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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 and a personnel evaluation form are also included. (AG)

Development of USES Aptitude Test Battery for Corrugator Operator

(paper goods) 643.782

U.S. DEPARTMENT OF LABOR
MANPOWER ADMINISTRATION
BUREAU OF EMPLOYMENT SECURITY

Technical Report on Development of USES Test Battery

For

CORRUGATOR OPERATOR (paper goods) 643.782

S-395

U. S. Employment Service
in Cooperation with
Pennsylvania State Employment Service and
21 other State Agencies

July 1967

FOREWORD

The United States Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 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, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination, predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

Frank H. Cassell

Frank H. Cassell, Director
U. S. Employment Service

GATB Study #2648

DEVELOPMENT OF USES APTITUDE TEST BATTERY

For

CORRUGATOR OPERATOR (paper goods) 643.782-010

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Corrugator Operator (paper goods) 643.782. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB, B-1002 Scores
Q - Clerical Perception	75
K - Motor Coordination	70
M - Manual Dexterity	85

RESEARCH SUMMARY

Sample

70 male workers employed as Corrugator Operators throughout the nation.

Criterion

Supervisory ratings

Design

Concurrent (test and criterion data were collected at approximately the same time)

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, aptitude-criterion correlations and selective efficiencies.

Concurrent Validity

Phi Coefficient = .222 (P/2 less than .05)

Effectiveness of Norms

Only 64% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 73% would have been good workers. Thirty-six 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 27% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	64%	73%
Poor Workers	36%	27%

SAMPLE DESCRIPTION

Size

N = 70

Status

Employed workers

Work Setting

1. Owens-Illinois Corporation

Oakland, California
Hialeah, Florida
Chicago, Illinois
Detroit, Michigan
Shakopee, Minnesota
Newark, New Jersey
Long Island City, New York
Circleville, Ohio
Bradford, Pennsylvania
Memphis, Tennessee
Dallas, Texas
Milwaukee, Wisconsin

2. Continental Can Company

Portland, Connecticut
Atlanta, Georgia
Cambridge, Massachusetts
Melvindale, Michigan
Jackson, Mississippi
Teterboro, New Jersey
Tyler, Texas
Martinsville, Virginia
Richmond, Virginia

3. Weyerhaeuser Company

New Orleans, Louisiana
Westbrook, Maine
Baltimore, Maryland
East Detroit, Michigan
Closter, New Jersey
Charlotte, North Carolina
Olympia, Washington

4. Miller Container Corporation

Roanoke, Virginia

5. National Container of California

Los Angeles, California

6. West Virginia Pulp and Paper Company

Richmond, Virginia

NOTE: Dr. John H. Rapparlie, Industrial Psychologist, Department of Personnel Relations, Owens-Illinois, was instrumental in obtaining management approval for the USES and affiliated State Employment Services to work cooperatively with plant management in obtaining samples from Owens-Illinois plants and some of the other companies.

Employer Selection Requirements

Education: Some plants have minimum requirements of 10th or 12th grade

Previous Experience: None except Weyerhaeuser plant in East Detroit, Michigan requires 4 years as Assistant Corrugator Operator

Tests: None

Other: Interview in most cases. Some plants require physical examinations.

Principal Activities

The job duties of each worker are comparable to those shown in the job description in the Appendix.

Minimum Experience

All workers had at least three months job experience

TABLE 2

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

	Mean	SD	Range	r
Age (years)	38.08	9.17	22-61	.087
Education (years)	10.03	1.79	6-14	-.039
Experience (months)	89.23	84.26	3-372	.200

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002, Form B, were administered between December 1964 and December 1966.

CRITERION

The criterion data consisted of supervisory ratings of job proficiency made at approximately the same time as the test data were collected. The workers' immediate supervisors made two ratings with a time interval of at least two weeks between the ratings.

Rating Scale

USES Form SP-21 "Descriptive Rating Scale." (See Appendix.) This scale consists of nine items covering different aspects of job performance. Each item has five alternatives corresponding to different degrees of job proficiency.

Reliability

The coefficient of reliability between the two ratings is .89 indicating a significant relationship. Therefore, the final criterion consisted of the combined scores of the two sets of ratings.

Criterion Score Distribution

Possible Range: 18 - 90
Actual Range: 40 - 84
Mean: 67.5
Standard Deviation: 9.5

Criterion Dichotomy

The criterion distribution was dichotomized into high and low groups by placing 36% of the sample in the low criterion group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers." The criterion critical score is 65.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitudes Q, K and M which do not have a significant correlation with the criterion were considered for inclusion in the norms because the qualitative analysis indicated that these aptitudes were important for the job duties and the sample had relatively high mean scores on these aptitudes. A relatively high mean score with employed workers may indicate some sample pre-selection. Tables 3, 4 and 5 show the results of the qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performed.)

Aptitude	Rationale
G - General Learning Ability	Must set up and operate machine to corrugate and face paperboard for containers.
S - Spatial Aptitude	Verifies size of fluting; adjusts fluting fingers, pressure rollers, brake tension on shaft rolls and speed of machine.

TABLE 3

(continued)

Aptitude	Rationale
P - Form Perception	Checks quality of paperboard containers.
Q - Clerical Perception	Checks measurements and computations on work order to determine that they are correct.
K - Motor Coordination	Uses rules, wrenches and hand wheels in adjusting rollers.
M - Manual Dexterity	Uses hand tools; manipulates knobs, hand wheels and valves; handles and threads paper through machine.

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

Aptitude	Mean	SD	Range	r
G - General Learning Ability	86.51	15.40	54-123	.044
V - Verbal Aptitude	86.28	11.26	66-119	.028
N - Numerical Aptitude	85.61	16.59	44-119	.053
S - Spatial Aptitude	91.81	17.27	58-150	.038
P - Form Perception	87.78	20.98	23-129	-.039
Q - Clerical Perception	94.10	14.93	65-129	.111
K - Motor Coordination	93.98	16.16	51-134	.100
F - Finger Dexterity	90.66	21.33	52-147	.072
M - Manual Dexterity	94.48	20.01	60-137	.119

TABLE 5

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	X		X
Irrelevant									
Relatively High Mean						X	X		X
Relatively Low Standard Deviation		X							
Significant Correlation with Criterion									
Aptitudes to be Considered for Trial Norms						Q	K		M

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of aptitudes Q, K and M at trial cutting scores were able to differentiate between the 64% of the sample considered good workers and 36% of the sample considered poor workers. Trial cutting scores at five point intervals approximately one standard deviation below the mean were tried because this will eliminate about one-third of the sample with three-aptitude norms. For two-aptitude trial norms, minimum cutting scores of slightly higher than one standard deviation below the mean will eliminate about one-third of the sample; for four-aptitude trial norms, cutting scores of slightly lower than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Norms of Q-75, K-70 and M-85 provided the highest degree of differentiation. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .22 (statistically significant at the .05 level).

TABLE 6

Concurrent Validity of Test Norms

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	15	30	45
Poor Workers	14	11	25
Total	29	41	70

Phi Coefficient (ϕ) = .22 Chi Square (x^2) = 3.36

Significance Level = P/2 less than .05

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study did not meet the requirements for incorporating the occupation studied into any of the 36 OAP's included in Section II of the Manual for the General Aptitude Test Battery. The data for this sample will be considered for future groupings in the development of new occupational aptitude patterns.

SP-21
Rev. 2/61

A-P-P-E-N-D-I-X

DESCRIPTIVE RATING SCALE
(For Aptitude Test Development Studies)

Score____

RATING SCALE FOR _____
D. O. T. Title and Code

Directions: Please read Form SP-20, "Suggestions to Raters", and then fill in the items listed below. In making your ratings, only <u>one</u> box should be checked for each question.

Name of Worker (print) _____
(Last) (First)

Sex: Male_____ Female_____

Company Job Title: _____

How often do you see this worker in a work situation?

☐ See him at work all the time.

☐ See him at work several times a day.

☐ See him at work several times a week.

☐ Seldom see him in work situation.

How long have you worked with him?

☐ Under one month.

☐ One to two months.

☐ Three to five months.

☐ Six months or more.

A. How much work can he get done? (Worker's ability to make efficient use of his time and to work at high speed.)

☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.

☐ 2. Capable of low work output. Can perform at a slow pace.

☐ 3. Capable of fair work output. Can perform at an acceptable but not a fast pace.

☐ 4. Capable of high work output. Can perform at a fast pace.

☐ 5. Capable of very high work output. Can perform at an unusually fast pace.

B. How good is the quality of his work? (Worker's ability to do high-grade work which meets quality standards.)

☐ 1. Performance is inferior and almost never meets minimum quality standards.

☐ 2. The grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.

☐ 3. Performance is acceptable but usually not superior in quality.

☐ 4. Performance is usually superior in quality.

☐ 5. Performance is almost always of the highest quality.

C. How accurate is he in his work? (Worker's ability to avoid making mistakes.)

☐ 1. Makes very many mistakes. Work needs constant checking.

☐ 2. Makes frequent mistakes. Work needs more checking than is desirable.

☐ 3. Makes mistakes occasionally. Work needs only normal checking.

☐ 4. Makes few mistakes. Work seldom needs checking.

☐ 5. Rarely makes a mistake. Work almost never needs checking.

D. How much does he know about his job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with his work.)

☐ 1. Has very limited knowledge. Does not know enough to do his job adequately.

☐ 2. Has little knowledge. Knows enough to "get by."

☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.

☐ 4. Has broad knowledge. Knows enough to do good work.

☐ 5. Has complete knowledge. Knows his job thoroughly.

E. How much aptitude or facility does he have for this kind of work? (Worker's adeptness or knack for performing his job easily and well.)

☐ 1. Has great difficulty doing his job. Not at all suited to this kind of work.

☐ 2. Usually has some difficulty doing his job. Not too well suited to this kind of work.

☐ 3. Does his job without too much difficulty. Fairly well suited to this kind of work.

☐ 4. Usually does his job without difficulty. Well suited to this kind of work.

☐ 5. Does his job with great ease. Exceptionally well suited for this kind of work.

F. How large a variety of job duties can he perform efficiently? (Worker's ability to handle several different operations in his work.)

☐ 1. Cannot perform different operations adequately.

☐ 2. Can perform a limited number of different operations efficiently.

☐ 3. Can perform several different operations with reasonable efficiency.

☐ 4. Can perform many different operations efficiently.

☐ 5. Can perform an unusually large variety of different operations efficiently.

G. How resourceful is he when something different comes up or something out of the ordinary occurs? (Worker's ability to apply what he already knows to a new situation.)

☐ 1. Almost never is able to figure out what to do. Needs help on even minor problems.

☐ 2. Often has difficulty handling new situations. Needs help on all but simple problems.

☐ 3. Sometimes knows what to do, sometimes doesn't. Can deal with problems that are not too complex.

☐ 4. Usually able to handle new situations. Needs help on only complex problems.

☐ 5. Practically always figures out what to do himself. Rarely needs help, even on complex problems.

H. How many practical suggestions does he make for doing things in better ways? (Worker's ability to improve work methods.)

☐ 1. Sticks strictly with the routine. Contributes nothing in the way of practical suggestions.

☐ 2. Slow to see new ways to improve methods. Contributes few practical suggestions.

☐ 3. Neither quick nor slow to see new ways to improve methods. Contributes some practical suggestions.

☐ 4. Quick to see new ways to improve methods. Contributes more than his share of practical suggestions.

☐ 5. Extremely alert to see new ways to improve methods. Contributes an unusually large number of practical suggestions.

I. Considering all the factors already rated, and only these factors, how acceptable is his work? (Worker's "all-around" ability to do his job.)

☐ 1. Would be better off without him. Performance usually not acceptable.

☐ 2. Of limited value to the organization. Performance somewhat inferior.

☐ 3. A fairly proficient worker. Performance generally acceptable.

☐ 4. A valuable worker. Performance usually superior.

☐ 5. An unusually competent worker. Performance almost always top notch.

July 1967

S-395

FACT SHEET

Job Title

Corrugator Operator (paper goods) 643.782-010

Job Summary

Sets up and operates machine to corrugate and face paperboard to form completed paperboard material for containers. Works under the general supervision of the foreman.

Work Performed

Operates the fluter and single facing units of a corrugating machine and coordinates the operations of the other units.

Receives job order which lists the customer, order number, dimensions, material to be used, width and type of board to run, number of feet to run and, if necessary, instructions to make full use of length and width of run. Checks measurements and computations to determine that they are correct and that there is no waste of board in either width or length; may have foreman adjust figures with office if they are incorrect. Verifies paper order and determines that proper weight, width and amount of paper has been ordered and has been brought from stock and placed on the proper shafts.

Splices fluting and single facer paper to end of previous rolls with glue or threads each paper over the feed, tension fluting rollers and through pull rollers; adjusts flow of starch with hand wheel. Checks the steam gages and reports to the engineer if heat is less than required. Adjusts the following: (1) fluting fingers (2) pressure rollers for thickness of paper (3) brake tension on shaft rolls and (4) speed of machine for the job. Notifies other workers on machine (double facers, slitters and bundlers) to be at their stations and then starts machine.

May operate and combine one, two or three single facer units into a single sheet depending on type of paper desired which makes a single, double, or triple wall sheet.

Maintains continuous check on quality; corrects any defect found; gives particular attention to high or low flutes, crushed or cut corrugations, flat spots or low caliper, wrinkled or loose bond, line up, proper minimum on bridge, pressure roll or finger marks, soft or wet sheet etc.

Uses rules, wrenches and hand wheels in adjusting rollers. Cleans starch troughs after each job is run and every night. Directs helper when operating three units. Performs other related work assigned by the foreman.

Effectiveness of Norms

Only 64% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the S-395 norms, 73% would have been good workers. Thirty-six percent of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the S-395 norms, only 27% would have been poor workers.

Applicability of S-395 Norms

The aptitude test battery is applicable to jobs which include a majority of duties described above.


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UNITED STATES OF AMERICA


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