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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)

TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

STITCHER, MACHINE (boot & shoe) 6-61.211

B-569 S-289

(Supersedes B-142)

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

January 1964

GATB # 2478

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

STITCHER, MACHINE (boot & shoe) 6-61.211

B-569

(Supersedes B-142)

Summary

The General Aptitude Test Battery, B-1002B, was administered to a final sample of 51 women who were selected under the Area Redevelopment Act of 1961 (Public Law 87-27) for training for the occupation of Stitcher, Machine (boot & shoe) 6-61.211. The criterion consisted of supervisory ratings obtained after eight weeks of employment at the Bata Shoe Company, Salem, Indiana. 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 F-Finger Dexterity were selected for inclusion in the final test norms.

GATB Norms for Stitcher, Machine (boot & shoe) 6-61.211, B-569

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
Q	CB-1-B	85	Q	Part 1	85
T	CB-1-G CB-1-K	90	K	Part 8	95
F	CB-1-O CB-1-P	75	F	Part 9 Part 10	70

Effectiveness of Norms

The data in Table IV indicate that only 67 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, 83 percent would have been good workers; 33 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 17 percent would have been poor workers.

TECHNICAL REPORT

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 Stitcher, Machine (boot & shoe) 6-61.211.

II. Sample

The General Aptitude Test Battery, B-1002B, was administered during the period March 16 through April 3, 1963 to 84 women who were selected under the Area Redevelopment Act (ARA) of 1962 (Public Law 87-27) for training for the occupation of Stitcher, Machine (boot & shoe) 6-61.211. Thirty-three of these women were eliminated from the final sample: nineteen left their job shortly after being placed on the job; four were transferred to another department early in their employment; and ten were assigned to jobs which required no sewing. Therefore, the final experimental sample consists of 51 female stitchers. All women in the experimental sample had completed three weeks of ARA training as well as eight weeks on-the-job training.

TABLE I

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

N = 51	M	σ	Range	r
Age (years)	31.7	8.4	18-45	.344*
Education (years)	10.4	1.6	8-14	.023

*Significant at the .05 level

III. Job Description

Job Title: STITCHER, MACHINE (boot & shoe) 6-61.211

Job Summary: Operates power sewing machine to fabricate uppers for canvas shoes (oxfords and lace-to-toe gym shoes). Performs related tasks such as preparing materials, keeping production records and maintaining equipment.

Work Performed: Operates power sewing machine to fabricate uppers for canvas shoes. Takes box of shoe parts from conveyor and places box on platform. Matches parts to be stitched and folds as necessary. Raises presser foot of machine; positions work under needle, and lowers presser foot. In most operations, stitching is done on a flat surface; in a few, work is placed on a wooden form which is shaped to conform to the part being stitched. Depresses foot pedal to start machine and guides material under needle. Continues stitching until all work in batch has been completed. Cuts pieces apart and trims threads with scissors. Places finished work in box (keeping left and right show parts separate) and replaces box on conveyor. Depending upon his skill and experience, a worker may be assigned to any one or several of the following specific operations:

Sewing Undereyelets: Aligns undereyelet (reinforcing strip on edge of shoe quarter) with edge of shoe quarter by matching notches and stitches parts together. Works on lace-to-toe style only.

Sewing Backs: Folds quarters together, aligning edges and stitching back seam of shoe.

Back Binding: Places upper on post, wrong side up, and stitches binding over back seam. Turns shoe right side out before placing in conveyor box.

Binding Tongues and Uppers: Places folded binding tape on edge of shoe tongue and stitches. Stitches binding on edge of shoe upper.

Vamping: Turns under edge of binding on upper. Aligns tongue and upper and stitches together following line marked on vamp. Works on oxford style only.

Places counter inside upper, aligns notches, stitches counter to upper.

Joining: Places quarters on lap, right side up. Picks up tongue and quarter. Places quarter so that it overlaps edge of tongue as indicated by notch. Stitches tongue to one side of upper and removes from machine. Stitches tongue to one side of upper of another shoe. Repeats operation on other side of first and second shoes. Works on lace-to-toe style only.

Sewing Insoles: Places insole and upper together, matching notches, and stitches parts together.

Performs related tasks such as preparing materials, keeping production records and maintaining equipment: Counts number of pairs of shoes processed and keeps hourly record. Rips and repairs imperfect stitching. Replaces machine belt and needles as required. Winds bobbins and threads machine. Oils machine twice each day and keeps thread and other supplies on hand. Keeps working area clean.

IV. Experimental Battery

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

V. Criterion

The criterion data collected consisted of two sets of independent ratings made by the first-line supervisor on USES Form SP-21, "Descriptive Rating Scale." A period of at least two weeks elapsed between the first and second ratings. The rating scale consisted of nine items covering different aspects of job performance, with five alternatives for each item. Weights of one through five, indicating the degree of job proficiency attained, were assigned to the alternatives. A reliability coefficient of .90 was obtained for the criterion. Therefore, the two sets of ratings were combined, resulting in a distribution of final criterion scores of 23 - 84 with a mean of 59.8 and a standard deviation of 11.3.

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:

Form Perception (P) - required in matching pre-cut parts to be stitched together and in detecting imperfect stitching.

Motor Coordination (K) - required in accurately aligning parts and guiding shoe parts into machine.

Finger Dexterity (F) - required in manipulating shoe parts to be stitched, in operating sewing machine and in using scissors.

Manual Dexterity (M) - required in obtaining parts to be stitched and in placing and guiding material in machine.

On the basis of the job analysis data, V-Verbal Aptitude and N-Numerical Aptitude were rated "irrelevant" for success in this occupation.

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 = 51

Aptitudes	M	σ	r
G-Intelligence	91.5	15.9	.148
V-Verbal Aptitude	93.0	13.1	.172
N-Numerical Aptitude	88.9	16.9	.153
S-Spatial Aptitude	96.4	15.5	.045
P-Form Perception	104.6	18.2	.341*
Q-Clerical Perception	99.5	13.9	.314*
K-Motor Coordination	98.5	15.0	.341*
F-Finger Dexterity	94.0	16.6	.285*
M-Manual Dexterity	99.4	18.9	.230

*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	X
Irrelevant		X	X						
Relatively High Mean					X	X	X		X
Relatively Low Sigma		X				X			
Significant Correlation with Criterion					X	X	X	X	
Aptitudes to be Considered for Trial Norms					P	Q	K	F	M

Trial norms consisting of various combinations of Aptitudes P,Q,K,F 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-85, K-95 and F-70 had the best selective efficiency.

VII. Validity of Norms

The validity of the norms was determined by computing a Phi Coefficient between the test norms and the criterion and applying the Chi Square test. The criterion was dichotomized by placing 33 percent of the sample in the low criterion group because this percent was considered to be the unsatisfactory or marginal workers.

Table IV shows the relationship between test norms consisting of Aptitudes Q, K and F with critical scores of 85, 95, and 70, respectively, and the dichotomized criterion for STITCHER, MACHINE (boot & shoe) 6-61.211. 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 Stitcher, Machine (boot & shoe) 6-61.211
(Q-85, K-95, F-70)

N = 51	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	10	24	34
Poor Workers	12	5	17
Total	22	29	51

Phi Coefficient = .392
χ^2 = 7.854
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 F with minimum scores of 85, 95, and 70, respectively, have been established as B-1002 norms for Stitcher, Machine (boot & shoe) 6-61.211 The equivalent B-1001 norms consist of Q-85, T-90, and F-75.

IX. Determination of Occupational Aptitude Pattern

The data for this study did not meet the requirements for incorporating the occupation studied into any of the 35 OAP's included in Section II of the Guide to the Use of the General Aptitude Test Battery, January 1962. The data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.