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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 060174

TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

MENDER (textile) 782.884
BURLER (textile) 689.684

S-75

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION

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U. S. Employment Service in
Cooperation with
North Carolina State Employment Service

U. S. DEPARTMENT OF LABOR
Bureau of Employment Security
Washington 25, D. C.
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STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY
FOR
MENDER (textile) 782,884-062
BURLER (textile) 689,684-010

S-75

Summary

The General Aptitude Test Battery, B-1001, was administered to 54 women employed as Mender 782,884 and Burler 689,684 at the Raeford plant of Robbins Mills, Incorporated, Raeford, North Carolina. Forty-five of the women were tested in April 1954 and nine in February 1955. Two of the 54 women were eliminated from the sample, leaving a final experimental sample of 52. The criterion consisted of supervisory ratings. On the basis of mean scores, standard deviations, correlations with the criterion, job analysis data, and their combined selective efficiency, Aptitudes P-Form Perception, A-Aiming, F-Finger Dexterity, and M-Manual Dexterity were selected for inclusion in the test norms.

GATB Norms for Mender 782,884 and Burler 689,684 S-75

Table I shows, for B-1001 and B-1002, the minimum acceptable score for each aptitude included in the test norms for Mender 782,884 and Burler 689,684.

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for S-75

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
P	CB-1-A CB-1-L	85	P	Part 5 Part 7	85
A	CB-1-C CB-1-K	90	K	Part 8	90
F	CB-1-O CB-1-P	80	F	Part 11 Part 12	75
M	CB-1-M CB-1-N	90	M	Part 9 Part 10	85

Effectiveness of Norms

The data in Table IV indicate that 11 of the 16 poor workers, or 69 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 69 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 30 of the 35 workers who made qualifying test scores, or 86 percent, were good workers. 2

TECHNICAL REPORT

I. Problem

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 occupations of Mender 782.884 and Burler 689.684.

II. Sample

The General Aptitude Test Battery, B-1001, was administered in April 1954 to a sample of 45 women employed as Mender 782.884 and Burler 689.684 at the Raeford plant of Robbins Mills, Incorporated, Raeford, North Carolina. Nine additional women who were employed at this plant in the same occupations were tested in February 1955. After testing, two of the women were eliminated from the group of 45; one of the women failed to complete her training period and the other woman was excluded because she was left-handed and this seemed to hamper her performance on the tests. Thus the final sample consisted of 52 women. Training time on the job is approximately eight weeks. During this time nearly all types of needed repairs will be encountered. All of the women in this sample were regarded as successful Menders and Burlers.

Table II shows the means, standard deviations, ranges, and Pearson product-moment correlations (corrected for broad categories) with the criterion for age, education and experience.

TABLE II

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

Mender (textile) 782.884
Burler (textile) 689.684
N = 52

	M	σ	Range	cr
Age (years)	27.3	5.5	19-39	.277
Education (years)	10.8	1.1	7-12	-.086
Experience (months)	15.2	9.2	4-47	.420*

*Significant at the .01 level.

There are no significant correlations between age or education and the criterion. The significant correlation between experience and the criterion might reflect a bias of the supervisor in favor of those who had been on the job for the longest periods of time. No attempt was made to correct the criterion for experience because the criterion consists of broad category ratings to which the statistical correction technique usually used for nullifying the influence of experience is not applicable.

III. Job Description

Job Title: Mender (textile) 782.884-062
Burler (textile) 684.684-010

Job Summary: Repairs unfinished cloth treated with fugitive tints, using a needle, pick, burling iron, and scissors, to make a wide variety of corrections.

Work Performed:

Pulls end of cloth forward over inclined mending board. Inspects the cloth for markings that indicate imperfections. Determines type of each fault and which tools and materials are necessary for correction.

Eliminates imperfections, including broken picks, tight picks, slack picks, mis-picks, kinky filling, coarse-fine filling, jerked-in filling, stripped back filling, slubby filling, slough filling, ends out, heavy picks, floats, fluff balls, big ends, ply ends, tight slack ends, fine ends, stripped back warping, harness drops, and warp slubs. Makes various corrections using burling iron and fingernails, pushing burls and slubs through to back of cloth and working threads forward to tight places. Clips surplus threads with scissors. For reweaving obtains threads from end of bolt to be used in needle and runs thread over and under warp or filling as necessary to follow pattern. Mends very small holes by adjusting filling and warp threads with pick. Removes surplus and miswoven threads with scissors.

Fills in prepared card form showing work done on each bolt of cloth. Records types of imperfections corrected, the number of each type and the time spent on the bolt of cloth.

Observes corrections closely to determine if they meet standards. Consults with supervisor in unusual cases.

IV. Experimental Battery

All of the tests of the GATB, B-1001, were administered to the sample group.

V. Criterion

The criterion consisted of supervisory ratings made by one forman who had first hand knowledge of the workers' performance on the job. Each worker was rated according to job ability and classified into one of three categories: "best workers," "better workers" or "good workers." Nineteen workers were placed in the top or "best group," 17 in the middle or "better group," and 16 in the low or "good group." For statistical analysis, these broad category ratings were converted to quantitative scores. The "best," "better," and "good" categories were assigned numerical scores of 60, 49, and 39, respectively.

VI. Statistical and Qualitative Analysis

Table III shows the means, standard deviations, and Pearson product-moment correlations (corrected for broad categories) with the criterion for the aptitudes of the GATB.

The means and standard deviations of the aptitudes are comparable to general population norms with a mean of 100 and a standard deviation of 20.

TABLE III

Means (M), Standard Deviations (σ), and Pearson Product-Moment Correlations (Corrected for Broad Categories) with the Criterion (c_r) for the Aptitudes of the GATB

Mender (textile) 782.884

Burler (textile) 689.684

N = 52

Aptitudes	M	σ	c_r
G-Intelligence	91.7	9.9	.173
V-Verbal Aptitude	92.5	11.4	.138
N-Numerical Aptitude	91.3	13.7	.087
S-Spatial Aptitude	91.3	12.1	.281*
P-Form Perception	97.9	14.2	.149
Q-Clerical Perception	88.7	14.6	-.072
A-Aiming	102.6	14.1	.208
T-Motor Speed	95.0	16.4	.206
F-Finger Dexterity	100.6	20.6	.421**
M-Manual Dexterity	107.3	20.1	.395**

**Significant at the .01 level.

*Significant at the .05 level.

The statistical results were interpreted in the light of the job analysis data. The job analysis indicated that the following aptitudes measured by the GATB appeared to be important for this occupation:

Form Perception (P) - required for detecting and identifying imperfections, for reweaving and for determining when all types of imperfections have been corrected according to standards.

Aiming (A) - required for use of pick in adjusting misplaced threads, for use of needle in reweaving, for threading needle, for pushing burls to back of cloth and for clipping threads.

Finger Dexterity (F) - necessary for dextrous use of needle, pick, burling iron, and scissors; for threading needle; for guiding needle in reweaving; for adjusting misplaced threads with pick; for stretching taut cloth sections; and for drawing reweaving threads from end of bolt of cloth.

Manual Dexterity (M) - required in smoothing and stretching cloth; raising cloth to see reverse side; and for handling scissors, burling iron and pick.

The highest mean scores in descending order of magnitude were obtained for Aptitudes M, A, F and P, respectively. All of the aptitudes except F and M have standard deviations of less than 20.

When $N = 52$, correlations of .354 and .273 are significant at the .01 level and the .05 level, respectively. Aptitudes F and M correlate significantly with the criterion at the .01 level of confidence. Aptitude S correlates significantly with the criterion at the .05 level of confidence.

Aptitudes P, A, F and M were considered for inclusion in the test norms on the basis of the qualitative and quantitative factors cited above: all four of these aptitudes appeared to be important in terms of job analysis data; in addition these four aptitudes showed the highest mean scores. Aptitudes F and M showed significant correlations with the criterion at the .01 level of confidence.

Tetrachoric correlations with the criterion were computed for several sets of trial norms consisting of various combinations of Aptitudes P, A, F and M with appropriate cutting scores. The results obtained indicated that all four of these aptitudes should be included in the test norms.

Although Aptitude S correlates significantly with the criterion at the .05 level, it does not appear to be important on the basis of job analysis data. Therefore, Aptitude S was not included in the test norms.

The cutting scores for Aptitudes P, A and F were set at one standard deviation unit below the mean scores and rounded to the nearest five-point score levels. The cutting score for Aptitude M was set at one standard deviation unit below the mean and rounded to the higher adjacent five-point score level to effect better selective efficiency. This resulted in cutting scores of 85, 90, 80 and 90 for Aptitudes P, A, F and M, respectively.

VII. Concurrent Validity of Norms

For the purpose of computing the tetrachoric correlation coefficient between the test norms and the criterion and applying the Chi Square test, the criterion was dichotomized by placing those workers who were rated "Best" and "Better" into the high criterion group and those workers who were rated "Good" into the low criterion group. This resulted in 16 of the 52 women, or 31 percent of the sample, being placed in the low criterion group.

Table IV shows the relationship between test norms consisting of Aptitudes P, A, F and M with critical scores of 85, 90, 80 and 90, respectively and the criterion for Mender 4-19.332 and Burler 6-19.331. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE IV

Relationship Between Test Norms
Consisting of Aptitudes P, A, F and M
with Critical Scores of 85, 90, 80 and 90, Respectively
and the Criterion for Mender 782.884 and Burler 684.684

N = 52

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	6	30	36
Poor Workers	11	5	16
Total	17	35	52

$$r_{tet} = .75$$

$$\chi^2 = 11.391$$

$$\sigma_{rtet} = .24$$

$$P/2 < .0005$$

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

VIII. Conclusions

On the basis of mean scores, correlations with the criterion, job analysis data and their combined selective efficiency, Aptitudes P, A, F and M with minimum scores of 85, 90, 80 and 90, respectively, are recommended as B-1001 norms for the occupations of Mender 782.884 and Burler 684.684. The equivalent B-1002 norms consist of P-85, K-90, F-75 and M-85.



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