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Department of the Army

THE ADJUTANT GENERAL'S OFFICE

Personnel Research and Procedures Division

PERSONNEL RESEARCH BRANCH

FC

Technical Research Note 54

SURVEY OF LITERATURE ON
DEVELOPMENT OF CRITERIA FOR MARGINAL MANPOWER

March 1956

D-13-281-01

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Human Resources Research
--Personnel Utilization

AD _____ Accession No. _____

Personnel Research Branch, TAGO, DA

SURVEY OF LITERATURE ON DEVELOPMENT OF CRITERIA FOR MARGINAL MANPOWER -
S. H. King, W. G. Hoyt, M. R. Marks, H. L. Roy

PRB Technical Research Note 54, March 1956, 13 pp - illus - tables
DA Project 295-60-000, Task 281. PRB Project D-13-281-01.
Unclassified Report

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The research literature was surveyed for purposes of evaluating methods that have been applied in the attempt to measure on-the-job usefulness of personnel with low mental ability. Paper-and-pencil tests, performance or job-sample tests, evaluations or ratings by superiors, career service data, assignment records, and neuropsychiatric evaluations have been used. It is not possible to determine, however, whether the results with these methods reflect genuine usability or are merely artifacts of the shortcomings of each method. More important, no previous research methods were found which separated and then directly balanced job assets against maintenance costs.

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Approved by Howard L. Roy
Program Coordinator

March 1956

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SURVEY OF LITERATURE ON DEVELOPMENT OF CRITERIA FOR MARGINAL MANPOWER

CONTENTS

	Page
I. BACKGROUND	1
II. PROCEDURE	2
III. FINDINGS	2
A. Techniques of Measuring Usefulness--Criterion Methodology	
B. Other Pertinent Findings	
IV. CONCLUSIONS	5
REFERENCES	7

SURVEY OF LITERATURE ON DEVELOPMENT OF CRITERIA FOR MARGINAL MANPOWER

This report summarizes studies which have attempted to measure the contribution made by men of limited mental capacity in a military situation. Because these studies have been concerned with broader aspects of the utilization of so-called mentally marginal personnel, the coverage of this report has been extended to set the findings in a proper context. For a better understanding of this context, it is appropriate to first summarize the background of the research requirement and attendant problems involved.

I. BACKGROUND

During World War II, about 98% of the manpower resources of the United States were considered potentially available for military service insofar as mental standards were concerned. On the basis of data available on over 12,000,000 men in service on 31 December 1944, Congress in 1951 set the minimum acceptable mental standard at the 10th percentile--meaning that the lowest 10% in service under mobilization conditions would be considered unacceptable for service in the post-war years. With no further factual data, it is possible to make a case for a belief that the lowest group, especially in time of mobilization, could be expected to make an appreciable contribution to the total military effort over and above the manifold costs admittedly incurred by the use of marginal personnel. On the other hand, using research data on the ability of men with particular test scores to absorb various types of military training, it is possible to show that the present standard is set too low for peacetime service, and may even be too low in time of mobilization.

It is not necessary to dwell on the importance of resolving the problem of marginal screening and utilization. For several years, arguments pro and con have been advanced by all of the Armed Services, elements of the civilian economy, and components of government charged with the responsibility for procuring military manpower (for example, Selective Service and Congress). It was not until 1954, however, that a specific and comprehensive program of research was initiated within the Army. On 28 May of that year, the Assistant Secretary of the Army (Manpower and Reserve Forces), in a memorandum to the Chief of Staff, requested a plan for research to determine the feasibility of utilizing marginal personnel. The memorandum posed questions about:

1. The kinds of Army jobs which might be filled by marginal personnel
2. Possible reorientation of training to fit marginal personnel for military jobs
3. Possible revisions in equipment to make it operable by men of limited capacity ("human engineering")
4. Possible acceleration of training for men at the upper end of the mental ability scale.

The Adjutant General was assigned the responsibility for resolution of the first two questions. A preliminary analysis of the research problem indicated that, prior to the resolution of any questions in this area, it is necessary to establish definitely that "usefulness to the Army" can be measured reliably and objectively. Further, it is necessary that units of measurement be such that productivity and the corresponding "costs" can be directly compared. Only if productivity assets can be balanced against costs for each individual under study, would it be possible to determine the conditions under which marginal men are useful.

A survey of research literature bearing on these problems was undertaken primarily for the evaluation of techniques which might have been applied successfully by other research workers to measure on-the-job usefulness of mentally marginal personnel and, secondarily, for any information on the job training and assignment aspects of the problem.

II. PROCEDURE

Psychological Abstracts and other reference sources were perused for material specifically related to the conduct of the proposed research. Abstracts were made of pertinent articles. In addition, articles containing related information--including bibliographies--were noted. A list of pertinent references is attached to this report.

Research reports of various government agencies were examined. Abstracts were made of those studies involving marginal personnel. Shortcomings of the research were noted.

Visits were made to government agencies to interview personnel engaged in related research and personnel engaged in other fields (such as cost accounting and apprentice training) who could possibly furnish useful clues. Information was gathered also on current research which has not reached the reporting stage.

III. FINDINGS

A. TECHNIQUES OF MEASURING USEFULNESS--Criterion Methodology

It will be remembered that evaluating individual usefulness involves the simultaneous comparison of productivity (assets) and of costs in commensurable units--say dollars or 'manpower units'. The survey indicated that no previous research has attempted to establish such a measurement technique. However, it was found that certain methods have been tried for answering the basic question of usefulness which, while not separating and balancing assets against costs, do attempt in their own way to measure usefulness. These are summarized below.

1. Direct Methods. The term direct is applied here to studies which collect data in a predetermined sample and the data are in terms of performance evaluation.

a. Tests. These may be paper-and-pencil tests of job knowledge (5, 15) or actual performance measures (35, 36). Very serious objections can be advanced against both methods in the context of the present problem. The use of paper-and-pencil tests seems unrealistic in that it involves skills already assumed to be low level or lacking in the marginal group. In addition, there appears to be no feasible way to convert such test scores into the kind of productivity unit which can be considered an asset to be balanced against a cost. These objections do not apply to the actual performance or job-sample measure. Unfortunately, however, in the researches reviewed, the measures have been of ability to perform in basic combat training only. No studies were found which attempted to measure, by means of performance tests, the ability to do a specific job after training.

b. Ratings. Ratings have been used to measure performance during training (27, 35, 36) and on-the-job after training (5, 15, 35, 36). Ratings are known to produce evaluations which are fairly reliable as far as stable ranking is concerned, and they can be expressed in terms which seem to reflect units of relative productivity. Their shortcomings, however, are quite serious, methodologically speaking: they are subject to hard and easy rater bias, they may be affected by differences in opportunity to observe the ratee and the degree of recall expected of the rater; third, and most important, they are not an absolute measure but, instead, a relative ranking which gives no information about the position of the group on a standard scale of productivity.

2. Indirect Measures. The term indirect, as used here, includes (1) the attempt to infer usefulness from separate, presumably related data; or (2) the type of study which is retrospective--cases for which criterion data are available are collected after the fact. The research study based on an analysis of records is the usual kind of indirect study. In the indirect method, assets and costs are usually grouped, both being compared with similar data on so-called normal groups.

a. Career Data Studies. These include, typically, record searches for official proficiency and character ratings, type of discharge, number of promotions, disciplinary actions, venereal disease infections, Veterans Administration claims (after service), length of service, decorations, and so on. While the technique has a priori appeal, there are at least two serious objections to its use. First, the eventual sample becomes that which can be reconstructed from records available. There is good reason to believe that cases excluded from the sample for reason of unavailability might appreciably influence the findings were they available. Second, although the variables considered may well be relevant to the general problem of determining the usefulness of an individual soldier, the circumstances under which the entries were recorded are suspect. Usually, the purpose of the record as made originally is not intentionally related to the manner in which the data were treated in the usefulness studies. For example, many so-called "decorations" are awarded by virtue of length or circumstance of service and do not necessarily reflect individual merit; V.D. infection records indicate only those cases

in whom the disease was detected and treated in the Army; proficiency ratings are known to be quite uniformly "excellent" as a matter of custom, and so on.

The net result of these objections is the conclusion that service record data are not always productive of valid inferences. (For example, it was stated (7) that records depended "upon many situational factors quite unrelated to the characteristics of the man".) It is probable that, were any two groups compared on the basis of such data, few differences (if any) would be found. It follows, then, that to conclude, as in (6), that "marginals" are as useful as "normals" because the records do not show marked differences, is unjustified, and perhaps dangerous.

b. Assignment Evaluations. Another indirect technique for assessing the job capacities of marginal personnel is to follow a group of them after training and infer capabilities from the nature of the assignments they receive. Data indicate (for example, 6, 9, 15) that such men do get assigned to a variety of career fields and do make progressions within these fields, although not to the same extent as normal controls. Data collected in this way, however, fall short of being sufficient or sometimes even accurate:

1. The manner of performance in the assigned job is not being measured. Instead, this kind of approach assumes that the normal process of assignment is a perfect measuring device--that those making the assignments correctly pre-judge the contribution to be expected of each man so assigned.

2. The data are reported usually as MOS's. An MOS may include a large number of duty positions varying in skill level requirement. Hence, it is not possible to infer capacity from a knowledge of the recorded MOS.

3. It is known to be a common practice of local commanders to assign unusable men to "duties" in which they will cause the least trouble. Since there is no MOS for such duties, but there is a requirement for recording one on every service record, the recorded MOS is misleading for any purpose, let alone inferring skill level.

c. Neuropsychiatric Evaluations. This indirect method of measuring usefulness notes the incidence of neuropsychiatric difficulties. It is reasonable to assume, for the individual, that much time spent in therapy or hospitalization means little time devoted to productive effort on-the-job. As a corollary, the incidence of such treatment in groups appears to afford a means of comparing their usefulness to the Army (8, 11, 12, 20). However, this technique confounds the problem of low mental ability with that of ability to adjust in a social situation, and the correlation between these two abilities is open to question.

B. OTHER PERTINENT FINDINGS

Although the primary purpose of this review was to examine previously used techniques for measuring usefulness on-the-job, a secondary purpose was to pick up clues to research techniques applicable in the mentally marginal area generally. The pertinent clues are summarized below.

1. Jobs Suitable for Assignment of Low Level Personnel. It has been pointed out previously that words like MOS, duty position, or even task do not clearly define job behaviors. Hence, any findings that purport to show that men of limited capacity can do certain "jobs" are suspect. With this caution in mind, some of the findings can be examined.

Of approximately 1000 low level airmen (Aptitude Index scores of 3 or less on each of eight job clusters of the Airman Classification Battery) approximately 700 were found (15) in the Transportation, Supply, Law Enforcement, Food Service, Construction, and Medical career fields 32 weeks after initial assignment; this implies, of course, some degree of usefulness in the named areas. There were shifts in assignment when the tabulations were made for a 6-week and the 32-week time intervals. There does not appear to be any pattern in the shifts which could be related to skill level. In another study (20), 58 men who had failed the Armed Forces Qualification Test were followed up to determine assignment. Such assignments included Infantryman, Artilleryman, Cook, Construction Worker, Wireman, Mechanic, Medical Aidman, and Truck Driver. With the rating criterion used, the service of most was considered to be satisfactory. The military history of 22 men who entered Special Training Units is given in (6). Of these, 9 had little or no work record. The remaining 13 had been placed in a variety of assignments, but, of course no conclusions could be drawn on the basis of so few cases.

2. Predictor Measures. A variety of predictor measures have been used to determine who in a group of admittedly low level personnel will succeed in a particular training program or on given jobs. Generally, the same predictors are not applicable for school and for on-the-job criterion situations (2, 7, 27). In a Navy study (7), highest school grade completed, score on a literacy test, and fewer number of additional years spent in any one school grade were related to successful completion of STU training (r 's ranged from .37 to .56). Background variables like marital status, dependents, hobbies, occupation, court record, ability to sign own name, and so on were also found to be related in some degree.

In Army studies, various nonverbal, noncultural tests (27) were found to be useful for predicting ratings on basic training performance (r 's from .41 to .47). On the other hand, typical verbal measures involving literacy and word fluency skills were found to predict success in completing the academic special training program. Since the latter had been developed on the hypothesis that literacy training would facilitate the learning of military subjects but the on-the-job success must always be the practical payoff, it would appear that verbal type tests have relatively little promise.

IV. CONCLUSIONS

1. No previous research studies were found which tried to determine the usefulness to the Armed Forces of marginal personnel by directly comparing measures of productivity with the costs of maintaining that productivity.

2. Existing studies have compared marginal personnel with so-called normals on the basis of test performance, evaluations by superiors, record-items such as promotions, discharges, kinds of assignment, and so on. In most instances there were statistically significant, but practically small, differences in favor of the normals. Comparison of marginal personnel with and without special pretraining has produced inconclusive results.

3. There is as yet no way of determining whether the differences obtained reflect genuine usability or are merely an artifact of the research techniques employed. In any event, such results as were obtained are not suitable for use in determining whether or not cutting scores on selection tests should be revised.

4. The necessary and sufficient method for determining whether or not specified personnel are usable in specified situations is to construct absolute measures of on-the-job usefulness (involving direct comparison of productivity and costs expressed in commensurate units) and to relate these measures to appropriate predictor tests in a sample genuinely representative of marginal personnel.

REFERENCES

1. Aptheker, H. Literacy, the Negro and World War II. J. of Negro Education, 1946, 15, 595-602.
2. Brown, C. W. and Ghiselli, E. E. The relationship between the predictive power of aptitude tests for trainability and for job proficiency. Journal of Applied Psychology, 1952, 36, 370-372.
3. Charles, Don C. Ability and accomplishment of persons earlier judged mentally deficient. Genet. Psychol. Monogr., 1953, 47, 3-71.
4. Current problems in manpower utilization: Texts and selected references. 1953.
5. Eells, Janet. Evaluation of screening standards for Recruit Preparatory Training. Bureau of Naval Personnel. Technical Bulletin 55-11. June 1955.
6. Ginzberg, E. and Bray, D. W. The uneducated. New York, Columbia University Press. 1953.
7. Hagan, E. P. and Thorndike, R. L. A study of the World War II Navy careers of illiterates sent through literacy training. Washington, Bureau of Naval Personnel Classification and Survey Research Branch, Research Division, Research Report, Contract Nonr-644 (00). April 1953.
8. Heron, Alastair. The establishment for research purposes of two criteria of occupational adjustment. Occup. Psychol., London, 1952, 26, 78-85.
9. Horton, R. E. Basic training for "slow learning" airmen. Informational Bulletin, Air Training Command: Training Analysis and Development, Scott Air Force Base, Illinois, 1952, 3, 29-32
10. Houle, C. O., Burr, E. W., Hamilton, T. H., and Yale, J. R. Literacy training. Chapter VIII in The Armed Services and adult education. Washington, Personnel Research Section, Department of the Army, 1 February 1951. (Reprint).
11. Hunt, W. A., Wittson, C. L., and Hunt E. B. Military performance of a group of marginal neuropsychiatric cases. Washington, Office of Naval Research, ONR contract 7 onr-450, Task Order 1. Paper presented before the American Psychiatric Association, May 1952.
12. Hunt, W. A. and Wittson, C. L. The neuropsychiatric implications of illiteracy. U. S. Armed Forces Medical Journal, 1951, 2, 365-369.
13. Hunt, W. A., Wittson, C. L. and Hunt E. B. The serviceability of military personnel of low intelligence. Washington, Office of Naval Research, ONR contract 7 onr-450 (11). (No date).

14. Mastropaolo, S., Carp, A., Erdman, R. L., and Schmid J., Jr. A study of the relative effects of six-week and twelve-week experimental basic training programs on a sample of limited-aptitude airmen: Part I. Basic training analyses. Part II. Six-week follow-up analyses. Lackland Air Force Base, Tex.: Air Force Personnel and Training Research Center, Technical Report (AFPTRC-TR-54-36). September 1954.
15. Mastropaolo, S., Carp, A., and Erdman, R. L. A study of the relative effects of six-week and twelve-week experimental basic training programs on a sample of limited-aptitude airmen: Part III. Eight-month follow-up comparisons. Lackland Air Force Base, Tex.: Air Force Personnel and Training Research Center, Technical Report (AFPTRC-TR-54-37). September 1954.
16. Mastropaolo, S. Personal Communication, 20 April 1955.
17. Mensh, I. N. and Hunt W. A. Abbreviated psychological measures. Washington, Office of Naval Research, ONR contract 7 ONR-45011, NR 154091. (No date).
18. Peckham, R. A. Problems in job adjustment of the mentally retarded. American Journal of Mental Deficiency, 1951, 56, 448-453.
19. Raines, G. N., Wittson, C. L., Hunt W. A., and Herrmann, R. S. Psychiatric selection for military service. The Journal of the American Medical Association, 1954, 156, 817-820 (October 30).
20. Ryan, Francis J. and Glass, Albert J. Personal visit on 21 March 1955 in connection with a psychiatric study of 550 enlistees and inductees on whom predictions were made concerning their adjustment to the Service. Washington, Army Medical Service Graduate School, Walter Reed Army Medical Center, Forest Glen Annex.
21. Seidenfeld, M. A. A progress report on "An annotated bibliography on marginal personnel with special reference to treatment of illiterates". Proj. No. Mil. Psy-37. Forwarded from DCSPEF, 12 July 1954.
22. U. S. Department of Labor, Bureau of Apprenticeship. Evaluating apprentices. Washington, U. S. Government Printing Office, 1953.
23. Walker, R. A. (ed.) America's manpower crisis. Chicago, Public Administration Service, Publication No. 106. 1952.
24. Working Group on Program Plan for Research on Marginal Personnel. Program plan: Joint research relating to the utilization of personnel with marginal mental ability. Washington, Research and Development Board, Committee on Human Resources, Subpanel on Coordination of Personnel Research, 14 December 1951.

Publications of the Personnel Research Branch, Personnel Research and Procedures Division, The Adjutant General's Office, Department of the Army.

25. Technical Research Report 1075. Development of nonverbal tests for the classification of military personnel. March 1954.
26. Technical Research Report 1080. Test Performance of administrative inductees. October 1953.
27. Technical Research Note 29. World War II Tests for Mentally Marginal Personnel. June 1954.
28. Research Memorandum 51-8. Study of the literature on criteria: I. The problem of definition. July 1951.
29. Research Memorandum 51-15. Survey of British personnel selection tests-- Comparison with U. S. Army classification testing. December 1951.
30. Research Memorandum 51-44. Study of the literature on criteria: II. Problems concerning the attainment or construction of criterion measures. December 1951.
31. Research Memorandum 52-1. Study of literature on criterion: III. General categories for classifying criteria. February 1952.
32. Research Memorandum 52-7. Study of literature on criteria: IV. Specific measures suggested for use as criteria. February 1952.
33. Research Memorandum 52-50. A survey of literature on performance testing: Summary materials for further research. August 1952.
34. Research Memorandum 52-77. Utility of aptitude area scores for enlisted men with low AFQT scores. October 1952.
35. Research Memorandum 55-29. Study of enlisted men of limited mental ability, Phase I. September 1955.
36. Research Memorandum 55-30. Study of enlisted men of limited mental ability, Phase II. September 1955.