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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)

January 1969 United States Training and Employment Service Technical Report S-429

Development of USTES Aptitude Test Battery for Rewinder Operator

(paper goods) 640.885

U.S. DEPARTMENT OF LABOR
MANPOWER ADMINISTRATION

Technical Report on Development of USTES Aptitude Test Battery

For . . . . . .

Rewinder Operator (paper goods) 640.885

S-429

(Developed in Cooperation with the Alabama and Wisconsin State Employment Services)

U. S. Department of Labor
Manpower Administration

January 1969

FOREWORD

The United States Training and 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.

GATB Study #2729

DEVELOPMENT OF USTES APTITUDE TEST BATTERY

FOR

Rewinder Operator (paper goods) 640.885-062

S-429

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Rewinder Operator (paper goods) 640.885-062. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB Scores
S - Spatial Aptitude	70
P - Form Perception	90
M - Manual Dexterity	80

RESEARCH SUMMARY

Sample:

87 male Rewinder Operators employed in Alabama and Wisconsin. All individuals in the sample were non-minority group members.

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 = .41 (P/2 $<$ .0005)

Effectiveness of Norms:

Only 66% of the nontest-selected workers used for the study were good workers: If the workers had been test-selected with the above norms, 80% would have been good workers. 34% of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 20% 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	66%	80%
Poor Workers	34%	20%

SAMPLE DESCRIPTION

Size:

N = 87

Occupational Status:

Employed workers

Work Setting:

Workers were employed at the American Can Company in Green Bay, Wisconsin and Naheola, Alabama.

Employer Selection Requirements:

Education: None specified.

Previous Experience: Mechanical work experience, preferably related to the industry.

Tests: A general pre-employment test, consisting of vocabulary, reasoning, word association, spelling, math, mechanical space aptitude and Bennett Mechanical Comprehension Test, Form AA.

Other: Interview and passing physical standards for employment.

Principal Activities:

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

Minimum Experience:

All workers in the sample had at least six months total 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)	35.3	10.4	22-62	-.495**
Education (years)	11.1	1.8	6-16	.212*
Experience (months)	101.0	109.8	6-492	-.366**

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

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B were administered in February, 1968.

CRITERION

The criterion consisted of supervisory ratings of job proficiency made at approximately the same time as the test data was collected. Ratings and re-ratings were made by the immediate supervisor of each worker with a two-week interval between ratings.

Rating Scale:

USES Form SP-21, "Descriptive Rating Scale" was used. This scale (see Appendix) consists of nine items with five alternatives for each item. The alternatives indicate the different degrees of proficiency.

Reliability:

The correlation between the ratings and re-ratings was .84, indicating a significant relationship. Therefore, the final criterion consisted of the combined score of the two sets of ratings.

Criterion Score Distribution:

Possible Range:	18-90
Actual Range:	40-85
Mean:	63.0
Standard Deviation:	10.4

Criterion Dichotomy:

The criterion distribution was dichotomized into low and high groups by placing 34% of the sample in low criterion group to correspond with the percentage of workers considered to be 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 57.

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. Aptitude Q which did not have a significant correlation with the criterion was considered for inclusion in the norms because the sample had a relatively high mean and a relatively low standard deviation on this aptitude. With employed workers a relatively high mean score or a relatively low standard deviation 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
P - Form Perception	To detect inferior or bad logs of tissue and reject them for reprocessing.
K - Motor Coordination	Rapidly coordinating eyes and hands to make sure log of tissue is positioned correctly for winding operation, is wound correctly and ejected to correct place.
M - Manual Dexterity	Turn and place log of tissue on cove holding spindle so that it can be sealed properly and tissue is not loose. Skillful use of hands needed in threading sheet of tissue over, under and around roller guides when continuous sheet is broken or tears.

TABLE 4

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlation with the Criterion (r) for the Aptitudes of the GATB; N=87

Aptitudes	Mean	SD	Range	r
G - General Learning Ability	96.2	12.5	57-122	.265*
V - Verbal Aptitude	90.8	11.5	65-121	.080
N - Numerical Aptitude	97.7	14.3	53-123	.182
S - Spatial Aptitude	98.4	16.1	65-130	.289**
P - Form Perception	98.9	16.7	38-134	.288**
Q - Clerical Perception	102.2	11.7	78-135	.017
K - Motor Coordination	97.4	18.8	62-148	.250*
F - Finger Dexterity	87.5	24.3	30-131	.272*
M - Manual Dexterity	100.4	21.3	47-167	.344**

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

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
Irrelevant									
Relatively High Mean				X	X	X			X
Relatively Low Standard Dev.	X	X	X			X			
Significant Correlation with Criterion	X			X	X		X	X	X
Aptitudes to be Considered for Trial Norms	G			S	P	Q	K	F	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 G, S, P, Q, K, F, and M at trial cutting scores were able to differentiate between 66% of the sample considered good workers and 34% of the sample considered poor workers. Trial cutting scores at five point intervals approximately one standard deviation below the mean are 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 more than one standard deviation below the mean will eliminate about one-third of the sample; for four-aptitude trial norms, cutting scores of slightly less 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. The optimum differentiation for the occupation of Rewinder Operator (paper goods) 640.885-062 was provided by norms of S-70, P-90 and M-80. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .41 (statistically significant at the .0005 level).

TABLE 6

Concurrent Validity of Test Norms, S-70, P-90 and M-80

	Nonqualifying Test Scores	Qualifying Test Score	Total
Good Workers	10	47	57
Poor Workers	18	12	30
Total	28	59	87

Phi Coefficient (ϕ) =.41
Significant Level = P/2 <.0005

Chi Square (X^2_y) = 14.3

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 grouping of occupations 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 one 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. Cannct 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.

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FACT SHEET

Job Title: Rewinder Operator (paper goods) 640.885-062

Job Summary: Tends a paper converting machine that winds various colored paper tissue from two parent rolls **simultaneously**, presses them together, perfumes them, perforates at given intervals and rolls them onto a core to a specified diameter or footage prior to cutting.

Work Performed: Work Preparation: Checks with foreman to find out what color tissue will be run. Records in work log parent roll number, weight and date, the color of roll, the culls and reason and any down time and reason.

Set-Up: Hooks overhead chain hoist to large rolls (approx. 2000#) of paper one at a time and positions them in slots at rear of machine. Tears off outside layers of tissue by hand to about 1 inch depth to remove dirty or inferior quality paper. Tears a tail and lays it over the first roller. Presses jog switch button and observes paper as it moves over and through press and tension rollers into machine.

Tends Machine: Starts machine and sits in chair in front of machine and control panel. Checks to see if cores are being properly positioned as they are automatically slid onto winding spindle. Adjusts by hand if necessary. Turns the ejected logs by hand so that when carried off the spindle by a small conveyor, the tail of the log will be positioned to be scaled down by a thin stream of sugar and water to keep log from unwinding until cut and wrapped. Occasionally pours 5 gallons of diluted perfume into a tank at the side of machine to be sprayed on tissue as it passes through machine. When bad or inferior log is observed, presses reject button on control panel and log by-passes saw section. Stops machine when needed to clean lint and broken pieces of tissues from press and tension rollers and cutting and perforating knives. Makes minor adjustments on tension of paper and size of roll of log by increasing or decreasing roller pressure. Occasionally sprays silicone mixture or light oil on spindles and winding area to facilitate sliding action of cores. Checks perforation every two hours by pulling off by hand a section of tissue and visually examining for correct spacing and depth of cuts by revolving knives. If adjustment needed, calls Millwright. Occasionally fills small trough with glue that is automatically applied to a small section, end to end, of the core so that the first round of paper wound on the core will stick and the paper can be wound to the correct tension around the core.

Effectiveness of Norms: Only 66% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the S-429 norms, 80% would have been good workers. 34% of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-429 norms, only 20% would have been poor workers.

Applicability of S-429 Norms: The aptitude test battery is applicable to jobs which include a majority of the job duties described above.

GPO 879-078

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