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RESEARCH NOTES

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6 CONSTRUCTION AND EVALUATION OF A REVISED KEY FOR THE OCB-3.
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CONSTRUCTION AND EVALUATION OF A REVISED KEY FOR THE OCB-3

PROBLEM

In the course of constructing biographical information blanks for use in the selection of applicants for attendance at officer candidate schools, use has been made of several populations and several criteria in evaluating essentially the same BIB content. A scoring key based upon a study of candidates in nine OCS's yielded validities of more than .40 against several leadership criteria in two Signal Corps OCS classes. (1) A study of an experimental population of 2924 enlisted men (who met OCS eligibility requirements) produced a key with a cross-validity of .37 against rating criteria in a sample of 150. (2) This key was subsequently adopted for operational use. Its shrinkage when revalidated in seven classes at the branch immaterial OCS at Fort Riley (PJ 3405-08) led to reanalysis of the content against within-school measures and Officer Efficiency Reports, Form 67-1. (3) The key based upon the 67-1 reports produced cross-validities of .20 and .11 against efficiency reports and within-school leadership ratings, respectively. These validities, while considerably less than those reported above, were relatively better, within the Riley samples, than those obtained for the operational key.

A resurvey of these three keys led to the suggestion that they be combined in some way. (4) It was hoped that an adequate combination of keys would result in one which would retain desirable features of each of them, with a significant increase over the validity of the present operational key. The objective of this project was to construct such a key, and to compare its validity with the validities of the component keys.

METHOD

CONSTRUCTION OF THE REVISED KEY

While many different BIB forms were employed in the background studies, it was possible to identify in the operational OCB-3 (PRT 2579) almost all of the items and item-alternatives used in the previous keys. A simple additive procedure was used in constructing the revised, or combined key. Any item-alternative which had been scored in any one of the component keys was similarly scored in the revision. Essentially, the revised key contains all the scored item-alternatives of the component keys, with adjustment made for overlap. A method of construction which might lead to further improvement in revised keys is suggested in Appendix A.

POPULATION

OCB-3 answer blanks were available for two groups of officer candidates. One of these, drawn from the first seven classes at the branch immaterial OCS at Fort Riley, had previously been studied.⁽³⁾ The other consisted of candidates in the first five classes at the new Infantry OCS, for whom selection data had been collected early in 1951. This latter group represented about one half of the total enrollment in these Infantry classes.

Each of these groups was further divided into subgroups of graduates and those relieved for leadership failure. The Fort Riley sample contained 418 graduates and 102 candidates relieved for leadership reasons. The Infantry OCS sample included 311 candidates -- 217 graduates and 72 candidates relieved for leadership reasons. Candidates relieved for other than leadership reasons were not studied in this project, except insofar as they formed a portion of the Infantry sample of 311 candidates.

VARIABLES^{1/}

Predictors. Only four predictors were specifically analyzed in this project, although others are included for comparative purposes. Those specifically employed were:

100. Officer Candidate Applicant Evaluation Report, OCE-2, PRT 652. This is a graphic and forced choice rating scale completed for each applicant by his superior noncommissioned officer.

110. Conduct of the Interview, OCI-4, PRT 737. Also a graphic and forced choice rating instrument, on which members of the interview panel record their impressions of the applicant in a structured interview situation.

136. Biographical Information Blank, OCB-3, PRT 735; Revised Key. This is the experimental key constructed for the purposes of this project.

171. Revised composite predictor score (with revised key). This variable is obtained by summing each candidate's scores for variables 100, 110, and 136; it represents the composite selection score which the candidate would have obtained, if variable 136 were in operational use.

^{1/} All variables in PR 3407 are numbered according to a master code. The notation is retained in this Research Note.

References are made in this report to the following predictor variables, previously evaluated within the samples concerned:

130. Biographical Information Blank OCB-3, PRT 735; operational key.

132. Biographical Information Blank OCB-3, PRT 735; 67-1 key. This key was developed through item analysis against Officer Efficiency Reports, as a portion of PR 3405. Use was made of a portion of sample 1 in developing this key.

135. Biographical Information Blank OCB-3, PRT 735; OCS-1 key. This key was developed on the basis of studies in nine OCS's in PR4061 (during World War II), and had substantial validity for predicting leadership measures in the Signal OCS in PR 4071-b.

170. Operational Composite Selection Score. This is the operational selection score, representing the sum of variables 100, 110, and 130. It is the score on the basis of which selection for officer candidate school is determined.

173. Experimental Composite Selection Score (with 67-1 key):
100+110+130.

175. Experimental Composite Selection Score (with OCS-1 key):
100+110+135.

Criteria. 210. Final platoon leader's ranking. This is the last leadership evaluation obtained from the platoon leader, near the end of the officer candidate course.

220. Final Fellow Candidate Ranking. The last leadership evaluation obtained from the candidates themselves, derived from the average rank assigned the candidate by his associates.

240. Composite criterion, derived from variables 210 and 220.

280. Graduation-Attrition Dichotomy. This variable provides two groups of candidates, one consisting of graduates, and one consisting of those who have failed for leadership reasons.

290. Officer Efficiency Report, Form 67-1. This is a score derived from the official ratings of officer performance which were used operationally at the time the follow-up data for Fort Riley graduates was obtained.

PROCEDURE

Data collection and field work were not required specifically for the purposes of this project. It was necessary only to rescore the OCB-3 answer sheets already on hand for the candidates (using the revised key var. 136).

and to correlate these scores with the pertinent predictors and the several criterion measures. A minimum amount of new statistical work was required, since a great deal of information was available from earlier studies involving these candidate samples. (3)(4) Where possible, use was made of correlation of sums procedures, to avoid the necessity of calculating composites and determining new product-moment correlations.

RESULTS AND CONCLUSIONS

In comparing the revised key (var. 136) with the component keys from which it was derived, the answers to the following questions were sought:

1. How do the keys compare in predicting leadership measures within the officer candidate schools? For this purpose, reference is made to the final leadership rankings of the graduates (vars. 210, 220, 240).

2. How do the keys compare in predicting leadership failure within OCS? For this purpose, the candidates were sorted into a group of graduates, and a group who failed for leadership reasons. Since the instruments are constructed as predictors of leadership, those candidates who failed for reasons other than leadership were eliminated from the analysis. The assumptions underlying the method of answering this question are that all candidates who graduate are superior, in leadership characteristics, to all candidates who fail for leadership reasons; and that a biserial correlation between the predictor and this dichotomous criterion grouping (var. 280) provides an estimate of the capacity of the instrument for predicting leadership failure.

3. How do the keys compare in predicting performance as officers, as measured by the Officer Efficiency Report, Form 67-1 (var. 290)?

4. How do composite selection scores (vars. 170-173), containing each of these keys, separately, as a component, compare with respect to 1, 2, and 3?

In view of major changes in selection regulations made since the selection of these candidates, and the lack of information concerning the extent to which the Infantry groups are representative of the total enrollment of their classes, generalization of the results of this project to the present officer candidate population should be made with caution.

Table 1 contains the information relative to questions 1, 2, and 3. In this table, the coefficients in parentheses were derived from the Fort Riley samples; all other figures refer to the cases from the Infantry School.

Table 1. Validity coefficients for the revised and the component keys for the OCS-3 for Fort Riley and Infantry samples.*

Variable	Candidate Rankings (var 220)	Pl. Ldr. Rankings (var 210)	Combined Rankings (var 240)	67-1 Reports (var 290)	Grad-Ldr. Failure dichotomy (v. 280) (biserials)
130. Operational Key	(.03)	(.07)	-.01	(.13)	.15
132. 67-1 Key	.05	.08	.08(.11)	(.20)	.22
135. OCS-1 Key	.12	.12	.15		.14
136. Revised Key	.10(.19)	.07(.20)	.09	(.21)	.27(.24)

*Coefficients in parenthesis refer to the Fort Riley samples. N's for product-moment coefficients (var. 220, 210, 240, and 290) are 217 for Infantry, 418 for Fort Riley. For the biserials, 217 graduates vs. 72 failures in Infantry; 418 graduates vs. 102 failures at Fort Riley.

In constructing the revised key, it was hoped that the combination would retain the desirable features of the two non-operational components--the improved prediction of leadership rankings found in the OCS-1 key (var. 135) and the better prediction of leadership failure characterized by the 67-1 key (var. 132). Table 1 suggests that this goal was accomplished at least to a limited extent. The new key is superior to the operational key in both respects; it also retains the predictability of follow-up performance. In the absence of Fort Riley figures for the OCS-1 key, it is difficult to evaluate the improvement which the new key makes in predicting leadership rankings: the .10 and .20 reported for that school are attenuated somewhat by its relatively poorer prediction in the Infantry sample. Its improvement in prediction of leadership failure, on the other hand, is quite clear. (Intercorrelations, means and standard deviations of predictor variables, other than composites, are found in Table 3 Appendix B.)

Table 2 contains the information relative to question 4. The predictor variables in this case are the composite selection scores, incorporating each key in turn. Although, the contributions of the two non-operational keys (vars. 132, 135) were not too marked (Table 1), each, in combination with the evaluation report and interview (vars. 172, 175), showed improvement over the operational composite (var. 170).

The composite containing the revised key also represents an improvement over the operational composite. From the data available, however, it does not appear to be distinctly superior to the other non-operational composites. Since the evaluation report and the interview, together, contribute a major part of the composite score, the substitution of various BIB keys of low validity would not be expected to produce major differences. (The evaluation report and the interview together correlate .30 with the graduation-leadership failure dichotomy in the Infantry sample.)

Table 2. Validity coefficients for composite selection scores, incorporating various OCB-3 keys, for Fort Riley and Infantry samples.*

	Candidate Rankings (var 220)	Pl. Ldr. Rankings (var 210)	Combined Rankings (var 240)	67-1 Reports (var 290)	Grad-Ldr.Failure dichotomy (v.280) (bisorials)
170. Operational composite	(.12)	(.14)	.14	(.09)	<u>.32</u>
172. Composite, with 67-1 key	.19	.21	<u>.21</u>		<u>.35</u>
173. Composite, with OCS-1 key	.23	.24	<u>.25</u>		<u>.34</u>
171. Composite, with revised key	.24(.18)	.20(.18)	<u>.23</u>	(.16)	<u>.36</u>

* Coefficients in parentheses refer to the Fort Riley samples. N's for product-moment coefficients (var. 220, 210, 240, and 290) are 150 for Infantry, 418 for Fort Riley. For the bisorials, 150 graduates vs. 50 failures in Infantry; 418 graduates vs. 102 failures at Fort Riley. Underlined coefficients were computed using correlations of sums.

A comparison of Tables 1 and 2 suggests that the two samples present different prediction problems. Within the Infantry sample, the use of composite scores improves the prediction of the criterion measures; the evaluation report and the interview add to the validity of the BIB. For the most part, this is not the case with the Fort Riley sample. Validities and intercorrelations of the components of composite scores are such that the addition of the other instruments usually diminishes the initial validity of the BIB alone. For example, the revised key predicts variables 220, 210, and 290, within the Fort Riley sample, with validities of .19, .20, and .21 respectively. The validity of the composite containing the revised key is less in each case: .18, .18, and .16. Within the scope of this project (especially in view of the limitations of the samples involved) this difference in prediction characteristics is of academic interest. It suggests, however, that in the major studies under PR 3407, attention should be directed to school differences in predictability. Clearly demonstrated differences in patterns of prediction (justified by sufficiently large numbers of cases) might be used to advantage in establishing programs of differential assignment.

Insofar as the samples involved can be considered representative, and assuming that the validity of the operational key has not been depressed as a result of preselection, it appears from the results of this project that the usefulness of the OCB-3 can be improved through changes in keying. The substitution of any one of the non-operational keys would result in improved prediction. When considered as part of an additive composite selection score (which is the present method of employing a BIB score), the differences among the non-operational keys are of no practical significance. Considered on the basis of the validities of the keys alone, the revised key has some claim to superiority. It is certainly best for the prediction of leadership failure, as measured by bisorials against graduation-failure dichotomies.

It is better than the 67-1 key for all purposes; its superiority to the OCS-1 key, in predicting standing of graduates, is left in doubt in the absence of information on the Fort Riley sample.

These latter considerations ignore differences in variance among the keys, which is a factor insofar as it weights the instrument in an additive composite. This characteristic is implicit, however, in comparing the keys as parts of the composite scores, where it was found that no practical differences exist.

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Preparation of Report: M. H. Heyman, E. Frankfeldt

COLLECTION OF DATA: Fort Riley 1947 - 1948; Infantry 1951.

PREPARATION OF REPORT: 1 August 1952.

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2. PRS Report 752. Procedures for selection of enlisted men for officer training. 9 February 1948.
3. RN 52-65. Item analysis and cross validation of Biographical Information Blank, OCS-3, against associates' and platoon leaders' ratings and against 67-1 Efficiency Reports. ~~in preparation~~ (23 September 1952)
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APPENDIX A

A NOTE ON CONSTRUCTION OF REVISED KEYS

It should not be concluded that the revised key, as constructed in this project, represents the best key which can be developed for the OCB-3, for purposes of OCS prediction. The method employed, consisting of the keying of all alternatives keyed in any one of the components, has certain implicit deficiencies. In particular, it tends to ignore items of information about individual alternatives which might lead to even more improvement. Consider, as a hypothetical example, a five-alternative item keyed differently in two of the components:

Key I: alternatives A, B, C, and D keyed positive

Key II: alternatives A and C keyed positive.

In the revised key, A, B, C, and D would be keyed positively, since each was so keyed in one or more of the components.

An inspection of the data from which the original keys were constructed might reveal that in population I, alternative E had marginal negative validity, while in population II, A and C had reasonably high positive validity. The method employed here in combining the keys would capitalize upon the marginal negative validity of one alternative in one population, and would obscure the good results obtained with alternatives A and C in the other population.

Since an attempt to combine keys is essentially an application of validity generalization, use should be made of the best information available for each item alternative, and for each item as a whole. Going to the original keying data, and comparing item behavior in each sample concerned, provides an opportunity to capitalize upon genuine item validity (where a response "holds up" in several situations), and minimizes the importance of chance fluctuations within a single sample.

APPENDIX B

Table 3. Intercorrelations, means, and standard deviations of predictor variables, for Infantry and Fort Riley samples.*

Variable	Evaluation Report (var. 100)	Interview (var. 110)	Infantry		Fort Riley	
			M	Sigma	M	Sigma
130. Operational OCB-3 Key	.01	.16	26.5	4.1		
132. 67-1 Key	.04	.04	36.1	7.5		
135. OCS-1 Key	-.07	.01	87.1	12.4		
136. Revised Key	.02(-.09)	.08(.12)	116.5	11.9	113.2	12.0
100. Evaluation Report			113.5	18.3	111.7	19.6
110. Interview			28.3	7.8	26.4	9.3

* Coefficients in parentheses refer to the Fort Riley samples.
 N's for correlations with variable 100 are 213 for Infantry, 477 for Fort Riley. N's for correlations with variable 110 are 311 for Infantry, 517 for Fort Riley.