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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)

S-73 United States Employment Service Technical Report June 1966

Development of USES Aptitude Test Battery

for

Printed-Napkin-Machine Operator

(paper goods) 649.885

U.S. DEPARTMENT OF LABOR
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Washington, D.C. 20210

Technical Report on Development of USES Aptitude Test Battery

For .....

Printed-Napkin-Machine Operator (paper goods) 649.885

S-73

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

June 1966

DEVELOPMENT OF USES APTITUDE TEST BATTERY

For

Printed-Napkin-Machine Operator (paper goods) 649.885

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Printed-Napkin-Machine Operator (paper goods) 649.885. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB, B-1002 Scores
S - Spatial Aptitude	90
Q - Clerical Perception	85
K - Motor Coordination	80
F - Finger Dexterity	75

RESEARCH SUMMARY

Sample:
55 male workers employed at two plants of the Wisconsin Tissue Mills located at Neenah and Menasha, Wisconsin.

Criterion:
Supervisory ratings.

Design:
Concurrent (test and criterion data were obtained at approximately the same time.)

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

Concurrent Validity:
Phi Coefficient = .49 ($P/2 < .0005$)

Effectiveness of Norms:

Only 67% of the non-test-selected workers used for this study were good workers; if the workers had been test selected with the above norms, 82% would have been good workers. 33% of the non-test-selected workers were poor workers; if the workers had been test selected with the above norms, only 18% 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	67%	82%
Poor Workers	33%	18%

SAMPLE DESCRIPTION

Size: N = 53

Occupational Status: Employed Workers

Work Setting: Workers employed at two plants of the Wisconsin Tissue Mills located at Neenah and Menasha, Wisconsin.

Employer Requirements:

Education: No consistent requirement - Ability to speak, read and write English.

Previous Experience: None

Tests: None

Other: Personal interview

Principal Activities: The work performed by each worker at the two plants is comparable to that described in the job description shown in the Appendix.

Minimum Experience: All workers in the sample had the minimum of 3-4 weeks experience required to become proficient in this job.

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)	28.4	7.4	18-48	.141
Education (years)	11.1	1.6	7-14	.043
Experience (months)	31.0	30.9	4-126	.331*

*Significant at the .05 level

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B were administered during March 1965.

CRITERION

The criterion data consisted of supervisory ratings of job proficiency made at approximately the same time as test data were collected. Two sets of ratings were made by each worker's immediate supervisor with an 8-16 week interval between ratings.

Rating Scale: An adaptation of USES Form SP-21, "Descriptive Rating Scale." The scale (see Appendix) consisted of nine items covering different aspects of job performance. Each item has five alternatives corresponding to different degrees of job proficiency.

Reliability: The correlation between the two independent ratings was .95. The final criterion consisted of the sum of the two descriptive rating scale scores.

Criterion Score Distribution:

Possible Range:	18-90
Actual Range:	50-88
Mean:	64.5
Standard Deviation:	9.9

Criterion Dichotomy: The criterion distribution was dichotomized into high and low groups by placing 35% of the sample in the low 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 60.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitudes Q and M which do not have a high correlation with the criterion were considered for inclusion in the norms because the qualitative analysis indicated that they were important for the job duties; the sample had a relatively low standard deviation for Aptitude Q and a relatively high mean score for Aptitude M.

TABLE 3

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

Aptitude	Rationale
Q - Clerical Perception	Necessary in observing the operation of machine for proper cutting, folding and printing.
K - Motor Coordination	Necessary in accurately reading paper roll thru decks, embossing rolls and feed rollers and in catching napkins as they are discharged.
F - Finger Dexterity	Necessary in turning hand wheels, in using feeder gage and steel tape and in cleaning printing plates.
M - Manual Dexterity	Necessary in turning the cylinder, in starting and stopping machine, and in taking off discharged napkins.

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	100.8	16.0	67-143	.363**
V - Verbal Aptitude	95.7	12.8	70-123	.337*
N - Numerical Aptitude	96.9	16.3	50-128	.211
S - Spatial Aptitude	110.1	18.7	74-153	.355**
P - Form Perception	106.3	16.6	77-149	.206
Q - Clerical Perception	101.3	13.5	65-126	.243
K - Motor Coordination	101.8	16.3	64-134	.292*
F - Finger Dexterity	97.9	18.5	57-142	.299*
M - Manual Dexterity	107.4	16.6	81-142	.173

*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	X
Irrelevant									
Relatively High Mean				X	X				X
Relatively Low Standard Dev.		X				X			
Significant Correlation with Criterion	X	X		X			X	X	
Aptitudes to be Considered for Trial Norms	G	V		S		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, V, S, Q, K, F and M at trial cutting scores were able to differentiate between the 67% of the sample considered good workers and the 33% 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 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 S-90, Q-85, K-80 and F-75 provided the highest degree of differentiation for the occupation of Printed-Napkin-Machine Operator (papergoods) 649.885. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .49 (statistically significant at the .0005 level).

TABLE 6

Validity of Test Norms, S-90, Q-85, K-80 and F-75

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	5	32	37
Poor Workers	11	7	18
Total	16	39	55

Phi Coefficient (ϕ) = .49
Significance Level = P/2 .0005

Chi Square (X^2) = 13.316

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 of occupations in the development of new occupational aptitude patterns.

WSES-1004

Form Approved
Budget Bureau No. 44—5907

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 the sheet "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 output. Can perform at a slow pace.
- ☐ 3. Capable of fair work output. Can perform at a 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. Very poor. Does work of unsatisfactory grade. Performance is inferior and almost never meets minimum quality standards.
- ☐ 2. Not too bad, but the grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.
- ☐ 3. Fair. The grade of his work is mediocre. Performance is acceptable but usually not superior in quality.
- ☐ 4. Good, but the grade of his work is not outstanding. Performance is usually superior in quality.
- ☐ 5. Very good. Does work of outstanding grade. Performance is almost always of the highest quality.

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

- ☐ 1. Very inaccurate. Makes very many mistakes. Work needs constant checking.
- ☐ 2. Inaccurate. Makes frequent mistakes. Work needs more checking than is desirable.
- ☐ 3. Fairly accurate. Makes mistakes occasionally. Work needs only normal checking.
- ☐ 4. Accurate. Makes few mistakes. Work seldom needs checking.
- ☐ 5. Highly accurate. 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. Very low aptitude. Has great difficulty doing his job. Not at all suited to this kind of work.
- ☐ 2. Low aptitude. Usually has some difficulty doing his job. Not too well suited to this kind of work.
- ☐ 3. Moderate aptitude. Does his job without too much difficulty. Fairly well suited to this kind of work.
- ☐ 4. High aptitude. Usually does his job without difficulty. Well suited to this kind of work.
- ☐ 5. Very high aptitude. Does his job with great ease. Unusually 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. A very limited variety. Cannot perform different operations adequately.
- ☐ 2. A small variety. Can perform few different operations efficiently.
- ☐ 3. A moderate variety. Can perform some different operations with reasonable efficiency.
- ☐ 4. A large variety. Can perform several different operations efficiently.
- ☐ 5. An unusually large variety. Can do very many 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. Very unresourceful. Almost never is able to figure out what to do. Needs help on even minor problems.

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

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

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

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

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

☐ 1. Never. Sticks strictly with the routine. Contributes nothing in the way of practical suggestions.

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

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

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

☐ 5. Very often. 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 satisfactory is his work? (Worker's "all-round" ability to do his job.)

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

☐ 2. Not completely satisfactory. Of limited value to the organization. Performance somewhat inferior.

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

☐ 4. Good. A valuable worker. Performance usually superior.

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

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FACT SHEET

Job Title: Printed-Napkin-Machine Operator (paper goods) 649.885

Job Summary: Cuts, folds and prints paper napkins by setting up, operating and adjusting napkin folding machine with printer attachments.

Work Performed: Prepares machine for operation by setting rolls of paper onto feeding mechanism using over head hoist to lift rolls into position. Inserts proper shaft thru core of paper roll and expands chuck of Air Shaft to hold roll in place. Turns hand wheels to advance rollers, threads free end of paper roll thru Decks, embossing rolls, and feed rollers using wrench to set lock nuts. Uses feeler gage and steel tape to insure roll is kept in line. Applies tension to paper being fed by adjusting weight controlling tension device. Makes ready rubber printing plates by cleaning and replacing in printer. Turns cylinder to tighten rollers. Fills ink troughs with ink as specified.

Starts machine and runs through several napkins to verify accuracy of machine set up. Observes operation of machine for proper cutting, folding and printing. Pulls lever to release brake to stop machine when rolls get small or out of round. Replaces rolls as necessary and resumes production. Takes off and wraps napkins while machine is operating by catching completed napkins as they are discharged or, depending on type of machine operated, directs activities of Wrappers.

Sets up cases for wrappers to pack napkins in for shipping using wire stitching machine. Makes out production record for machine operation and performs routine maintenance and housekeeping tasks.

(This sheet is printed in duplicate. One copy should remain as part of the Appendix in order to complete the technical report. The other copy can be removed by employment service personnel who wish to set up separate fact sheet files.)

GPO 910-494

S-73

June 1966

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DEPARTMENT OF LABOR
UNITED STATES OF AMERICA


PUBLIC EMPLOYMENT SERVICE
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