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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. (AG)

TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

METAL-CHAIR ASSEMBLER (furn.) II 6-36.275

B-465 or S-194

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

September 1962

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

Metal-Chair Assembler (furn.) II 6-36.275

B-465 or S-194

Summary

The General Aptitude Test Battery, B-1002A, was administered to the sample of 52 women who were referred and employed as Metal-Chair Assemblers (furn.) II, 6-36.275 by the Imperial American Corp., Austin, Texas during the three year period 1958-1960. The criterion used was production ratings. On the basis of mean scores, standard deviations, correlations with the criterion, job analysis data, and their combined selective efficiency, Aptitudes K-Motor Coordination, F-Finger Dexterity, and M-Manual Dexterity were selected for inclusion in the test norms.

GATB Norms for Metal-Chair Assembler II 6-36.275 B-465 or S-194

Table I shows, for B-1001 and B-1002, the minimum acceptable score for each aptitude included in the test norms for Metal-Chair Assembler II 6-36.275.

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for B-465 or S-194

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
T	CB-1-G CB-1-K	75	K	Part 8	80
F	CB-1-O CB-1-P	85	F	Part 11 Part 12	80
M	CB-1-M CB-1-N	95	M	Part 9 Part 10	90

Effectiveness of Norms

The data in Table V 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, 32 of the 37 workers who made qualifying test scores, or 86 percent, were good workers.

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 occupation of Metal-Chair Assembler II 6-36.275

II. Sample

The General Aptitude Test Battery, B-1002A, was administered to a sample of 57 women applicants who were referred and employed as Metal-Chair Assemblers (furn.) II, 6-36.275 by the Imperial American Corp., Austin, Texas during the three year period 1958-60. Of the 57 workers in the tested sample, 5 were eliminated from the sample because of their low educational level which was 3-5 years of formal schooling. No tests are used in the selection of individuals for employment. Employees are referred by the local employment office which uses standard interview techniques in selecting those people desiring assembly work. One hour of training time is required for proficiency on the job. All workers in the sample had at least two months experience.

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

N = 52

	M	σ	Range	c^r
Age (years)	24.5	4.9	18-39	.187
Education (years)	9.1	1.9	6-12	.006
Experience (months)	11.1	8.5	2-36	.006

There are no significant correlations between age, education or experience and the criterion. The data in Table II indicate that the sample is suitable for test development purposes with respect to age, education and experience.

III. Job Description

Job Title: Metal-Chair Assembler II, 6-36.275

Job Summary:

Assembles various styles of chairs and chaise lounges made of aluminum tubing and webbing strips or solid material, using bolts, washers, nuts, and hand tools.

Work Performed:

Assembles back and seat of chair. Positions back and seat of chair on table so that chair will fold properly when completed; pushes rod through clamp holes, puts on nut and tightens with screw-driver and small wrench. May twist frame slightly to line up holes and tap the rod lightly to get it through the holes.

Attaches prepared webbing strip to frame. Lifts and turns assembled parts over so that bottom side of frame is up; places webbing strips under frame and pulls over tubing, positioning hole in end of webbing strip over hole in top of frame; inserts screw through grommet in webbing and into hole in frame and turns screw several times with short screwdriver to make screw secure; attaches all strips to one side then turns assembled piece around and, in like manner, attaches other end of each strip to bottom of frame in corresponding hole, using hand-vice-grip to tighten the strip; attaches crosspiece strips in like manner weaving the strips in alternate manner in both top and bottom sections; lifts and turns the assembled piece and, in like manner, tightens and attaches strip to side, using the hand-vice-grip. Stacks assembled piece for additional assembling and tightening of screws.

Assembles arms, arm rests, and legs to back and seat. Arranges legs, arms, and arm rests on table to attach to back and seat of chair or chaise lounge; attaches legs, then arms and arm rests, using bolts, nuts, and washers, making certain that proper type of washer is on bolt and between each moving part, and that nut is positioned parallel to sides of rod in order to keep it from working loose; tightens bolts with screwdriver, using hand tool to hold nut steady.

Counts completed articles when placing them in boxes, writes number in each box on outside of box, and circles name and color of article.

IV. Experimental Battery

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

V. Criterion

The criterion consisted of production ratings expressed in broad categories made by the production superintendent on the basis of production records. Criterion data were collected in September 19 . The rahge of scores was 38 through 61 and resulted in 16 persons being placed in the low criterion group and 36 persons being placed in the high criterion group. The mean score was 50.1 and the standard deviation was 9.3.

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 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 = 52

Aptitudes	M	σ	c^r
G-Intelligence	79.0	10.8	-.193
V-Verbal Aptitude	79.5	8.8	-.080
N-Numerical Aptitude	77.4	14.6	-.012
S-Spatial Aptitude	86.4	14.5	-.128
P-Form Perception	89.0	15.7	-.108
Q-Clerical Perception	87.9	12.7	-.122
K-Motor Coordination	95.0	14.3	.359**
F-Finger Dexterity	106.7	16.6	.292*
M-Manual Dexterity	109.5	16.9	.311*

**Significant at the .01 level
*Significant at the .05 level

For a sample of 52 cases, correlations of .354 and .273 are significant at the .01 level and the .05 level of confidence, respectively.

Aptitude K correlates significantly with the criterion at the .01 level. Aptitudes F and M correlate significantly with the criterion at the .05 level.

B. Qualitative Analysis:

The job analysis indicated that the following aptitudes measured by the GATB appear to be important for this occupation.

Motor Coordination (K) and Finger Dexterity (F) - required in handling and assembling screws, grommets, nuts, bolts and washers.

Manual Dexterity (M) - required in handling and positioning parts of chairs to assemble them; using wrenchs, screw drivers and other hand tools.

Form Perception (P) - required in selecting and positioning parts.

On the basis of the job analysis data, the following aptitudes are considered obviously unimportant for performing the duties of this job and are considered "irrelevant" aptitudes: V-Verbal Aptitude, N-Numerical Aptitude and Q-Clerical Perception.

C. Selection of Test Norms

TABLE IV

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			X			
Relatively High Mean							X	X	X
Relatively Low Sigma	X	X				X	X		
Significant Correlation with Criterion							X	X	X
Aptitudes to be considered for trial norms							K	F	M

Trial norms consisting of various combinations of Aptitudes K, F and M with appropriate cutting scores were evaluated against the criterion by means of the tetrachoric correlation technique. A comparison of the results showed that B-1002 norms consisting of K-80, F-80 and M-90 had the best selective efficiency.

VII. Validity of Norms

The validity of the norms was determined by computing a tetrachoric correlation coefficient between the test norms and the criterion and applying the Chi Square test. The criterion was dichotomized by placing as close as possible to one-third of the sample in the low criterion group. A criterion critical score of 40 was used and resulted in 16 of the workers or 31 percent of the sample being placed in the low criterion group.

Table V shows the relationship between test norms consisting of Aptitudes K, F and M with critical scores of 80, 80 and 90 respectively, and the dichotomized criterion for Metal-Chair Assembler II 6-36.275. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE V

Validity of Test Norms for Metal-Chair Assembler II 6-36.275

(K-80, F-80, M-90)

N = 52

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	4	32	36
Poor Workers	11	5	16
Total	15	37	52

$r_{tet} = .82$ $\quad \chi^2 = 15.231$

$\sigma_{r_{tet}} = .24$ $\quad P/2 = < .0005$

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 the results of this study, Aptitudes K, F and M with minimum scores of 80, 80 and 90 respectively, have been established as B-1002 norms for the occupation of Metal-Chair Assembler II 6-36.275. The equivalent B-1001 norms consist of T-75, F-85 and M-95.

IX. Determination of Occupational Aptitude Pattern

A significant relationship between OAP- 34 and the criterion for the experimental sample was obtained. The proportion of the sample screened out by OAP-34 was .48, which is within the required range of .10 to .60. Therefore, the occupation Metal Chair Assembler II, 6-36.275 will be allocated to OAP-34 of the existing 35 OAP's (Revised 10/61).