A COMPARISON OF WISC-R INTELLIGENCE SCORES WITH SCORES OF THE TALENT ASSESSMENT PROGRAM OF MOTOR SKILLS IN AN EDUCABLY MENTALLY HANDICAPPED AND LEARNING DISABLED POPULATION

A Thesis

by

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ABSTRACT

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The purpose of the present research is to determine what correlations exist between motor skills as measured by the Talent Assessment Program (TAP) and intelligence as measured by the WISC-R. The subjects were 49 seventh and eighth grade students, of whom 30 were Educably Mentally Handicapped (EMH) and 19 were Learning Disabled (LD). The subjects ranged in age from 14 to 16. Thirty-three of the subjects were male and 16 were female. Each subject's overall score on the TAP was correlated with his or her Performance, Verbal and Full Scale scores on the WISC-R. The correlations were calculated separately for the EMH and LD groups to determine if the correlations would be different for the lower IQ EMH group and the higher IQ LD group. While the correlation between the TAP scores and the WISC-R Performance scale scores was significantly different from zero for each group at the .05 level, there was not significant correlation between the TAP scores and the Verbal scale

scores for either group. The TAP scores were significantly correlated with the Full Scale scores for the LD but not the EMH population. It is concluded that the TAP is a moderately valid predictor of performance skills, as measured by WISC-R, although further research is needed to determine its validity in predicting actual job success. There does appear to be some evidence that the verbal abilities needed for academic success are not necessary for success at pure motor skills tasks. The findings suggest that the correlation between overall IQ and motor skills may be greater in higher IQ populations.

NOTE OF APPRECIATION

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A Comparison of WISC-R Intelligence Scores with Scores of the Talent Assessment Program of Motor Skills of an Educably Mentally Handicapped and Learning Disabled Population

Since the beginning of psychological testing there has been a continuing desire for a valid predictor of vocational ability and success. Many such tests have been devised over the years, although many have been of limited scope (Bird, 1974). These tests generally fall into four categories (Botterbusch, 1980). Psychological tests are generally used to determine the traits, abilities and characteristics of the individual as they relate to a work environment. An on the job evaluation consists of placing the subject in an actual work situation and directly assessing his/her skills. Sheltered employment allows assessment similar to that of on the job evaluation but takes place in a less structured, less competitive environment. A work sample evaluation attempts to simulate job tasks in a testing environment so that the subject's skills for executing the actual job task can be predicted from his/her performance on the work sample.

The earliest use of standardized tests in vocational assessment involved using intelligence tests to identify IQ levels for various professions (Super, 1964).

The use of intelligence tests to measure mental abilities soon led to the development of various tests

designed to measure motor skills (Super, 1962). Among the first motor skills tests were those developed by the Minnesota Mechanical Abilities Project (Patterson et al., 1930) and the Employment Stabilization Research Institute (Patterson & Darley, 1936). Among the tests spawned by these two research projects were the Minnesota Manual Dexterity Test, The Minnesota Mechanical Assembly Test, The Minnesota Clerical Test and the Minnesota Spatial Relations Test (Super, 1962). As the use of these tests became popular in the assessment of vocational abilities more and more tests were developed to test a broader range of abilities and the abilities necessary for newly developing occupations.

There has thus been a great proliferation of vocational tests over the past half century with literally hundreds available on today's market (Botterbusch, 1980).

A relative newcomer among the motor skills tests is the Talent Assessment Program (TAP) (Appendix), a work sample test, developed by W. E. Nighswonger (1979), a consultant for the International Association of Rehabilitation Facilities. The TAP evaluation consists of ten hands-on activities, directions for which are given orally. Each of the ten items is timed and a penalty is assessed for errors. By comparing the time plus penalty score with those received by the normative populations, the evaluator can calculate what Nighswonger

refers to as a "Talent Quotient" or TQ. Nighswonger (1979) states that the TQ "relates to the functional capacities applicable to THINGS and MATERIALS in the world of work" whereas the intelligence quotient measures "academic potential" and "relates primarily to capacity to apply logic in solving problems in the field of intangibles. It is the foundation of the professions." (page 6). The very strong implication throughout the test developer's writings is that the Talent Quotient and the Intelligence Quotient are measures of distinctly different abilities. One would therefore assume, based on this assertion, that there could be little correlation between the IQ and the TQ and little correlation between motor skills and intelligence.

Much of the past research, however, suggests that there is a correlation between intelligence and motor skills. Tobias and Gorelick (1960) administered a series of work sample tests which had been demonstrated to be valid predictors of job performance in a sheltered workshop to 75 of the workshop's clients. These test scores were then correlated with the WAIS Verbal IQ, Performance IQ and Full Scale IQ for each of the 75 subjects. While significant correlations were found between the work sample scores and each of the three WAIS scores, by far the highest correlation was with the Performance scale of the WAIS with a correlation

of .63. The WAIS Full Scale correlated at .43 and the Verbal scale at .27, still significant at the .05 level. Tobias and Gorelick concluded that similar factors were required for achievement on both the performance section of the WAIS and the valid work sample tests.

Wagner and Hawver (1965) correlated scores of 27 mentally handicapped workshop clients on the Stanford-Binet with five measures of motor ability. They found a significant correlation between IQ and motor ability as measured by each of the five tests. The S-B scores were then correlated with supervisor ratings of the workshop clients with a resultant correlation of .63. Wagner and Hawver suggested that a "general factor" may be measured by all the tests, resulting in the high correlations.

Elkin (1967) correlated scores on 15 common psychological tests with scores on work sample tests. The subjects were 58 mentally handicapped clients at the Saskatchewan Training School. Elkin found a significant correlation between almost all of the tests and the scores on the work samples. The correlation with the Stanford-Binet was .54 for females and .46 for males and the correlation with the Raven Progressive Matrices was .58 for females and .56 for males. Elkin concluded that "significantly high intercorrelations between intellectual, psychomotor and vocational measures indicated

considerable overlap betwen these predictive indices and success on the job." (page 579). He supported the conclusion of Wagner and Hawver that a general ability factor encompassing both intellectual and motor skills existed.

Webster (1974), in a study of psychotic patients, compared Performance and Full Scale scores on the WAIS with scores on a benchwork evaluation. The six subtests of the benchwork evaluation were: (1) key linking, (2) rachet dyes, (3) boat horn valves, (4) pen assembly, (5) three-way fixtures, and (6) semi-conductors. These tests were thought to measure: (1) visual-motor coordination, (2) analytic skill, (3) synthetic ability, (4) spatial perceptual accuracy, (5) anticipation and placement, (6) mechanical ability, and (7) visual perceptual organization. Scores on the benchwork evaluation were significantly correlated with both the Performance IQ and the Full Scale IQ. In a second experiment using many of the same variables but using a multiple regression correlation analysis, Webster (1979) found the the Performance IQ was the best single predictor of vocational success when compared to the patient's chronological age and the severity of his psychological or psychiatric disorder.

Other researchers, while not finding significant correlations between overall IQ and success on motor

skills jobs have found correlations between the Wechsler Performance Scale and success on such jobs. Fry (1956) using an efficiency quotient derived from Wechsler scales, found a high correlation between the Performance scale and supervisor work ratings. The efficiency quotient was used because, according to Fry,

> It became apparent on studying test scores that the advantage which Wechsler allows for increasing age was misleading in terms of practical performance. A forty year old with an IQ of 60 answered fewer questions and completed fewer tasks than a twenty year old with the same IQ. Since it is actual performance that counts in a practical work situation, it was necessary to derive an efficiency quotient for each girl by comparing her with the twenty-year-old group, which, according to Wechsler, represents the age at which mental power reaches its peak. (page 404).

The subjects in Fry's study were 38 mentally handicapped girls who worked at the laundry at the Manitoba School for Mentally Defective Persons over a two year period. The laundry foreman used a five point rating scale, developed by Fry, to rate the girls' work performance. While the correlation with the Verbal scale efficiency quotient was not significant, the Performance scale quotient was highly significant at .69.

Appell, Williams and Fishell (1962) compared a group of 12 mentally handicapped workshop clients who had been employed following training with a group of 25 clients who were unable to be placed in an employment situation. It was found that while the Verbal

and Full Scale IQ's were not significantly different for the two groups, the performance IQ of the employed group was significantly higher than that of the unemployed group. The researchers noted that although previous research, performed at the same workshop, had indicated that IQ was not a significant factor contributing to employment, none of the previous research had investigated differences on the various scales of the intelligence tests used.

Lowe (1967), using former institutionalized psychiatric patients as subjects studied the validity of the WAIS, the MMPI and the Rorschach in predicting vocational success. He found no significant difference between the employed group and the unemployed group on any of the tests with the lone exception of the WAIS block design subtest on which the unemployed group scored significantly higher than did the employed group. It must be noted, however, that the criterion for classification in the employed group consisted of only five consecutive days of employment over a 90 day period following release from the hospital.

Nighswonger (1979) asserts that his Talent Assessment Program measures different skills than those measured by common intelligence tests. However, much of the past research suggests that perhaps a "general factor" exists, which includes both intellectual and

psychomotor skills. Based on this research a significant correlation between the TQ and IQ would be predicted.

Statement of the Problem

The initial purpose of the present research is to determine what, if any, correlation exists between the IQ as measured by the WISC-R and the TQ as measured by the TAP in a group of mentally handicapped subjects.

Most of the past research correlating motor skills ability with IQ has been performed on EMH populations (Tobias & Gorelick, 1960; Wagner & Hawver, 1965; Elkin, 1967; and Appell, Williams and Fishell, 1962). Therefore, a second purpose of the present research is to determine what, if any, correlation exists between the IQ as measured by the WISC-R and the TQ as measured by the TAP in a higher IQ learning disabled population.

Two hypotheses are tested in this study:

Hypothesis I: a significant positive correlation will be found between the TQ on the TAP and scores on the Verbal, Performance and Full Scale on the WISC-R for the EMH population.

Hypothesis II: a significant positive correlation will be found between the TQ and scores on the Verbal, Performance and Full Scale on the WISC-R for the higher IQ LD population.

Method

Subjects

The subjects were 49 seventh and eighth grade public school students from a rural county in northwestern North Carolina. All had been placed in either an Educably Mentally Handicapped (EMH) class or a Learning Disabled (LD) class prior to testing on the TAP. The subjects constituted the entire population of seventh and eighth grade EMH and LD students in the county with the exception of three students on whom the Stanford-Binet had been used to determine IQ. With these exceptions the Wechsler Intelligence Scale for Children-Revised (WISC-R) had been administered to all of the subjects within three years prior to the TAP evaluation. Seventh and eighth grade students were used since the county's TAP assessment program was designed to evaluate handicapped students prior to their placement into vocational courses at the high school level. The subjects ranged in age from 14 to 16, 33 were male and 16 were female. There were 30 EMH subjects with an IQ range of 50 - 81 and a mean IQ of 66.1. The 19 LD subjects had an IQ range of 72 - 100 with a mean IQ of 86.2.

Apparatus

The WISC-R evaluations were administered under normal test conditions in office space provided within various school buildings. The TAP evaluations were administered in a specially equipped mobile unit designed to house the TAP Assessment materials. The unit was designed so that four students could be evaluated at one time with two evaluators present. Each subject worked within his or her own cubical and, although he or she could see the other subjects, the work of the other subjects on the test items could not be seen. The unit provided good lighting and sufficient space to perform the tasks comfortably.

Procedure

The WISC-R was given to each student by the county School Psychologist as a part of the proceedings for placement into the special education curriculum. The TAP was administered by the writer and a second evaluator over a 21-month period. For the TAP evaluations, the students were instructed on how the evaluation would be scored and it was explained that since both time and accuracy were considered in the scoring, they should strive for a balance between the two. The subjects were told that while the scores would not influence their other school activities at the time of the testing, the scores would be used later to aid in

determining vocational class placement at the high school level and therefore it was important to perform as well as possible on all parts of the evaluation so a clear picture of his or her abilities could be gained.

All of the instructions throughout the evaluation were given orally and as outlined in the TAP evaluator's manual. As dictated by the TAP manual, all four of the subjects being tested at the same sitting began the first test item together and item 10 was always given after the subject had completed all of the other test items. The other eight test items were given in random order and so that no two of the subjects were working on the same item at the same time. This was done in order to discourage any competition between subjects, encouraging the subjects to work at a pace suitable to their own skills. All questions asked by the subjects were answered provided the answer did not give advantage on the evaluation. All subjects were required to attempt all ten test items and to continue working on each item either until the task was completed or until sufficient time had elapsed to result in a score of zero. The entire evaluation took approximately three hours for each subject to complete and the subjects were allowed one break which could be taken at any point during the evaluation at which the subject had completed one test item but had not yet

begun another. The TQ was calculated as outlined in the TAP manual (See Appendix B).

Results

The findings of the present study suggest that while the Verbal scale of the WISC-R does not appear correlated to motor skills as measured by the TAP, the Performance scale is positively correlated to the TAP scores. The relationship between the TAP Talent Quotient and the Full Scale Wechsler score is somewhat less definite.

To determine the correlation between the TAP TQ and the WISC-R IQ a Pearson correlation coefficient was calculated between the TQ and the Wechsler Verbal, Performance and Full Scale scores for all 49 subjects. Correlation coefficients were calculated separately for the EMH and the LD groups to determine if any differences existed between the two populations. The correlation between the TQ and the Verbal scale IQ was not significant for either the EMH group ($r = .09$, $p > .05$) or for the LD group ($r = .11$, $p > .05$). However, the correlation between the TQ and the Performance scale of the WISC-R was significant for both the EMH ($r = .43$, $p < .05$) and the LD ($r = .49$, $p < .05$) groups. While the TQ was not correlated with the Full Scale IQ for the EMH group ($r = .30$, $p > .05$) the correlation was significant for the LD group ($r = .40$, $p < .05$).

See Appendix B for group means and standard deviations.

Discussion

The present findings clearly support the findings of past research (Fry, 1956; Tobias and Gorelick, 1960; Appell et al., 1962; Webster, 1974, 1979) in that a significant positive relationship was found between motor skills and scores on the Performance scale of the Wechsler. While the correlation is not high enough to suggest that the TAP and the Performance scale of the Wechsler are measuring precisely the same abilities, there appears to be some support for the suggestion of Wagner and Hawver (1965) and Elkin (1967) that a "general factor" exists resulting in the correlation. In addition, while further research is needed to better determine the validity of the TAP in predicting actual job success, the present results would tend to support the TAP's concurrent validity as a test of motor skill ability insofar as the Wechsler Performance scale has been found to be a valid predictor of motor skill ability.

The fact that no correlation was found between the verbal IQ and the Talent Quotient supports the findings of Fry (1956) and of Appell et al. (1962). The suggestion here is that the verbal ability necessary for success in academic undertakings is not connected closely with the motor skills needed in mechanical activities.

To this extent, Nighswonger's (1979) contention of a separation between the TQ as relating "to the functional capacities" and the IQ as relating to "academic potential" may indeed be supported. However, the dichotomy is incomplete in that it is true only of the verbal scale of intelligence and not of the performance scale or, in the case of the LD population in the current study, of the overall intelligence score.

There is also some question as to the role of verbal ability in an actual occupational setting. While a person may indeed possess the needed motor capacities to perform a certain work activity, it is questionable whether he/she could function satisfactorily in a competitive employment setting without at least some minimum verbal skills of the nature evaluated on the verbal scale of the Wechsler. This fact must be considered in determining the overall usefulness of the TAP in job success prediction.

Another consideration in the general applicability of the TAP is its somewhat limited scope. Botterbusch (1980), in a review of 14 currently available vocational evaluation, characterized the TAP as being an evaluation of perceptual and dexterity skills rather than an attempt to present a comprehensive picture of the examinee. The TAP appears aimed mainly at assembly, packaging sorting skills of the nature gener-

ally found in a factory setting. It provides very little information on the wider range of motor skills necessary for most non-factory or non-mechanical settings.

However, when used to assess this limited range of skills, the TAP offers some distinct advantages over most other evaluations in that it can be group administered and requires very little time expenditure. The TAP requires two and one half to three hours to complete whereas some of the more comprehensive test batteries require two to three weeks and require a great deal of individualized administration. In addition, the TAP requires very little training on the part of the evaluator. The training requires one and one half days and is carried out at the purchaser's site.

To overcome the problem of assessing verbal skills, the TAP could, as Nighswonger suggests be given in conjunction with group administered intelligence and/or achievement tests. Such tests, like the TAP, would necessitate little special training for the administrator. These factors could significantly reduce both cost and time considerations, as compared with the administration of a Full Scale Wechsler and more comprehensive motor skills tests, in situations

where in depth psychometric and comprehensive vocational information is not considered necessary.

Comparing the LD and EMH populations, the correlation between the WISC-R Performance scores and the TAP scores was significant for both populations while the correlation between the WISC-R Verbal scores and the TAP scores was not significant for either population. However, the WISC-R Full Scale scores of the LD population correlated significantly with the TAP scores while for the EMH population the correlation between the Full Scale WISC-R scores and the TAP scores failed to reach significance. This finding suggests that the correlation between motor skills and overall IQ may be greater in higher IQ populations. However, further research with higher IQ populations, including non-learning disabled populations, will be necessary before any firm conclusion can be drawn on this matter.

REFERENCES

References

Appell, M. J., Williams, C. M. & Fishell, K. M. Significant factors in placing mental retardates from a workshop situation. Personnel and Guidance Journal, 1962, 41, 260-265.

Bird, C. Limitations of testing in vocational evaluation. Vocational Evaluation and Work Adjustment Bulletin, 1974, 7, 41-44.

Botterbusch, K. F. Commercial vocational evaluation systems. Menomonie, Wisconsin; Materials Development Center, 1980.

Elkin, C. Predicting productivity of trainable retardates on experimental workshop tasks. American Journal of Mental Deficiency, 1967, 71, 576-580.

Fry, L. M. A predictive measure of work success for high grade mental defective. American Journal of Mental Deficiency, 1956, 61, 402-408.

Lowe, C. M. Prediction of posthospital work adjustment by the use of psychological tests. Journal of Counseling Psychology, 1967, 14, 248-252.

Nighswonger, W. E. A profile in career evaluation (Revised). Jacksonville, Florida: Talent Assessment Inc., 1979.

Patterson, D. G. et al. The Minnesota Mechanical Abilities Tests. Minneapolis: University of Minnesota Press, 1930.

Patterson, D. G. & Darley, J. G. Men, Women and Jobs. Minneapolis: University of Minnesota Press, 1936.

Super, D. Appraising vocational fitness New York: Harper & Brothers, 1962.

Super, D. E. A developmental approach to vocational guidance: Recent theory and results. Vocational Guidance Quarterly, 1964, 13, 1-10.

Tobias, J. & Gorelick, J. The utility of the Goodenough Scale in the appraisal of retarded adults. American Journal of Mental Deficiency,1960, 65, 64-68.

Wagner, E. E. and Hawver, D. A. Correlations between psychological tests and sheltered workshop performance for severely retarded adults. American Journal of Mental Deficiency, 1965, 69, 685-691.

Webster, R. E. Predictive applicability of the WAIS with psychiatric patients in a vocational rehabilitation setting. Journal of Community Psychology, 1974, 2, 141-144.

Webster, R. E. Utility of the WAIS in predicting vocational success of psychiatric patients. Journal of Clinical Psychology, 1979, 35, 111-116.

APPENDIX A

Means and Standard Deviations of WISC-R and TAP Scores for EMH and LD Populations

Means and Standard Deviations

of WISC-R and TAP Scores for

EMH and LD Populations

	EMH GROUP		LD GROUP	
	Mean	Standard Deviation	Mean	Standard Deviation
WISC-R				
VIQ	68.63	7.47	83.63	10.58
PIQ	72.57	8.45	91.53	9.20
FSIQ	68.43	7.42	86.21	7.57
TAP				
TQ	74.1	13.51	86.11	19.02

APPENDIX B

Description Of The Talent Assessment Program Tests of Motor Skills

Appendix B: Discription of the Talent Assessment Program Test of Motor Skills.

The Talent Assessment Program consists of ten different tasks designed to measure seven vocationally related skills. The measured skills, according to the test developers, are (1) visualizing three-dimensional assemblies; (2) visualizing material flow paths; (3) discrimination by color; (4) discrimination by touch; (5) dexterity with and (6) without tools; and (7) capacity for recall (p. 4).

On item number 1 the examinee is given a three-dimensional frame, a box containing the necessary parts and a screwdriver and is asked to build a frame identical to the assembled frame he has before him. Upon completion, the examiner notes any errors and points these out to the examinee. As on all ten items, the time taken to complete the task and the number of errors made are noted for the purpose of scoring. On the final item of the evaluation (#10), the examinee is asked to rebuild the frame without again viewing the already assembled frame used in item #1. Thus the examinee must be able to recall the structure of the frame totally from memory based on his building it at

the beginning of the evaluation. These two items are designed to measure structural and mechanical visualization, hand-eye coordination and, on item #10, recall ability. The manual relates these items to such vocational areas as drafting, carpentry, commercial art, decoration and steel construction.

Item #2 consists of 96 common screws of twelve different sizes and shapes with eight screws of each size and shape. The examinee is asked to sort the twelve types of screws into the twelve bins so that, upon completion, each of the twelve bins will contain eight screws that are identical to one another. This item is designed to evaluate the examinee's ability to discriminate objects by their size and shape. According to the manual, this item relates to such vocational fields as dentistry, drafting, hardware packaging, osteopathy and body and fender repair (p. 12).

Item #3 consists of approximately 288 marbles of six different colors (red, blue, yellow, orange, light green and dark green) and six bins. The examinee is asked to sort the marbles into the bins by color. The item is designed to evaluate the examinee's ability to discriminate by color and, according to the test developer, is related to the vocational areas of paint mixing, decorating, landscaping, art and body and fender repair (p. 13).

The fourth item consists of twelve plastic discs, covered on one side with sandpaper; a board with twelve slots in it and a blindfold. The sandpaper on each of the discs is of a different grit and therefore a different roughness. The discs are placed in front of the examinee with the sandpaper side up. With the blindfold on, the examinee is asked to place the discs in the slots on the board in descending order of roughness (roughest to smoothest). This item is designed to be a test of tactile discrimination. The TAP manual relates this test to fields including surgery, fruit and textile sorting, paper hanging, dentistry, osteopathy and auto body repair (p. 14).

TAP item #5 consists of 30 split bolts and a board with one large and three smaller bins. The examinee is asked to take each of the split bolts out of the large bins and disassemble them, sorting the three parts into the three smaller bins so that all the taps are placed together in one bin, all the inserts are placed together in the next bin and all the bolts are placed together in the third bin. Upon completion of the disassembly process the examinee is asked to reassemble the split bolts and place them back into the large bin. The timing is stopped after both the disassembly and the reassembly processes have been completed. On this item, as with items 6, 7, and 8, if any errors are

noted the errors are pointed out to the examinee and he is asked to correct the errors. Timing is continued and the extra time required to correct the errors acts as a penalty time. Item #5 is designed to evaluate the examinee's dexterity without tools on smaller items and is related in the manual to such vocational areas as factory assembly work, candy dipping, paste craft and electronics service (p. 15).

Item #6 consists of twelve conduit couplings with washers. The disassembled couplings are placed in front of the examinee in a specified order and the examinee is asked to assemble the couplings in a demonstrated fashion. Upon completion of the assembly phase, the examinee is asked to disassemble the couplings. As with item 5, timing stops after both processes have been completed. This item is designed to evaluate the examinee's dexterity without tools on larger items and is related in the manual to vocational areas such as mail and fruit sorting, hardware packaging and assembly, bookbinding and factory assembly work (p. 16).

Item #7 consists of a large metal plate with a series of holes in it; three small plates, also with holes in them; severel staples; some small screws; tweezers and a small screwdriver. Following a demonstration of the task, the examinee is asked to fill in

the double set of holes in the large plate by placing staples in them. This is done using the tweezers (the staples may not be touched by the hands). He then places a small plate over the top of the staples and, again using only the tweezers, places the screws through the holes in the small plate and into the corresponding holes in the larger plate. The screws can then be tightened using the screwdriver. This item is designed to test dexterity with small tools and the manual relates the test to such vocational areas as surgery, watchmaking, sewing, negative re-touching, electronics assembly and service, office machine repair, dentistry and optometry (p. 17).

TAP test item #8 consists of a metal base with a metal plate attached to the base by six bolts. The six bolts are of three different sizes with two of each size. On each bolt is a spring placed between the head of the bolt and the metal plate so that, as the bolt is tightened, the spring is compressed. A socket wrench with three different sizes of sockets is provided as is an adjustable wrench. The examinee is asked to remove the bolts, turn the metal plate to a specified position and then reattach the plate to the base by replacing the bolts. Due to the tension placed on the bolts by the springs it is necessary to use the wrenches for almost the entire process. This item is

intended to evaluate the examinee's dexterity with larger tools and the manual relates it to fields such as cabinet making, automotive mechanics, welding, appliance service, aircraft mechanics, office machine repair and body and fender repair (p. 18).

Item #9 consists of ten electrical diagrams, each depicting a series circuit with one or more branches and three or more light bulbs. The examinee is asked to determine which light bulb in each diagram will produce the most light (receive the most electricity). This item is designed to test the ability to follow a flow-path and is related, according to the manual, to such areas as fuel injection, plumbing, electronics, drafting, blueprint reading and traffic controls (p. 19).

As described above, item #10 consists of reassembling the three-dimensional frame assembled in item #1 without the use of the model used in #1. Item #1 is always given first and item #10 last so that all the other eight items occur in the interim between the seeing of the model and the recall.

To determine the score on each item, the time taken to complete the item and a penalty for errors made are added together. This raw score is then compared to the scores of the normative group to achieve a percentile ranking. The normative groups are broken

down into a junior high group, a senior high group and a post high school group. The junior high norms were used for the present study since the subjects were seventh and eighth graders. The percentile score on each subtest is then weighted and the total of the weighted percentiles is used to determine the overall "Talent Quotient".

VITA

James Davis Sullivan was born in New Orleans, Louisiana on October 25, 1954. He was graduated from Dulaney High School in Lutherville, Maryland in June 1972. The following fall he entered Georgetown College in Georgetown, Kentucky. In 1974 he transferred to Wake Forest University in Winston-Salem, North Carolina where he received a Bachelor of arts degree in Psychology in May of 1976. In the fall of that year he began working toward a Master's degree in Clinical Psychology at Appalachian State University.

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