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SOME PROPERTIES OF AN OFFICER MEASURE OF PERFORMANCE AND POTENTIAL

Arthur C. F. Gilbert and Frances C. Grafton

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Objectives of this research were to evaluate the reliability of a criterion measure of officer performance, the Performance Evaluation Form, and to determine whether the instrument could differentiate among the requirements of alternative officer assignments. Officers were rated by the immediate supervisor, another superior officer who knew the rated officer's performance, and two associates; four complete ratings were available for 771 Infantry Branch and 102 Quartermaster Branch officers. The matrices of

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correlations among the dimensions of the Performance Evaluation Form were factor-analyzed for each type of rater in the two career branches. Factor structure for each of the four sets of ratings and for the two branches was similar. There were some differences between the two branches in the factor structure of the ranking of attributes in terms of an officer's potential for future assignments.

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FOREWORD

Part of the on-going research program on leadership in the Army Research Institute for the Behavioral and Social Sciences (ARI) is concerned with delineating and then measuring the major factors that collectively comprise leader behavior. ARI Research Reports 1172 and 1182 describe the development of eight broad dimensions of leadership performance, based on analyzing actual behavior in a simulated combat situation. These dimensions were used to construct the Performance Evaluation Form, which is designed to measure overall officer duty performance and evaluate potential performance. Technical Paper 344 reports the use of the Performance Evaluation Form as a criterion measure of Ranger duty performance in the validation of peer ratings obtained at Ranger school. This paper investigates the reliability of the Performance Evaluation Form itself and its ability to differentiate between requirements of different officer assignments. The work was done in the Personnel and Manpower Technical Area, under Army Project 2Q162717A766. An earlier version was presented at the 1976 meeting of the Military Testing Association.

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SOME PROPERTIES OF AN OFFICER MEASURE OF PERFORMANCE AND POTENTIAL

BRIEF

Requirement:

To evaluate the reliability of the Performance Evaluation Form as a measure of officer performance and potential and to determine if the instrument could differentiate among the requirements of different types of officer duty assignments; to explore the possible interaction between assignment requirements and evaluations provided by raters in different types of positions relative to the ratee.

Procedure:

Four complete ratings on the Performance Evaluation Form were obtained for 771 Infantry and 102 Quartermaster officers who had attended Officer Basic Course during FY 1974. Each officer's immediate supervisor, another superior officer, and two close associates rated the officer in several domains of leadership and ranked these domains in terms of the officer's potential strengths for future assignment. Reliability estimates were obtained, and factor analyses performed to determine if different factor structures would emerge in the two different branches or for the different sets of raters.

Findings:

Results indicated a certain uniformity within each branch as to how each officer was rated by the four different sets of raters. This uniformity appears to be true when the two branches are compared. Some evidence supported the idea that the rankings of the attributes differed in the two branches in terms of the officer's potential for future assignments.

Utilization of Findings:

Ratings of officer duty performance can be reliably made, essentially unaffected by immediate task requirements within the Infantry and Quartermaster Branches.

SOME PROPERTIES OF AN OFFICER MEASURE OF PERFORMANCE AND POTENTIAL

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SOME PROPERTIES OF AN OFFICER MEASURE OF PERFORMANCE AND POTENTIAL

INTRODUCTION

The leadership research program of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) continues to focus on the dimensions of leadership and on the development of predictive indexes of leadership. Helme, Willemin, and Grafton (1971) defined eight broad dimensions of leadership performance, on the basis of an analysis of officer behaviors in a realistic simulated combat situation. The factors defined were technical-managerial leadership, combat leadership, team leadership, command of men, mission persistence, executive direction, tactical staff skills, and technical staff skills.

As part of ongoing research on the relationship between active duty officer performance and measures obtained during Officer Basic Courses (OBC), a criterion instrument was developed to reflect critical aspects of leadership as defined by Helme, Willemin, and Grafton (1974) and other sources (Stogdill, 1974; Fleishman, 1974). This instrument, the Performance Evaluation Form (Gilbert, 1975; Gilbert & Downey, 1978) provides measures of officer performance and potential during OBC and will be described in greater detail in this paper.

The objectives of this research effort were (a) to evaluate the reliability of the Performance Evaluation Form and (b) to determine if the instrument could differentiate among the requirements of alternative officer assignments. In view of these objectives, it was hypothesized that differentiation among branches on the variables of the Performance Evaluation Form should be maximized if two branches differing substantially in functional assignments were evaluated. Consequently, the Infantry Branch was selected as best representing combat arms branches; the factor structure of ratings in this branch should emphasize the combat aspect of the variables. The Quartermaster Branch (QM) was selected to represent the service support branches. In this instance, the factor structure of variables in the Quartermaster Branch should differ markedly from ratings in the Infantry Branch.

PROCEDURE

The Performance Evaluation Form

As described briefly elsewhere (Gilbert, 1975; Gilbert & Downey, 1978), the Performance Evaluation Form provides both a measure of overall performance and nine ratings along dimensions considered crucial in the leadership domain. The 10 scales of the Performance Evaluation Form are shown in Figure 1.

Performance Evaluation Form scale	Factor
Part I	
Duty performance	
Part II	
Applying tactical knowledge and skills in support of combat operations	Tactical staff skills[a]
Understanding the mission and clearly defining personal roles of subordinates in its accomplishment	Team leadership[a]
Making decisions and initiating actions under pressure	Command of men[a]
Defining functional roles and duties in the process of developing subordinates to fill assignments for long-term unit effectiveness	Initiation of structure[b]
Planning and organizing manpower and materiel to meet situational requirements	Executive direction[a]
Motivating troops to accomplishing the mission by taking into consideration their well being and morale	Consideration[b]
Applying knowledge of logistics and technical matters to solve support problems	Technical staff skills[a]
Part III	
Combat leadership	Combat leadership[a]
Technical-managerial leadership	Technical-managerial leadership[a]

[a]Helme, Willemin, and Grafton (1971).

[b]Stogdill (1974); Fleishman (1974).

Figure 1. Performance Evaluation Form scales and corresponding factors.

Part I of the instrument evaluates the officer's overall performance. A 7-step scale was adapted from Willemin (1965); 7 is "outstanding" and 1 is "unsatisfactory" (Figure 2).

Figure 1 shows the seven scales of Part II, and lists the attribute that each scale is intended to measure. Five of the seven scales correspond to the factors derived by Helme, Willemin, and Grafton (1971), and two correspond to the principal leadership dimensions identified by Stogdill (1974) and Fleishman (1974). The rater is asked to rank-order the scales in terms of the officer's relative potential for future assignments and then to rate the officer on the 7-step scale defined in Figure 2. In Part III, the rater evaluates the officer's potential performance in combat leadership and in technical managerial leadership on the 7-step scale.

Data Collection

Approximately 5,000 officers in the 13 Career Branches and in the Chaplain Corps who attended OBC during FY 1974 were participants in the overall research program.

Four Performance Evaluation Forms were mailed to four different raters for each officer. The organization personnel officer was responsible for insuring that the forms were completed by each officer's immediate supervisor, a superior officer other than the immediate supervisor, and two close associates. The personnel officer, in consultation with the officer's immediate supervisor, designated the other three raters.

Four complete ratings were obtained on 2,886 officers. The distribution of these officers in the 13 Career Branches and in the Chaplain Corps is shown in Table 1. The research reported here analyzed the ratings of the 771 Infantry officers and the 102 Quartermaster officers.

Data Analysis

Reliability estimates were obtained for the 10 scales of the Performance Evaluation Form for the Infantry Branch and for the Quartermaster Branch. The Infantry Branch was selected as being representative of the Combat Arms Branches, and the Quartermaster was selected as being representative of the Service Support Branches. The reliability estimates for each of the 10 scales of the Performance Evaluation Form were computed by averaging the six possible correlations obtained among the four raters. The resulting average correlations were adjusted by use of the Spearman-Brown Prophecy Formula.

Scale value		Description
7	OUTSTANDING	Far above the requirements of the situation, suggesting the highest kind of formal recognition through meritorious award, or decoration.
6	SUPERIOR	Markedly above the requirements of the situation, suggesting formal recognition through a special (favorable) efficiency report, or letter of commendation.
5	ABOVE AVERAGE	Somewhat above the requirements of the situation, suggesting informal recognition through specific favorable comment in his regular efficiency report, and through informal appreciation or commendation.
4	AVERAGE	Fully up to the requirements of the situation, suggesting general appreciation (perhaps mostly unexpressed).
3	BELOW AVERAGE	Somewhat below the requirements of the situation, though suggesting only the mildest kind of corrective action through informal recommendation for improvement, or through change of duty assignment within the organization.
2	MARGINAL	Markedly below the requirements of the situation, suggesting formal corrective action through a special (unfavorable) efficiency report, administrative admonition, letter or reprimand, summary court, or transfer out of the organization.
1	UNSATISFACTORY	Far below the requirements of the situation, suggesting the most drastic kind of formal corrective action through reclassification, demotion, general court, or boarding out of the Army.

Figure 2. Officer performance scale.[a]

[a]Adapted from Willemin (1965).

Table 1

Distribution of Officers by Branch with Four Complete Ratings

Branch	Number
Air Defense	22
Adjutant General	176
Armor	354
Chaplain	27
Engineer	205
Field Artillery	520
Finance	49
Infantry	771
Military Intelligence	34
Military Police	121
Ordnance	120
Quartermaster	102
Signal Corps	352
Transportation Corps	33
Total	2,886

In addition, a factor analysis was performed, using the nine specific scales of the Performance Evaluation Form across the four sets of ratings (i.e., 36 variables) in the Infantry Branch, to evaluate whether a different emphasis was placed on the different leadership domains by the separate classes of raters (i.e., immediate supervisor, another superior officer, and associates). Ratings by the two associates were kept separate in all analyses. Since only a rater factor emerged, separate factor analyses were performed for each of the four sets of ratings to determine if factor structures were different.

A parallel set of factor analyses was performed for the four sets of ratings in the Quartermaster Branch to determine if a different emphasis would be placed on the attributes. Theoretically, the attributes measured in the QM Branch should reflect some differences in duty requirements, as assessed by the instrument, from those measured in the Infantry Branch.

As stated previously, the leadership domains in the Performance Evaluation Form required the raters to rank-order seven of the leadership domains in terms of their perception of the officer's potential for future assignments. A series of factor analyses, paralleling those

using the ratings of these attributes, was performed for the rankings of these attributes in the two branches.

RESULTS AND DISCUSSION

The 10 reliability estimates for the Performance Evaluation Form are shown in Table 2 for both branches. Table 2 shows that for the Infantry Branch, the reliability estimates ranged from .74 for the global rating of duty performance to .59 for the scale that describes the officer's potential ability to apply knowledge of logistics and technical matters to solve troop support problems. The reliability estimates for the Quartermaster Branch ranged from .70 for the scale that described global duty performance to .50 for the scales that reflected the officer's potential for combat leadership and for technical-managerial leadership. Generally, the obtained reliabilities more closely resemble those reported for a broad sample of officers by Willemin (1965) than those reported for officers in the Ranger course (Gilbert, 1975; Gilbert & Downey, 1978).

The obtained reliability estimates were evaluated to detect statistically significant differences in magnitude between the two branches. Only one statistically significant difference appeared: The reliability estimate for the scale that measures potential to perform under combat leadership conditions was significantly higher for the Infantry Branch than for the Quartermaster Branch. However, the cause of this lower reliability estimate for the four raters in the Quartermaster Branch could be the comparatively smaller opportunity to assess this characteristic.

After the reliability estimates were obtained, the data were analyzed to determine (a) whether the ratings of potential performance in various areas differed between the Infantry and Quartermaster Branches, and (b) the extent to which the four ratings might differ within the branches.

The first analysis involved computing the correlation among the nine variables across all four raters for the Infantry Branch. This correlation matrix was then factor-analyzed, using a principal components solution with the highest absolute row value as the communality estimate. Four factors were extracted with associated eigenvalues of at least 1.00. These factors were then rotated, using the varimax method. Each factor tended to be associated with a rater. The two sets of associated ratings represented two distinct factors throughout. The loadings of the ratings on the nine scales of the Performance Evaluation Form on these four factors are shown in Table 3. (In this paper, the nine variables in Parts II and III of the form are referred to by the leadership behavior each variable is designed to measure, as shown in Figure 1.)

Table 2

Reliability Estimates for the 10 Scales of the Performance Evaluation Form for the Infantry and Quartermaster Branches

Scale	Reliability estimate	
	Infantry (N = 771)	Quartermaster (N = 102)
Part I		
Duty performance	.74	.70
Part II		
Applying tactical knowledge and skills in support of combat operations	.67	.69
Understanding the mission and clearly defining personal roles of subordinates in its accomplishment	.63	.62
Making decision and initiating actions under pressure	.71	.63
Defining functional roles and duties in the process of developing subordinates to fill assignments for long-term unit effectiveness	.60	.64
Planning and organizing manpower and materiel to meet situational requirements	.63	.55
Motivating troops to accomplish the mission by taking into consideration their well being and morale	.65	.69
Applying knowledge of logistics and technical matters to solve troop support problems	.59	.56
Part III		
Combat leadership	.71	.50
Technical-managerial leadership	.64	.50

Table 3 shows that the loadings for the variables on each factor are high and uniform in magnitude on the four factors. Each of the four factors can best be described as representing a particular type of rater. However, the factors did not yield much information on how each rater evaluated an individual on the variables in question. Consequently, it was considered desirable to explore the factor structure of the ratings given by each type of rater. Since only rater factors emerged in the analysis of the Infantry data, it was felt that separate analyses for each rater in the Quartermaster Branch also would be appropriate.

Table 3

Loadings of Ratings by the Four Sets of Raters on the Four Factors in the Overall Analysis of Infantry Ratings

Variable	IS	OS	A	A
1. Tactical staff skills	.77	.81	.78	.76
2. Team leadership	.82	.85	.78	.81
3. Command of men	.81	.83	.81	.81
4. Initiating structure	.80	.80	.76	.78
5. Executive direction	.82	.80	.78	.79
6. Consideration	.73	.76	.74	.74
7. Technical staff skills	.72	.73	.72	.75
8. Combat leadership	.79	.82	.80	.77
9. Technical-managerial leadership	.76	.79	.79	.76

Note. IS = immediate supervisor
OS = other supervisor
A = associate.

A correlation matrix for each of the four raters in each branch was computed for the nine variables of Parts II and III of the Performance Evaluation Form. Each of the eight matrices obtained was factor-analyzed. A principal components solution was obtained, using the highest row value as the communality estimate.

In each of the eight solutions, only one factor emerged with an associated eigenvalue of 1.00 or greater. The percentage of common variance associated with this first factor for each analysis is shown in Table 4. In Table 5, the unrotated factor loading of the nine variables on this factor is shown for each analysis.

Table 4

Percent of Variance Corresponding to the First Factor Extracted in the Factor Analyses of Ratings

Analysis	Percentage of variance
Infantry:	
Immediate superior	90.75
Other superior officer	91.71
Associate	91.17
Associate	90.22
Quartermaster:	
Immediate superior	87.73
Other superior officer	87.55
Associate	85.39
Associate	86.24

Table 5

Loadings of Each Variable on the First Unrotated Factor for Each of the Eight Analyses of Ratings

Variable	Infantry				Quartermaster			
	IS	OS	A	A	IS	OS	A	A
1. Tactical staff skills	.82	.85	.81	.81	.68	.68	.74	.77
2. Team leadership	.87	.88	.84	.86	.81	.84	.84	.86
3. Command of men	.86	.88	.86	.86	.83	.86	.83	.86
4. Initiating structure	.83	.83	.82	.81	.81	.80	.83	.86
5. Executive direction	.85	.84	.84	.83	.81	.82	.85	.80
6. Consideration	.79	.80	.80	.78	.68	.76	.75	.72
7. Technical staff skills	.74	.76	.78	.77	.66	.81	.75	.74
8. Combat leadership	.84	.88	.86	.83	.78	.81	.81	.80
9. Technical-managerial leadership	.79	.83	.84	.79	.79	.89	.77	.74

Note. IS = immediate supervisor
OS = other superior officer
A = associate.

The loadings for each of the four raters on the nine variables for the Infantry Branch appear to be similar in magnitude. Across the four sets of loadings, the higher loadings appear for the ratings on the factors corresponding to command of men, team leadership, combat leadership, and executive direction. More exact testing for differences among the factor loadings or among the raters for these loadings is risky, because of the different magnitude of the eigenvalues obtained in each matrix and because of the interdependence among the loadings in a given matrix. Thus, any interpretation is exploratory in nature.

The loadings for each of the four raters on the nine variables for the Quartermaster Branch appear to be comparable. If one considers the four loadings for each variable, the three variables having the highest loadings are command of men, team leadership, and executive direction.

Comparison of the loadings of the variables on the first factor for the four raters in the two branches showed no marked trend or differences between the Infantry and Quartermaster Branches.

Generally, as far as ratings of performance potential on the variables are concerned, there was a certain uniformity within each branch as to how the officer was perceived. Also, apparently there was a certain uniformity across the two branches.

This lack of the hypothesized differentiation between the branches led to a search for possible differences in rankings of the variables between the branches. Consequently, the next series of analyses focused on the ranking of the officer's potential performance on the seven variables in Part II of the form. These analyses paralleled the analyses of the ratings except that only seven variables were involved.

Again, correlation matrices for each of the four raters in each branch were computed for the seven variables in Part II. Each matrix was factor-analyzed, using a principal components solution with the highest absolute row value as the diagonal estimate of communality.

In each of these analyses, only one factor had an associated eigenvalue of 1.00 or better. In analyzing the rankings of the superior officer in the Quartermaster Branch, the first factor had an associated eigenvalue of .9215. The percentage of common variance accounted for by the first factor in each analysis is shown in Table 6, and the unrotated factor loadings are shown in Table 7.

The loadings for each variable for the unrotated first factor solution for the Infantry Branch again had a certain uniformity. In other words, the four raters in the Infantry Branch tended to perceive the ratee in similar fashion. If the loadings are considered across the four raters, a bipolar factor appears to emerge, one end defined by command of men, and the other end by technical skills. Tactical

Table 6

Percent of Variance Corresponding to the First Factor Extracted in the Eight Factor Analyses of Rankings

Analysis	Percentage of variance
Infantry:	
Immediate superior	56.31
Other superior officer	59.56
Associate	61.80
Associate	54.65
Quartermaster:	
Immediate superior	47.32
Other superior officer	43.62
Associate	47.98
Associate	49.48

Table 7

Loadings of Each Variable on the First Unrotated Factor for Each of the Eight Analyses of Rankings

Variable	Infantry				Quartermaster[a]			
	IS	OS	A	A	IS	OS	A	A
1. Tactical staff skills	.46	.55	.58	.55	-.21	-.56	-.58	.25
2. Team leadership	.30	.33	.35	.24	-.24	.01	.08	-.60
3. Command of men	.59	.55	.58	.52	-.36	-.36	-.37	-.27
4. Initiating structure	-.26	-.27	-.30	-.22	.28	.35	.02	-.34
5. Executive direction	-.45	-.47	-.52	-.59	.53	.67	.59	-.17
6. Consideration	.08	.06	.04	.16	-.37	-.28	-.20	-.19
7. Technical staff skills	-.67	-.67	-.64	-.61	.44	.26	.50	.65

Note. IS = immediate supervisor
OS = other superior officer
A = associate

[a]Factor loadings reflected for the two associate ratings in the Quartermaster Branch.

skills and team leadership load substantially and positively on this factor when the four sets of loadings are considered.

In the Quartermaster Branch, on the other hand, there seemed to be differences in the factor structure that emerged in each of the four analyses, as shown in Table 7. If loadings across the four raters are considered, as well as individual loadings for each of the four raters, a bipolar factor emerges. One end of this factor is defined by technical staff skills and the other by command of men. Executive direction loads positively on all four unrotated factors for this branch. Tactical skills load negatively for three solutions.

In summary, the factor-analytic solution of the rankings appears to give different factor structures for the Infantry Branch and for the Quartermaster Branch. Considerable uniformity appears to exist among raters in the Infantry Branch but not in the Quartermaster Branch.

Results of this research do not indicate different factor structures underlying the ratings in the two branches. This could be due to the high correlations among variables for a given rater. However, the rankings of the variables for each rater provide evidence for differences in factor structure between the branches. The emergence of more clearly defined factors and differences between branches in the context of these analyses may be due in part to the fact that each attribute in the Performance Evaluation Form was described by a single statement.

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