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ABSTRACT

The study was designed to determine the reliability and criterion validity of a psychomotor performance test (the Fine Finger Dexterity Work Task Unit) with 40 partially or totally blind adults. Reliability was established by using the test-retest method. A supervisory rating was developed and the reliability established by using the split-half method. The correlation between the supervisor's two separate scores based on their responses to odd and even items reveal a Pearson product-moment coefficient of .98. A factor analysis was computed to determine whether a general or distinct factor of performance existed. Two factors emerged: performance and compliance/conformity, of which performance was the stronger. A concurrent approach was used to establish the criterion validity of the Fine Finger Dexterity Work Task Unit. Statistical analysis revealed some degree of positive correlation between the predictor and criterion. It was concluded that the validity coefficient of .33 would be useful in selection when the selection ratio and base rate were favorable. (Author/CL)

# Predicting Job Performance for the Visually Impaired: Validity of the Fine Finger Dexterity Work Task

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Running Head: MANUAL DEXTERITY

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Abstract

The present study was designed to determine the reliability and criterion validity of a psychomotor performance test designed specifically for blind or visually impaired persons, the Fine Finger Dexterity Work Task Unit developed by the Rehabilitation Research and Training Center on Blindness and Low Vision in cooperation with National Industries for the Blind and Royal Maid Association for the Blind. Reliability was established by using the test-retest method, $r$ = .92. A supervisory rating was developed and the reliability established by using the split-half method. The correlation between the supervisor's two separate scores based on their responses to odd and even items revealed a Person product-moment coefficient of .98. A factor analysis was computed to determine whether a general or distinct factor of performance existed. Two factors emerged: performance and compliance/conformity, of which performance was the stronger. A concurrent approach was used to establish the criterion validity of the Fine Finger Dexterity Work Task Unit. Statistical analysis revealed some degree of positive correlation between the predictor and criterion, $r$ = .33, $p < .05$. It was concluded that the validity coefficient of .33 would be useful in selection when the selection ratio and base rate were favorable.

# Reliability and Criterion Validity of a Manual Dexterity Task for Predicting Job Performance of the Visually Impaired

In 1978 it was estimated from 1970 Census data that nearly 11.5 million people had some degree of visual impairment, and of these, nearly 500,000 were legally blind (National Society to Prevent Blindness, 1980). Furthermore, because this number grows each year, there is an increasing need for society to make adjustments in education, training, and employment opportunities.

Many blind and visually impaired persons are excluded from employment because of invalid assumptions regarding the necessity of sight for performance (Miles, 1984; Rusalem, 1972). For example, contrary to common beliefs, manual dexterity was proven more important than vision in operating sewing machines (Cascio, 1982).

If blind and visually impaired persons are to be appropriately assimilated into the work place, there is an urgent need for information regarding their employment-relevant abilities. These abilities, however, cannot be adequately assessed with paper and pencil instruments validated for the sighted. Instead, performance evaluation instruments validated with the blind and visually impaired would appear appropriate for the determination of these abilities.

Although some researchers have investigated the Purdue

Pegboard and the Minnesota Rate of Manipulation instruments as predictors of performance of the visually impaired (Bauman, 1958; Hoffman, 1958; Mosfield & Perry, 1950) little research has been conducted to examine work samples or psychomotor tests which have been designed especially for the prediction of performance of the visually impaired. If these work sample measures do have more content validity, (i.e., they more closely correspond to actually work situations), they should prove to have more criterion validity than measures like che Purdue Pegboard which are designed to predict psychomotor performance on jobs in general.

The present study was conducted for the purpose of providing information regarding one of these work sample devices that may be used to measure the psychomotor abilities of the blind and visually impaired. More specifically, this study evaluated the test-retest reliability and criterion validity of the Fine Finger Dexterity Work Task Unit which was designed specifically for blind and visually impaired persons.

## Method

### Subjects

The subjects were 40 partially or totally blind adults, 19 females and 21 males. The subjects were employed at Mississippi Industires for the Blind (MIB) (n = 7), Royal Maid Association for the Blind (n = 20), and in training at the Regional Rehabilitation Center (n = 2),

and the Addie McBryde Rehabilitation Center (n = 11). The subjects ranged in age from 18 to 62. Each subject was randomly selected from a group of volunteers from each location.

Stimulus Material and Apparatus

The material that was used in the study consisted of the Fine Finger Dexterity Work Task Unit (Bagley, 1984), and a supervisory rating form. In addition, other apparatus included a work pace reinforcer consisting of a variable timer, a momentary normally open switch, a time elapse meter, a tone generator or buzzer, and two electrical impulse counters. The Fine Finger Dexterity Work Task Unit examined in this study was developed by the Rehabilitation Research and Training Center on Blindness and Low Vision in cooperation with National Industries for the Blind. I is a psychomotor task which includes plastic bins for placement of assemblies and other items, machine screws, microswitches, mounting blocks, an electrical cord and plug, nails, and T-plates. A detailed description of the task and list of materials are available from the MSU Rehabilitation Research and Training Center.

Performance Appraisal Forms

Items for a supervisory rating form were developed through observation of jobs, interviews with supervisors, and an examination of the behavioral components revealed by a job analysis. The items dealt with production rates, quality control, safety procedures, handling of machinery, finger dexterity,

frustration, and manual dexterity. A 5-point scale was developed with a score of 1 being unsatisfactory and a score of 5 being excellent. There were 21 items in the supervisory rating form, which was completed by the immediate supervisor of the employee.

The reliability of the supervisory ratings was established by using the split-half method of reliability--computing two separate scores based on the supervisor's responses to odd items and even items (Allen & Yen, 1979). These scores were correlated using the Pearson product-moment correlation coefficient. A factor analysis was computed to see if there was a general factor of performance or a distinct factor of performance.

Procedure

Eight job analyses were conducted through observation and interviews of the employees at their jobs. Job titles included: Sealer, Hemmer, Mop Winder, Side Seamer, Carder, Flatware Packaging, Mop Packager, and Yarn Cutter.

After the jobs were analyzed, the process of testing the subjects took place. The Fine Finger Dexterity Work Task Unit was administered to present employees at Mississippi Industries for the Blind (MIB), Royal Maid Association for the Blind (Tupelo), and trainees at Regional Rehabilitation Center (Tupelo), and Addie McBryde Rehabilitation Center (Jackson).

The evaluators consisted of five graduate assistants, and the Training Director of the Rehabilitation Research and Training Center on Blindness

and Low Vision located at Mississippi State University. Each of the evaluators was experienced in administering tests.

Before the subjects were brought to the test area, the evaluator made sure that all boxes, pins, inserts, and T-plates were in their correct places. The total indicator and error indicator were cleared to zero, and then the work pace reinforcer was set on 17 seconds. The evaluator went to the supervisor of one of the departments and randomly selected one subject to be tested. When the subject was selected, the evaluator asked the supervisor for permission to release the worker from his or her work.

If subjects were willing to perform the test, the evaluator guided them individually to the test area. Of the 40 subjects asked to participate in the test, none refused. Upon arrival at the test area, the evaluator oriented each subject to the test area by guiding his/her hands over the test area and test equipment.

After the general orientation phase was completed, the appropriate instructions were read to the subject, according to the test manual; and the subject was given an opportunity to ask questions. If there were questions, the evaluator answered them, and then the trial period began. The evaluator recorded the score for the 10 minute trial period and any necessary observations. After the evaluator recorded the practice time,

the evaluator made sure the timer was set at 17 seconds and the total response and error counter were cleared to zero. Then the evaluator started the subject on the first 50 minute test. As the subject started the test, the evaluator started timing. After 50 minutes the test session was concluded. The evaluator then guided the subject back to his or her work station. A retest took place 15-30 days after the initial test. The retest was also 50 minutes in length.

After the subjects had been tested the second time, the immediate supervisor was given a supervisory rating form to complete. The supervisor was informed that the rating did not pertain to the employee's work but was used only for research. When all the testing and supervisor ratings were completed, the Fine Finger Dexterity Work Task Unit scores and supervisory rating scores were correlated to establish concurrent criterion validity.

## Results

Reliability of the Fine Finger Dexterity Work Task Unit was established employing the test-retest method. The test-retest scores were correlated using the Pearson product-moment correlation coefficient. The retest interval varied between 15 and 30 days. The resulting coefficient was .92, $n = 40$.

The reliability of the supervisory rating form was estimated by using the split-half method. The correlation between the supervisor's two separate scores based on their responses to

odd and even items showed a high positive correlation, $r$ = .98. A factor analysis was computed to determine whether there was a general or distinct factor of performance. Two factors emerged: performance and compliance/conformity of which performance accounted for most variance. A concurrent design was used to establish the criterion validity of the Fine Finger Dexterity Work Task Unit (Allen & Yen, 1979; Cascio, 1982). The correlation coefficient obtained was .33 which was significant at the .05 level.

## Discussion

The statistical results reveal that the Fine Finger Dexterity Work Task Unit was correlated with supervisory ratings, accounting for approximately 11% of the variance in those ratings. Although the validity coefficient obtained was statistically significant, its magnitude was not substantial enough to warrant its use as the exclusive predictor in a selection system. It could, however, prove of value if combined with other predictors, especially in situations where the selection ratio is favorable (Cascio, 1982).

It is recommended that further research investigate other potential predictors which, when combined with the Fine Finger Dexterity Work Task Unit, would more strongly relate to performance. Furthermore, it is recommended that more research be conducted to determine the criterion validity of the Fine

Finger Dexterity Work Task Unit using performance criteria such as production, accident, and grievance records. It is possible that using supervisory ratings as the criterion in this study could have resulted in an underestimation of its validity.

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