICH ASKS "DO YOU THINK THIS MAN WILL COMPLETE FLIGHT TRAINING?"

 After you have completed every step on this page, sign your initials here ______, and close the booklet.

Thank you for your time and effort on this rating form.



Potential Aviation Warrant Officer Descriptions

THE VERY BEST TYPE OF AVIATION WARRANT OFFICER

I would stake my life on him to know his job and do it right at all times. 1

He will keep a clear head in any situation. Men will be eager to work with him and for him.

AN EXTREMELY HIGH TYPE OF AVIATION WARRANT OFFICER

He will have very good judgment. 2

He will do a great deal more than what is expected of him.

He will adjust to any changing situation.

A VERY GOOD AVIATION WARRANT OFFICER

He will have good judgment. 3

He will remain calm and relaxed in any situation.

He will have what it takes to do the job right.

A GOOD AVIATION WARRANT OFFICER

His judgment will be average.

His decisions may not always be correct, but he will usually come through.

He will do an average job.

A FAIR AVIATION WARRANT OFFICER

He will get nervous in tough situations.

His judgment will be below average.

He may do his job, but nothing more.

A POOR AVIATION WARRANT OFFICER

He will lose his head in tight situations.

He will have very little of what it takes to be an Aviation Warrant Officer.

He will usually fail to get his job done.

THE WORST TYPE OF AVIATION WARRANT OFFICER

He will panic in tough situations.

7 Men will refuse to work with him.

He will have the worst judgment of anyone in his unit.



ANSWER SHEET

Side 1

1.	Your name_								2.	SSAN
		Last	First			N	ίI			
3.	Age	4 . T	'oday's Date	Mor	nth E	ay	Yea		5.	Class Number
6.	Section Num	iber						_	7.	Squad Number
8.	How many v	weeks l	have you beer	n a n	nembe	r of	thi	is sq	uad?	
			0	1 2	2 3 -	4 5	6	7		
			_	((Di r cle	one))	_		
9.	Your present	t posit	ion in this squ	uad:						
		(sc	juad leader, so	quad	mem	ber,	sec	tion	leade	er, etc.)

When you have completed all items on this page, sign your initials here then fill out the rest of this booklet.



ANSWER SHEET Side 2 Alphabetical Listing of Squad Members' Names

_	Potential Aviation Warrant Officers	Name of the contract of the co	
Best			
Next Best			
<u> </u>			
ext Worst			



CONFIDENTIAL: To Be Seen By Research Personnel Only

You will be asked to make several judgments about each of the men whose names are listed below, except yourself. Forget about who you like or dislikeand make your judgments on the basis of what you actually think about each of these men.

- Step 1. Draw a line through your own name and do not rate yourself at all.
- Step 2. RANKING Column #1: On the basis of what kinds of Aviation Warrant Officers you think they will be, rank these men from BEST to WORST. (1 = Best, 2 = Next Best, ... the highest number will be assigned to the man you think will be the Worst Aviation Warrant Officer.)
- Step 3. DESCRIPTION Column #2: Read the following descriptions. Assign each man the nurni er of the description you think best lits the kind of Aviation Warrant Officer he will be.
 - 1. THE VERY BEST TYPE OF AVIATION WARRANT OFFICER.
 - 2. AN EXTREMELY HIGH TYPE OF AVIATION WARRANT OFFICER.
 - 3. A VERY GOOD AVIATION WARRANT OFFICER.
 - A GOOD AVIATION WARRANT OFFICEF.
 - A FAIR AVIATION WARRANT OFFICER
 - A POOR AVIATION WARRANT OFFICER.
 - THE WORST TYPE OF AVIATION WARRANT OFFICER.

COLUMN 3: Answer "yes" or "no" to the question in this column for each Step 4. man listed.

Alı	phabetic Listing of Names	RANKING 1	DESCRIPTION 2	Will be complete flight training?
1.	Your name Last First	MI :	2. SSAN	
3.	Age 4. Today's DateMonth 1	Day Year	5. Class Number	er
6.	Section Number		7. Squad Numb	oer
8.	How many weeks have you been a memb	er of this squa 4 5 6 7	ad?	

(Circle one)

Your present position in this squad:

(squad leader, squad member, section leader, etc.)



CONTEMPORARY EVALUATION FORM

Name o	of Ra	ted Candidate (Last	, First, MI)	Section	Perio	od of Evaluation	on Date
			KEY TO EVAI	LUATION RA	ATING		
	Unsatisfactory Below Average U BA		Aver A	_	Average A		
Rating		De.cription	Rating	Description		Rating	Description
	_ A.	ADAPTABILITY	G.	EXPRESSIO	N	М,	LOYALTY
	В.	APPZARANCE	Н.	FORCE		N.	MORAL COURAGE
	C.	ATIENTION	I.	INGENUITY	,	O.	MOTIVATION
	D.	COOPERATION	J.	INITIATIVE		P.	SELF-DISCIPLINE
	Ε.	DEPENDABILIT	Υ К.	INTELLIGE	NCE	Q.	STAMINA
	. F.	ENTHUSIASM	L.	JUDGMENT		R.	TACT
						S.	UNDERSTANDING
		SIGNATURE IT) RATING PEI S Form 441 (Rev		TA	C OFFIC	OFOFCER'S INIT	IALS
				16 19	on	Adun buc	reation ;

ERIC