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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 also included.

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TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

FANCY STITCHER (boot & shoe) 690.782
TOP STITCHER (boot & shoe) 690.782
VAMP STITCHER (boot & shoe) 690.782

S-159

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

U. S. DEPARTMENT OF LABOR
Bureau of Employment Security
Washington 25, D. C.
July 1959

GATB #2241
September 1958

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

FANCY STITCHER (boot + shoe) 690.782 -046
TOP STITCHER (boot + shoe) 690.782 -130
Vamp Stitcher (boot + shoe) 690.782 -118

S-159

Summary

The General Aptitude Test Battery, B-1002A, was administered to a sample of 113 women employed as Fancy Stitcher 690.782, Top Stitcher 690.782, and Vamp Stitcher 690.782 at the Herbst Shoe Company in Milwaukee, Wisconsin, the Musebeck Shoe Company in Cedar Grove, Wisconsin, the Albert H. Weinbrenner Company in Merrill and Antigo, Wisconsin, and the Leverenz Shoe Company in Sheboygan and New Holstein, Wisconsin. The criterion consisted of broad category supervisory ratings. On the basis of mean scores, correlations with the criterion, job analysis, and their combined selective efficiency, Aptitudes P-Form Perception, K-Motor Coordination, and M-Manual Dexterity were selected for inclusion in the test norms.

GATB Norms for Fancy Stitcher 690.782, Top Stitcher 690.782, Vamp Stitcher 690.782 - S-159

Table I shows, for B-1001 and B-1002, the minimum acceptable score for each aptitude included in the test norms for Fancy Stitcher 690.782, Top Stitcher 690.782 and Vamp Stitcher 690.782.

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for S-159

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
P	CB-1-A CB-1-L	80	P	Part 5 Part 7	80
T	CB-1-G CB-1-K	75	K	Part 8	80
M	CB-1-M CB-1-N	90	M	Part 9 Part 10	85

Effectiveness of Norms

The data in Table IV indicate that 23 of the 31 poor workers, or 74 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 74 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 73 of the 81 workers who made qualifying test scores, or 90 percent, were good workers.

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 Fancy Stitcher 690.782, Top Stitcher 690.782 and VAMP Stitcher 690.782.

II. Sample

During the period April 1955 to September 1958, the GATB, B-1002A, was administered to 113 women employed by various shoe companies in Wisconsin. The name of each company, the number tested at each company, and dates of testing are shown below.

<u>Name</u>	<u>Location</u>	<u>Number</u>	<u>Date</u>
Herbst Shoe Company	Milwaukee	26	April 22, 1955
Musebeck Shoe Company	Cedar Grove	17	July 20, 1956
Albert H. Weinbrenner Company	Merrill and Antigo	50	July 10, 1957 and April 24, 1958
Leverenz Shoe Company	Sheboygan and New Holstein	20	June 10, 1958 and September 24, 1958

Hiring for the jobs is done on the basis of a personal interview and a check of references. The workers usually begin on the unskilled operations in the Fitting Room and progress to more complicated operations. The general procedure is to start them on jobs such as Lining Fitter, Sizer, Lining and Upper Assembler, and as openings occur they are put on simple stitching operations as Label Stitcher or Tongue Lining Stitcher and then advanced to Fancy Stitcher. As openings occur in Top Stitcher or Vamper jobs, they are posted. Fancy Stitchers have priority in applying and are considered according to seniority. If no Fancy Stitcher applies, workers with experience in the simple stitching operations can be placed directly in these jobs. Fancy Stitchers frequently do not apply because they are earning as much or more than they could as a Vamper or Top Stitcher. The jobs of Top Stitcher and Vamper II, especially in the manufacture of men's shoes, are considered to be at a slightly higher skill level. However, this does not always hold true but depends on the style of shoe being produced. In Fancy Stitching on women's and children's shoes, many operations require as high a skill as Top Stitching or Vamping. Employers supplying samples for this study were of the opinion that the same ability requirements were basic to the three occupations. The training period for each of the three occupations is about three months.

In view of this information regarding the nature of these three occupations there is ample justification for treating the workers in the three jobs as one occupational sample. The job progressions usually followed in the stitching department in the shoe industry. The promotional line followed indicates sufficient interchangeability among the three occupations to justify treating the data as one sample.

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 (r^c) for Age, Education, and Experience

Fancy Stitcher 690.782
 Top Stitcher 690.782
 Vamp Stitcher 690.782
 N = 113

	M	σ	Range	r^c
Age (years)	44.0	10.6	19-66	-.372**
Education (years)	9.1	1.8	6-12	.249**
Experience (months)	136.9	116.1	3-480	.022

** Significant at the .01 level

The correlations between age and education and the criterion are significant at the .01 level. This may indicate either a slight bias on the part of the supervisors in favor of the younger, more educated workers, or a tendency for the younger, more educated workers to be better workers. The correlation between experience and the criterion is not significant.

III. Job Descriptions

Job Title: Fancy Stitcher (boot & shoe) 690.782-046

Job Summary: Operates single needle sewing machine to assemble and decorate various parts of shoe uppers. Positions leather upper part or parts under presser foot of machine. Starts machine with foot pedal and guides part under needle following decorative markings on part. When joining parts together, fits according to markings along edges. Performs such fancy stitching as: outlining eyelet row, stitching imitation foxing or panel designs, extra rows of stitching, piping, and appliques. When necessary, changes needles, threads machine, and oils moving parts.

Job Title: Top Stitcher (boot & shoe) 690.782-130

Job Summary: Fits together and sews quarter lining and leather upper quarter of shoe using single needle sewing machine equipped with edge trimmer. Obtains lining and upper pieces from box at side of table. Fits lining to under side

of upper to obtain proper allowance for counter and sets assembly under foot of machine. Depresses foot pedal to start machine and guides upper quarter and lining under foot of machine to stitch lining to quarter. Machine automatically trims edge of lining back under edge of upper quarter to provide finished appearance to edge being sewn. Pushes finished pieces to back of table where they are picked up by expediter. When necessary, threads machine, changes needles, and oils moving parts.

Job Title: *Vamp Stitcher (boot & shoe) 690.782-118*

Job Summary: Fits and sews upper vamp to upper quarters of shoe using single needle sewing machine. Fits one quarter to vamp, overlapping edges according to markings of pieces. Sets overlapped edges together under presser foot of machine and starts machine with foot pedal. Guides parts under foot, making stitch line even distance from edge of piece. Stitches second row about one-fourth inch inside first row to strengthen joint. Guides part by hand, stitching second row parallel to first row. Fits other quarter to vamp and repeats first and second stitching operation. When necessary, threads machine, replaces needles and oils moving parts.

IV. Experimental Battery

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

V. Criterion

The criterion for this study consisted of broad category supervisory ratings. Workers in the various shoe companies were rated in rank order and divided into three categories: above average, average, and below average.

At the Herbst Shoe Company, the plant superintendent and the forelady made pooled ratings and reratings with a three-week interval between the ratings. The plant superintendent and the forelady each made independent ratings at the Musebeck Shoe Company. At the Albert H. Weinbrenner Company, the forelady and two foremen made ratings and reratings with a five-week interval between the ratings. At the Leverenz Shoe Company, the plant superintendent and the foreman made ratings and reratings with a four-week interval between the ratings.

The broad category ratings for workers in the various companies were combined into one distribution for the total sample group. This resulted in placing 38 workers in the above average group, 44 in the average group, and 31 in the below average group. For computational purposes, the three broad categories of above average, average, and below average, were converted to quantitative values of 61, 49, and 38, respectively.

VI. Statistical and Qualitative Analyses

A. Statistical 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 working 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

N = 113

Aptitudes	M	σ	c^r
G-Intelligence	92.8	13.2	.281**
V-Verbal Aptitude	92.9	13.8	.189*
N-Numerical Aptitude	90.8	16.3	.297**
S-Spatial Aptitude	93.7	15.3	.289**
P-Form Perception	95.8	16.2	.501**
Q-Clerical Perception	98.5#	14.9	.445**
K-Motor Coordination	101.3#	16.5	.534**
F-Finger Dexterity	94.5	19.8	.492**
M-Manual Dexterity	101.4#	18.2	.461**

** Significant at the .01 level

* Significant at the .05 level

Relatively High Mean Score

The highest mean scores in descending order of magnitude were obtained for Aptitudes M, K, and Q respectively. All the aptitudes have standard deviations of less than 20. Aptitude G has the lowest standard deviation. For a sample of 113 cases, correlations of .243 and .186 are significant at the .01 level and the .05 level of confidence, respectively. All the aptitudes correlate significantly with the criterion at the .01 level except Aptitude V which correlates significantly with the criterion at the .05 level.

B. Qualitative Analysis:

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 appear to be important for this occupation.

Form Perception (P) - required to fit parts of shoe together properly and to position them in machine; to fit linings to underside of upper lining; to perceive pertinent details when performing fancy stitching operations; and to make stitch line an even distance from edge of piece.

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 with those workers rated as Above Average and Average placed in the high criterion group, and with those rated as Below Average placed in the low criterion group. This resulted in 31 of the 113 workers, or 27 percent of the sample, being placed in the low criterion group.

Table IV shows the relationship between test norms consisting of Aptitudes P, K, and M with critical scores of 80, 80, and 85, respectively, and the dichotomized criterion for Fancy Stitcher 690.782, Top Stitcher 690.782 and Vamp Stitcher 690.782. 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, K, and M with Critical Scores of 80, 80, and 85, Respectively, and the Criterion for Fancy Stitcher 690.782, Top Stitcher 690.782, and Vamp Stitcher 690.782

N = 113

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	9	73	82
Poor Workers	23	8	31
Total	32	81	113

$r_{tet} = .86$ $\chi^2 = 41.230$

$\sigma r_{tet} = .17$ $P/2 < .0005$

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 mean scores, correlations with the criterion, job analysis data, and their combined selective efficiency, Aptitudes P, K, and M with minimum scores of 80, 80, and 85 respectively, are recommended as

B-1002 norms for the occupations of Fancy Stitcher 690.782, Top Stitcher 690.782, and Vamp Stitcher 690.782. The equivalent B-1001 norms consist of P-80, T-75, and M-90.

IX. Determination of Occupational Aptitude Pattern

When the specific test norms for an occupation include three aptitudes, only those occupational aptitude patterns which include the same three aptitudes with cutting scores that are within 10 points of the cutting scores established for the specific norms are considered for that occupation. The only one of the existing 23 occupational aptitude patterns which meets these criteria for this study is OAP-15 which consists of P-85, K-80, and M-80 for B-1002 and P-85, T-80, and M-85 for B-1001. The selective efficiency of OAP-15 for this sample was determined by means of the tetrachoric correlation technique. A tetrachoric correlation of .72 with a standard error of .17 was obtained, which indicates a significant relationship between OAP-15 and the criterion for this experimental sample. The proportion of the sample screened out by OAP-15 was .32, which is within the required range of .10 to .60. Therefore, it is recommended that OAP-15 be used in counseling for the occupations of Fancy Stitcher 690.782, Top Stitcher 690.782, and Vamp Stitcher 690.782.