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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

ED 066471

TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

ENCODER (banking) 1-25.911

B-589 S-309

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U. S. Employment Service
in Cooperation with
Arizona State Employment Service

August 1964

GATB #2510

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

ENCODER (banking) 1-25.911

B-589

Summary

The General Aptitude Test Battery, B-1002B, was administered to a final sample of 50 individuals employed as Encoders 1-25.911 at the Arizona Bank, First National Bank of Arizona, and Valley National Bank in Phoenix, Arizonia. The criterion consisted of production records. On the basis of mean scores, standard deviations, correlations with the criterion, job analysis data, and their combined selective efficiency, Aptitudes Q-Clerical Perception, K-Motor Coordination and M-Manual Dexterity were selected for inclusion in the final test norms.

GATB Norms for Encoder 1-25.911, B-589.

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
Q	CB-1-B	95	Q	Part 1	95
T	CB-1-G CB-1-K	105	K	Part 8	105
M	CB-1-M CB-1-N	90	M	Part 9 Part 10	85

Effectiveness of Norms

The data in Table IV indicate that only 64 percent of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 75 percent would have been good workers. 36 percent of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms only 25 percent would have been poor workers.

I. Purpose

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Encoder 1-25.911.

II. Sample

The General Aptitude Test Battery, B-1002B was administered during the period August 1963 through April 1964 to a final sample of 50 individuals (38 female and 12 male) employed as Encoders 1-25.911 by the Arizona Bank (N=6), First National Bank of Arizona (N=5), and Valley National Bank (N=39), Phoenix, Arizona. Hiring requirements for the Arizona Bank and the First National Bank of Arizona are essentially the same. They prefer applicants who are over 21 and have at least a 12th grade education, and who have had some experience or hobby which relates to fingering exercises, such as those in playing a musical instrument, in typing, or in operating office machines. The Valley National Bank, in addition to the above mentioned requirements, administers a J. P. Cleaver Corporation Personality Test, the Wonderlic, the A.T.S. Number Perception Test, and the S.E.T. Clerical Aptitude Test. Cutoff scores set at the 50th percentile level screened out approximately 40 percent of the applicants.

Foremen at the above banks indicated that workers attain peak performance after being on the job for 6 months. All of the individuals in the final sample are considered experienced.

TABLE I

Means (M), Standard Deviations (σ), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience

N = 50	M	σ	Range	r
Age (years)	27.2	7.3	18-53	.029
Education (Years)	12.4	1.1	8-16	.069
Experience (months)	22.4	11.2	7-60	.025

III. Job Description

Job Title: Encoder 1-25.911

Job Summary: Imprints sorting symbols, account numbers, and values of checks in magnetic ink onto face of checks, forms, or directly onto magnetic tape depending upon the type of equipment operated.

Work Performed: Places a batch of checks onto holding tray of encoding machine. Picks up and examines each check to determine its value and account number and feeds check into input end of machine. Depresses keys and prints onto face of check in magnetic ink or directly onto magnetic tape the value of check, account number, and sorting symbols; the machine simultaneously prints value of check onto a paper tape for verification purposes. Continues process until all checks in batch are processed. Examines tape and compares total value of checks in batch. Routes completed checks to next operation for further processing.

IV. Experimental Battery

All the tests of the GATB, B-1002B, were administered to the sample group.

V. Criterion

The following sets of criterion data, each based on production records for a three-month period (March-May 1964), were collected:

(1) Speed Scores - average number of checks processed per hour by Encoder.

(2) Accuracy Scores - obtained by the following formula:

$$1 - \frac{\text{total errors}}{\text{total checks processed}}$$

Since the correlation between the above criterion distributions was .65, indicating that the criterion distributions tended to be measures of different aspects of performance, establishment of a multiple-hurdle criterion as the final criterion was considered. However, while the speed scores showed a significant correlation with Aptitude M, the accuracy scores did not correlate significantly with any of the aptitudes. On the basis of these results, it was assumed that the accuracy scores would not disclose any information to warrant combination with the speed scores to form a multiple-hurdle criterion. Therefore, the speed scores were selected as the final criterion for the study. These scores had a range of 53-113, with a mean of 89.5 and a standard deviation of 13.9.

VI. Qualitative and Quantitative Analyses

A. Qualitative Analysis

On the basis of the job analysis data, the following aptitudes were rated "important" for success in this occupation:

Clerical Perception (Q) - required for reading values of banking instruments, account numbers, and sorting symbols quickly and accurately.

Motor Coordination (K) - required for speed and accuracy in depressing selected keys while reading symbols.

Finger Dexterity (F) - required for speed and accuracy in depressing appropriate keys of machine and for fingering bank checks.

On the basis of the job analysis data, V-Verbal Aptitude and S-Spatial Aptitude were rated "irrelevant" for successfully performing the duties of this job.

B. Quantitative Analysis:

TABLE II

Means (M), Standard Deviations (σ), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N = 50

Aptitudes	M	σ	r
G-Intelligence	104.2	17.1	.111
V-Verbal Aptitude	105.3	16.5	-.004
N-Numerical Aptitude	106.3	17.6	.187
S-Spatial Aptitude	103.2	20.0	.144
P-Form Perception	120.3	17.9	.166
Q-Clerical Perception	119.4	12.9	.124
K-Motor Coordination	115.5	17.3	.259
F-Finger Dexterity	105.5	23.7	.001
M-Manual Dexterity	107.6	24.3	.280*

*Significant at the .05 level.

C. Selection of Test Norms:

TABLE III

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important						X	X	X	
Irrelevant		X		X					
Relatively High Mean					X	X	X		
Relatively Low Sigma						X			
Significant Correlation with Criterion									X
Aptitudes to be Considered for Trial Norms						Q	K		M

Trial norms consisting of various combinations of Aptitudes Q, K and M with appropriate cutting scores were evaluated against the criterion by means of the Phi Coefficient technique. A comparison of the results showed that B-1002 norms consisting of Q-95, K-105 and M-85 had the best selective efficiency.

VII. Validity of Norms (Concurrent)

The validity of the norms was determined by computing a Phi Coefficient between the test norms and the criterion and by applying the Chi Square test. The criterion was dichotomized on the basis of recommendations by the supervisors who felt that Encoders who reach between 850 - 900 items per hour or more are satisfactory workers. Therefore, a critical criterion score of 87.5 was chosen. As a result, 18 workers, or 36 percent of the sample, were placed in the low criterion group.

Table IV shows the relationship between test norms consisting of Aptitudes Q, K and M with critical scores of 95, 105 and 85, respectively, and the dichotomized criterion for Encoder 1-25.911. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE IV

Validity of Test Norms for Encoder 1-25.911
(Q-95, K-105, M-85)

N = 50	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	5	27	32
Poor Workers	9	9	18
Total	14	36	50

Phi Coefficient = .368
X^2 = 6.755
P/2 $<$ .005

The data in the above table indicate a significant relationship between the test norms and the criterion for the sample.

VIII. Conclusions

On the basis of the results of this study, Aptitudes Q, K and M with minimum scores of 95, 105 and 85, respectively, have been established as B-1002 norms for the occupation of Encoder 1-25.911. The equivalent B-1001 norms consist of Q-95, T-105 and M-90.

IX. Determination of Occupational Aptitude Pattern

The data for this study did not meet the requirements for incorporating the occupation studied into the January 1962 edition of Section II of the Guide to the Use of the General Aptitude Test Battery. The data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.