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Relationships Among Measures of Language and Work Performance of Adult Retardates

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RELATIONSHIPS AMONG MEASURES OF LANGUAGE

AND WORK PERFORMANCE OF ADULT RETARDATEES

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BY

DEBRA PREISSER

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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CHAPTER I

INTRODUCTION

The Problem

As a result of the President's Panel on Mental Retardation in 1962, recommendations were made that would make the diagnosis and interpretation of mental retardation to parents the responsibility of community-centered clinics. Thus, the trend of mental health departments of transferring clients from state facilities to community agencies has resulted in a number of community institutions designed to rehabilitate the mentally handicapped person. Many new facilities have been created in Illinois within the last ten years; many of these facilities include workshops that simulate a working environment for the handicapped adult and offer employment, work adjustment training and counseling. To encourage compliance with federal operational standards for sheltered workshops, federal and state grants were made available to those workshops who met the established government standards. All sheltered workshops eligible for federal and state grants in aid were then able to provide such special services as physical therapy, occupational therapy, psychological services and speech therapy. As a result of these grants, many speech pathologists are now

being offered employment in sheltered workshops.

Rehabilitating the mentally handicapped adult is a relatively new assignment for speech pathologists. Typical employment for speech pathologists has included the public school environment, university clinics, and medical hospitals. Although these settings provided clinicians with a multitude of cases, including language delayed children, children with articulation disorders, people exhibiting voice or fluency problems, and organic problems that might include aphasia and cerebral palsy, these settings did not expose clinicians to the mental retardate. However, in recent years clinicians have begun to work with the mentally retarded child in the schools. Because of the increasing numbers of public school educational programs for the mentally retarded child, many public school speech clinicians are now finding that a small percentage of their time is devoted to the exceptional child. An informal area survey conducted by Preisser (1973) indicated that approximately 22% of the area speech clinicians' time was devoted to the exceptional child. In addition to the public school, a small proportion of speech pathologists have been employed in state facilities in recent years; these clinicians have had the opportunity to work with both the mentally handicapped child and adult.

Most of the above-mentioned programs have been initiated within the last ten to fifteen years; prior to that time it was unusual to find the retardate on the speech

clinicians' caseload. Indeed, until recent years, speech clinicians felt that the normal population could benefit more from speech therapy services and should, therefore, be given first priority when services were administered. It is interesting to compare the statements concerning therapy for the retarded in the first and second editions of the Handbook of Speech Pathology, edited by Travis. Jack Matthews stated in the first edition, "...although speech pathology as a profession may not have actively discouraged speech therapy for the mentally retarded, certainly there has been little encouragement given by the profession to devote attention to communication disorders associated with mental retardation." (1957, p. 532). Matthews concludes by saying that there is little research data to guide us in the acceptance or rejection of the advisability of attempting speech therapy with the severely retarded; however, "...it would be well to remember that in high grade defectives adequate speech may make the difference between self-sufficiency and dependency-between a lifetime in an institution at taxpayer's expense and vocational adjustment in society." (p. 546). In the most recent edition of the Handbook, Matthews himself compares the attitudes of the late fifties with those of the early seventies concerning therapy with the retarded; he says, "...one of the most significant developments we can report in this 1971 revision is the great increase in the in-

terest of communicologists in the field of mental retardation." (1971, p. 802).

Even for those speech clinicians who worked with the retarded child in public schools or the retarded child and adult in institutions, the therapy programs of these clients may be different from those of the sheltered workshop employee. In the public schools, the goals are more educationally oriented; in the state facilities, where the more severely retarded are presented to clinicians, the goal may be simply to establish some type of communication system. The goal of the sheltered workshop is easily stated, that is, to rehabilitate the client so that he may be a successful participant in the community; successful community participation would include both local activities and active employment. The speech clinicians have the responsibility of improving a client's communications skills so that he may function adequately in the community and on the job. The goal of community adjustment is similar to the goals of any type of client with a communication handicap; however, most speech clinicians have not had to deal with work performance when programming for therapy. All speech pathologists must establish priorities for determining caseload; however, clinicians in sheltered workshops face some peculiar problems. Sometimes clinicians must deal with a client who is functioning adequately for his intellect and still seems to exhibit

some remediable deficit in speech and language. Or, on the other hand, a client may present a complex picture of deficits, and clinicians must then decide which deficit or deficits are most closely related to, and would facilitate, community adjustment and employment.

Speech clinicians do have some strategies for dealing with the priorities of caseload and decisions for appropriate therapy plans for the adult retardate. The decision for the plan of remediation should be based on a careful study of the individual's needs and on the careful study of the relationship of these needs to his work performance and adjustment. Brown and Pearce (1970) suggest that training institutions can do several things to facilitate future vocational adjustment. They feel that if we "...view students as individuals, it is only logical that we attempt to generate a training environment that fosters individual development." (p. 22). The training institutions need, first, a way of measuring some components of individual development, and secondly, a variety of procedures that might contribute to individual improvement. The teachers need to manipulate performance variables but the performance variables must first be identified through testing.

Speech pathologists have at their disposal a multitude of speech and language measures to assess the adult retardate's components of individual development and to determine his needs. Clinicians can measure the morphological, the

phonological, the syntactical, the auditory and the visual skills of his clients; the results of careful testing will, of course, indicate directions for therapy programming.

Clinicians typically rely on the literature when developing therapy programs for special populations. Although, as Yoder and Miller stated in 1972, "The structure of the retardate's language, phonology, morphology, and syntax has received only minimal attention, and the majority of the research is in the area of phonology." (p. 4), there is considerable information concerning the retardate in the literature. The Johns Hopkins Bibliography entitled Speech and Language in the Mentally Retarded (1973) contains 360 entries; however, only one of these entries deals with the retarded adult.

Speech pathologists also have access to the suggestions found in the literature concerning remediation strategies with the retarded child. These studies (Miller and Yoder, 1972; Fulton, 1967; Lynch and Bricker, 1972; Stremmel, 1972; and Spradlin, to be published) have all suggested various frameworks for designing therapy for the mentally handicapped child. In addition, other studies (Delp and Smeets, 1972; Spradlin and McLean, 1967; and Schiefelbusch and Bair, 1960) have described aspects of the retardate's speech and have suggested remediation procedures for the deficits. All of the above-mentioned studies have been concerned with the retarded child; there is obviously a paucity in the litera-

ture concerning remediation programs for the adult retardate.

In addition to language performance scores and suggestions for therapeutic programs for retarded children, speech clinicians also have a number of comparative studies that are relayed in the literature. Most comparative studies compare scores of the school-age child and compare speech and language scores to such academic abilities as reading, mathematics, or spelling. Finkenbinder (1973) studied the correlation between an auditory discrimination test and reading ability and found that the Goldman-Fristoe-Woodcock Test of Auditory Discrimination was a poor test to correlate with mental age, chronological age, or selected reading variables; the correlation coefficients for this study were, respectively, .41, .42, and .41 (p. 127). A language test that has been used extensively in comparative studies of both normals and retardates is the Illinois Test of Psycholinguistic Abilities. Some authors, Kass, Macione, Ragland, and McLeod (Kirk and Kirk, 1972) have correlated the ITPA with various reading disabilities. Tests that have also been used in comparative studies include articulation tests and measures of vocabulary. Although these correlations are useful for certain clinicians, the comparison of the results of language tests with school performance or reading ability is not a relevant correlation for the clinicians working with the adult mental retardate; many of the sheltered workshop em-

ployees, at present, are products of institutions that provided minimal academic training or are products of home environments with little academic stimulation. The comparison to academic abilities of the retardate's language scores would, in most instances, be unfair.

Although clinicians have begun working with the mentally handicapped adult and have some strategies for meeting his needs in therapy programs, there is little evidence in the literature of attempts to evaluate the effectiveness of these therapeutic programs. Guion (1974) states the importance of evaluation, "Few programs are as important than program evaluation to those who institute formal programs or speak of their 'interventions.' If one is going to intervene, his obligation is to find out whether that intervention will help or hinder the organizational enterprise [community and vocational adjustment of the adult retardate]" (p. 296). Although clinicians have assumed that remediation of speech, language, and hearing deficits would facilitate interpersonal relationships and community adjustment in any client, this hypothesis is difficult to test with the adult retardate because the variables influencing successful community adjustment have not been adequately defined. Because community adjustment is difficult to measure, clinicians might do well to observe some aspects of vocational adjustment and determine the relationship between speech and language abilities and work adjustment. While work adjustment is also influenced by a number of variables, work performance can be measured objectively. It

would seem relevant to find the relationship between defined traits of speech and language abilities and defined traits of work performance.

It is difficult to state what traits are most important or most closely related to work performance. One study (Niziol and DeBlassie, 1972) indicated that various personality weaknesses and poor interpersonal relationships were the two main factors causing poor work performance and failure in work adjustment. Another approach has been to identify certain traits and then to determine their relationship to various occupations. One can study a feature such as color discrimination, for example, as D.G. Barker (1971) did, and find that "...even though good color discrimination is required in only a relatively small proportion of occupations, it can be critical where it is required." (p. 27). Barker used the trait descriptions of the United States Department of Labor; although the occupations handbook describes various skills necessary for over 4000 job tasks, it does not describe various speech and language skills that are necessary in various occupation. The Dictionary of Occupational Titles (United States Department of Labor, 1965) includes such traits as lifting, carrying, and other physical tasks, vision, including acuity, depth perception and field of vision. The authors do mention the "Verbal Aptitude" and define it as "...the ability to understand meanings of words and ideas associated with them, and to use them effectively. To com-

prehend language, to understand relationships between words, and to understand meanings of whole sentences and paragraphs. To present information or ideas quickly." (p. 653). There has been no attempt to measure this "verbal aptitude" that seems to be necessary in various occupations.

It has been demonstrated that, although the speech clinicians do have certain strategies for designing therapy for the adult retardate, there has been inadequate investigation of the relationship of speech and language abilities to vocational performance. Perhaps a relevant correlation for the sheltered workshop client would be the relationship of work performance with the performance on various speech and language measures.

There are suggestions in the literature for the correlation of language tests and work performance in order to plan more effective therapies. Some special educators feel there has been too much emphasis on the measurement of abilities or disabilities and not enough emphasis on performance. Lester Mann (1971, p. 13) states,

It is time to settle down to systematic, long-term efforts to improve education of the handicapped and learning disabled child on the basis of appropriately determined goals. We will do this most effectively if we concern ourselves with products (achievements) rather than processes (abilities).

Speech pathologists, or any evaluators, must of course concern themselves with processes to a certain extent, but it is apparent that it would be relevant to determine the re-

lationship between the products and processes.

It should be stated that determining relationships between work performance and language abilities would be most valuable to speech pathologists and would not be considered the best means of predicting work performance. Indeed, Guion (1974) points out that indirect sampling of work performance will result in less reliable predictions of performance. He states, "The farther one goes in assessment from direct sampling, the greater the inferential leap necessary to relate test content to job content." (p. 291). However, determining relationships between work performance and language abilities is important to the clinicians in developing effective speech and language remediation programs for the adult mental retardate.

Statement of Purpose

This investigation attempts to add information concerning specific speech and language abilities (as measured and defined by certain tests) and their relationship to the work performance of the adult mental retardate. The purpose of this study is to determine the relationship between the scores of mentally retarded adults on various speech and language tests (the Illinois Test of Psycholinguistic Abilities, the Length-Complexity Index, the Goldman-Fristoe-Woodcock Test of Auditory Discrimination, the Templin-Dar-

ley Tests of Articulation, a vocabulary test, a visual tracking test, and a syllable sequencing test) and quantitative and qualitative measurements of work performance on certain job tasks (whole stock, filament repair, crack-outs, and Celotex labeling) in a sheltered workshop environment.

The following questions were posed at the outset of this study:

1. Is there a statistically significant relationship between the adult retardates' scores on a typical battery of speech and language tests and his work performance on a representative sample of work tasks?
2. Is there a statistically significant relationship between the scores of various speech and language tests that are typically used by speech clinicians in evaluating the speech and language of the adult mental retardate?
3. Is there a statistically significant relationship between the performance scores of four similar but not identical job tasks of the adult mental retardate?

Speech pathologists in a sheltered workshop will, of course, be responsible for evaluating the speech and language skills of the adult retardate. A typical battery of tests for any client would include some measure of articulation, auditory discrimination, expressive language and receptive language. When working with special populations such as the retarded or learning disabled, speech clinicians are likely to include measures of psycholinguistic abilities, syllable sequencing abilities, and visual tracking skills. After the evaluation, speech pathologists are called upon to

make a statement concerning the probable effects of the client's speech and language abilities on his work performance. As was mentioned above, there are many sources in the literature that predict the probable effects of certain language abilities on such skills as reading and spelling, but there are no sources that predict the effects of language abilities on the work performance of the adult mental retardate. Not only are there no sources noting the effects of language abilities on work performance of the adult retardate, but there is also a paucity of research regarding the residual effects of perceptual problems and language disabilities in the adolescent. Lyness (1973) states, "While the older child may have overcome his inability to organize and blend sounds visually and auditorily for word-attack skills, in junior and senior high he may still be unable to sequence whole units of thoughts for a report." (p. 349)

If certain language abilities, as measured by the above-mentioned tests, correlate highly with the adult retardate's work performance, then it would be beneficial for speech pathologists to be aware of the relationship when planning both the evaluation and therapy for the client. Because the clinician's evaluation is sometimes influenced by temporal limitations, it would be helpful to know which tests are correlated more highly with work performance, especially in those clients who present no obvious disability or in those clients who present a multitude of disabilities.

Just as determining the relationship between the language abilities and work performance would conserve time and provide for more efficient programming, determining the relationship between the tests themselves would also be beneficial. If two tests reveal equally significant correlations, then for the purposes of predicting work performance, only one test would be necessary. For example, if the scores of a certain auditory discrimination test and a measure of sentence length and complexity exhibit equally high correlations with work performance, then it would seem a duplication to administer both tests, provided, of course, that the clinician did not feel it imperative to administer the other test for some other purpose.

Determining the relationship between the various job tasks would not be as important to speech pathologists as it would be to vocational evaluators. It would conserve evaluation time if evaluators knew that two tasks were equally as difficult. For example, if both tasks of crack-outs and whole stock proved to be equal in difficulty, then a client's performance on one task would probably equal his performance on the other task. Evaluators could then limit the number of job tasks necessary for a reliable and predictive evaluation.

It should be stated that the present investigation is a non-parametric study; therefore, any statistically significant correlations (for the purposes of this study, a cor-

relation co-efficient of .95 or higher is considered significant) actually indicates areas for further study. Because work performance involves a series of visual and motor sequencing tasks, it seems relevant to assume that abilities such as rhythmic and syllable sequencing, visual tracking skills and psycholinguistic abilities would be more closely related to work performance than such abilities as articulation proficiency, vocabulary, and auditory discrimination. It is possible that there will be no significant relationships between the selected language abilities and performance on selected job tasks; this would indicate that work performance and speech and language abilities are independent variables. If there are no significant relationships, speech pathologists must continue to program for therapy on the basis of individual deficits, the severity of those deficits, and the possible causes of the deficits. Speech pathologists would still be charged with the responsibility of improving the speech and language of the adult mental retardate; improved speech and language skills would allow the adult retardate to communicate more effectively with his fellow man.

CHAPTER II

REVIEW OF THE LITERATURE

Sheltered Workshops

Since this investigation deals with a special population in a relatively new environment, i.e., the adult retardate in a sheltered workshop, information concerning the rationale and development of the sheltered workshop would seem beneficial to the reader.

Before the initiation of sheltered workshops, the majority of adult retardates could be found in one of three situations. For years, many "odd" adults were kept quietly in their homes by well-meaning parents; not only did this situation create a burden for the family, but the community also suffered because these "handicapped" families tended to withdraw from society and did not contribute to community activities and growth. In some communities concerned and progressive citizens or friends of the handicapped family would provide menial employment for the retardate. Although these jobs were not competitive, the retardate did receive wages, and he could feel that he was a contributing member of society. The majority of adult retardates, however, were placed in state institutions where

they received custodial care. Because the residents of the state institutions provided an extremely economical labor force, the institutionalized adult retardate was encouraged to perform a variety of jobs and was found to be successful. The fact that it was quite expensive to maintain custodial care plus the fact that the retardate proved successful on a number of jobs caused the United States government to seriously review the capabilities of the adult retardate.

In 1944 then, the United States Department of Labor issued a pamphlet encouraging the development of shops where the retardate could be trained under special supervision. This pamphlet was issued during the war years, and the government was seeking economical ways to increase the labor supply. A number of these shops began to appear across the country, especially in the larger cities. By 1957 enough sheltered workshops existed in the larger cities to warrant an institution that was held to provide an opportunity for cross-fertilization of ideas among workshop people. Goodwill Industries, Inc. had become nationally known for its efforts to employ the handicapped and in 1961 Goodwill issued a set of standards for its own workshops. The United States government soon developed a set of standards of its own, as was mentioned above, and in 1967 the National Policy and Performance Council developed standards for use in federal grant programs for sheltered workshops. To insure that these standards were used as goals, grants to improve

the physical resources, staff, technical assistance and equipment of existing sheltered workshops were established. (Massie, 1968).

Clevenger (1972) succinctly stated the reason for the creation of sheltered workshops. "The realization that these people (educable and trainable retarded) can perform useful work under structured conditions has led to the development of sheltered workshops and adult activity centers designed specifically for them and the restructuring of their educational programming to focus on vocational rehabilitation." (p. 1).

The creation and success of sheltered workshops has caused considerable criticism of traditional educational programs for the retarded because little emphasis has been placed on vocational training in the educational settings. In an article written in 1970 by Gregory Miller it was mentioned that two million of the nation's five and one-half million retardates were of employable age; Miller felt that educators had failed to see the need for a practical, vocational orientation in education for the retardate. Perez-Ramos also felt that it was necessary to include vocational formation in total education (1968). D'Alton (1970) was frank in his opinion of the importance of work in rehabilitation of the adult retardate; he felt that because society viewed the mentally retarded with alarm, the only way to rehabilitate the client was within the production form.

On the other hand, while recognizing the importance of vocational training, Buckrell (1970) felt that the scope and intensity of sheltered workshop programming should be broadened to enable young trainees to use previous school learning and develop mature and acceptable behaviors. It would seem that a satisfactory curriculum for the adult retardate has not yet been determined.

Malin (1971) feels that even though the number of sheltered workshops has recently been greatly increased, they are still at a relatively early stage of conceptual development. Sheltered workshops have contributed much to successful rehabilitation of the retardate, and their proven benefits to the individual and to society alike warrant careful evaluation and program expansion.

Prediction of Vocational Adjustment

As was stated above, the ultimate goal of any sheltered workshop employee is community and vocational adjustment. Many studies have attempted to determine the relevant variables of successful work adjustment. These investigations have measured the performance of the retardate on a number of tests and on a variety of skills as well as studied various biographical and personality attributes of successful and unsuccessful clients.

Although Johnson (1972) compared the predictability of theoretical knowledge of a psychomotor skill to the actual

performance of that skill and found that theoretical tests of a psychomotor skill are not good indicators of the ability to perform that skill, several investigators have attempted to predict vocational rehabilitation success from a number of psychometric attributes and work behaviors. M.S. Tseng (1972) attempted to predict rehabilitation drop-outs from a variety of measures. In his investigation, Tseng used forty-two clients in a vocational training institution and attempted to determine the relationship of numerous variables; product-moment correlations were used to determine the relationships. The measures that he used for his investigation included four scholastic aptitude scores, two brain-damage measures, three achievement scores and nineteen occupational interest measures. The work behaviors included attitude, cooperation, ability to work with others, reliability, initiative, motivation, punctuality, appearance, courtesy, self-reliance and work tolerance. All of the work behaviors were measured through the use of an Instructor Rating Scale.

Tseng found that all eleven of the Instructor Ratings and seven of the nineteen occupational interest measures were significant correlates of criterion (according to author's test of significance). Except for the Wechsler Adult Intelligence Scale verbal intelligence quotient none of the scholastic aptitude, brain-damage or achievement measures were significantly related to training outcomes. Following is a list of the highest correlations Tseng found; one should

note that even with the highest correlation co-efficient (.57) 68% of the variance remains unaccounted for:

Instructor Rating, motivation	(r=.57)
Instructor Rating, courtesy	(r=.48)
Instructor Rating, attitude	(r=.40)
Instructor Rating, reliability	(r=.40)
Instructor Rating, initiative	(r=.40)
Picture Interest Inventory, verbal	(r=.38)
<u>WAIS</u> , verbal quotient	(r=.20)

Tseng stated that the "...implications of these findings is that in trying to predict vocational rehabilitation outcomes one should look into client's personal qualities and interests rather than into the inborn nature of his abilities or the level of his cognitive skills." (p. 156).

Sali and Amir (1971) indicated similar findings when they studied personal factors influencing the retarded person's success at work. In this investigation 305 retardates between the ages of sixteen and forty-three were observed. Work success (performance, output and complexity of job activity) was compared with data obtained on specific abilities, personality characteristics, physical defects and outward appearance. They found that performance and output variables appeared to be more influenced by personality characteristics than intelligence or specific abilities (motor co-ordination, color and shape discrimination). Among specific abilities, motor co-ordination was most related to work success, and among personality characteristics, perseverance was most highly related to work success. The personality characteristics that were associated with good social adjust-

ment appeared to be those required for work success.

Other investigators besides Tseng, Sali and Amir have used intelligence scores to measure the abilities of the retardate. In France, Husson (1973) tested the hypothesis of similarity and independence between vocational and intelligence test results for retarded versus normals using the WAIS and other selected vocational batteries. He found that retardates scored significantly lower on the vocational battery; he concluded that the independence between intelligence and vocational aptitude was strongest when the level of intelligence was high. In other words, intelligence appears to be more closely related to aptitude in retardates than in normals.

Using adult retardates, Kaufman (1970) attempted to determine diagnostic indices of employment with the mentally retarded. Kaufman used seventy-one retardates between the ages of seventeen and twenty-one years who had full-scale WAIS intelligence quotients between forty-two and eighty-four. He compared the WAIS performance with the reading and arithmetic portions of the Wide Range Achievement Test. He found that the WAIS comprehension score was the variable discriminating best between the employed and unemployed retardate. Kaufman felt that if the comprehension subtest is (as Wechsler says) a common sense judgmental measure, then didactic programs are needed to prepare retardates for successful employment.

Although comparing the relationship between mental age, level of language functioning and social acceptance (rather than work performance) of the trainable mentally retarded, King (1971) did find that language functioning was important to the retardate. King used eighty TMH students in her investigation. She compared performance on the Leiter International Performance Scale, Arizona Articulation Proficiency Scale, the Illinois Test of Psycholinguistic Abilities, receptive and expressive Peabody Picture Vocabulary Test scores with judged functioning level and social acceptability of her subjects. Using a one-way analysis of variance, King found that language accounted for 23% of the variance in social acceptability and 46% of the variance in judged functioning level. King assumed that the 35% of variance that was unaccounted for in social acceptability ratings was due to the appearance of the retarded.

Realizing that motor performance is important in work performance, Stewart (1972) compared the relationship of selected abilities to gross motor performance in educable retarded students. He used seventy-four male and female EMR students between the ages of seven and twelve years. Using a multiple linear regression, he compared the subtests of the Frostig Developmental Tests of Visual Perception, the Wechsler Intelligence Scale for Children, the Wepman Auditory Discrimination Test, with a six-category gross-motor per-

formance test (including body perception, gross agility, balance, locomotor agility, ball throwing and ball tracking). Although no statistics were cited in the abstract, Stewart concluded that eye-motor coordination and spatial relationships (from the Frostig tests), auditory discrimination and sex were better predictors of gross motor performance of EMRs than the other abilities that were observed. Stewart also found that EMR children without auditory discrimination problems tended to score higher on all measures than those with discrimination problems.

Eskelund (1972) investigated the predictive validity of a battery of typical work samples. Work samples have traditionally been used to predict the vocational performance of the retardate. His results suggest there is no basis to justify the use of work samples in their present form as valid predictors of employability. If work samples are not predictive, the obvious measure would be actual work performance. Nicklesburg (1970) evaluated time sampling as a technique for determining behavioral characteristics which could differentiate between succeeding and non-succeeding retardates on the job. His conclusions were that time sampling can indeed identify work characteristics which differentiate between succeeding and non-succeeding retarded trainees; repeated observations tend to be reliable. Succeeding subjects were not habitually sitting or standing idle, not wandering about or being gone from the

work station and were working independently.

A few investigators have attempted to predict rehabilitation outcome on the basis of biographic data and program services. In 1973 Bowman and Micek compared rehabilitation outcome and rehabilitation service components. They stated that "Much effort in rehabilitation research has been expanded to predict successful rehabilitation outcome by investigating the influences of client demographic data and psychological test scores." (p. 100) Possibly related to successful outcome are the client's age, home ownership, source of support, referral source, education, type of disability, social factors, health factors, training factors and intelligence test scores. By comparing these factors the results could be systematically applied to screen and select applicants for vocational rehabilitation services. By using such an approach it is quite probable that the rate of successful rehabilitation closures could be increased by statistically selecting those applicants who offer the best potential for success. The purpose of Bowman and Micek's investigation was to determine which rehabilitation service delivery components contribute to successful rehabilitation outcome. A 10% random sample was selected from all file closures of the state Division of Vocational Rehabilitation files during a six-month period; 114 of 3200 files were selected. Both a stepwise multiple regression and multiple linear regression were used to determine relationships. Although no statistics

were cited, the best predictor variables were the following: training, weekly earnings, completion of vocational plan, average professional contacts per referral plan, urban residence, physical restoration, number of closures of institutions and average caseload size of counselors in the institutions. Four of these variables, training, weekly earnings, completion of vocational plan and average professional contacts per referral made significant individual contributions.

Betz (1972) also studied the predictive potency of several variables for employment of the handicapped. He studied age, sex, highest grade completed, marital status, number of dependents, years of prior work experiences, rural-urban residence, income from welfare, referral source, physical handicap, secondary disability, WAIS full-scale quotient, WAIS performance quotient, WAIS verbal quotient, number of weeks on pre-vocational training program and number of job stations and mean supervisor ratings. Although details of the study were not cited Betz concluded that the variables he studied were not related in a predictive manner to outcome.

Perlman and Hylbert (1969) also attempted to identify potential drop-outs at a rehabilitation center. They stated, "Although many articles in the literature are concerned with the prediction of drop-outs from schools and colleges, similar studies regarding the prediction of success or failure for handicapped clients in vocational training are generally

lacking. The past decade has seen a limited number of publications that focused on the prediction of rehabilitation success." (p. 217) Perlman and Hylbert randomly selected 285 cases in a vocational training center. Predictors that were studied included the following: age, type of disability, origin of disability, distance from client's home to the center, pre-selected training goal at entry to center, age at onset of disability, age at entry to center, rehabilitation lag, years of work experience prior to entry to center and years of formal education. Perlman and Hylbert found that a combination of five variables (sex, training goal at entry to center, age at onset of disability, age at entry to center and years of work experience) were the most predictive. Both authors indicated that there was a definite need for cross-validation of this study.

Novis, Marra and Zadrozny (1960) developed a quantitative method for identifying rehabilitation potential of clients. They found that medical history, age, occupational level and education, when appropriately weighted, had considerable utility when used in a population of social security disability applicants.

To facilitate success of the retarded, several authors have made suggestions for program development. Fleer (1972) studied the speed of performing a simple ballistic movement under two conditions of response-initiation, stimulus-cued and self-cued of twenty-four educable retardates. The find-

ing that self-initiated movement was slower than reaction-signal initiated movements supports the hypothesis that retardates suffer a deficiency in the capacity for self-arousal. This suggests that for maximum performance the retardate needs frequent reinforcement. Lustig (1970) felt that planned manipulation of the components of a work situation in a sheltered workshop would improve job adjustment of the retardate. He suggested that situations be manipulated through various organizational factors which include time (increasing or decreasing the amount devoted to an activity), position (modifying the worker's location to work components), rate (varying the speed requirements of a job from fast to slow), type of interpersonal work relationship (democratic or autocratic) and quantity (the number and kind of stimuli to which the worker relates).

Other methods that have been suggested to facilitate work performance include self-visualization of work through the video-recorder (DeRoo and Haralson, 1971), variation of work and rest schedules (Bishop and Hill, 1971), and attachment of transducers directly to the tools to record retardate work behavior and to provide immediate reinforcement (Schroeder, 1972).

It should be stated that by 1971 the number of successful retardate rehabilitations had increased from 2,000 to 19,000 (Journal of Rehabilitation in Asia, 1971). Em-

employers have given retardates high marks for safety, attendance and the ability to accept repetitive work. In addition, employers have stated their expectations of the retardate as follows: diligence, punctuality, regular attendance, ability to assimilate training on one or more operations or sets of duties and the ability to perform duties safely (Rosenthal, 1969).

In summary, then, because of the increasing numbers of successfully rehabilitated adult retardates several investigators have attempted to determine the reliable predictors of vocational adjustment of the retardate. Intelligence scores, specific abilities, motor performance and various personality characteristics have been studied. Although there were no statistically significant correlations cited between any of the variables the research does suggest that motor ability and certain personality characteristics are more closely related to work performance than the other variables that have been studied. Even though an increasing number of speech and language pathologists are developing programs for the adult retardate only one study investigated various language abilities of the retarded and then compared their relationship to social acceptance of the retarded. Blount (1969) also states the importance of adequate language and communication skills for the social acceptance of the adult retardate. It seems obvious that there remains a need to investigate other variables, especially language

abilities, in order to reliably predict vocational performance of the adult retardate.

CHAPTER III

PROCEDURES

Five sheltered workshop clients were selected to participate in this investigation. Seven speech and language measures (to be described) were administered to each subject. The raw score of each measure was computed and each subject's score was ranked from one to five for each test. The subjects were then observed on each of four job tasks. Quantitative and qualitative measures of work performance were computed and each subject's performance score was ranked from one to five on each task. The rank orders of all scores were then compared to determine any statistically significant relationships; the Kendall-tau co-efficient of correlation was used to determine the relationships between the scores.

Selection of Subjects

Five adult retardates who work in the sheltered workshop of the Coles Training and Development Center in Charleston, Illinois were selected for this investigation. The five subjects were randomly selected from a group of fifteen clients who met the criteria of program placement, age, hearing acuity and intelligence.

Each client in a sheltered workshop is classified and enrolled in one of three programs. The three programs include evaluation, work adjustment training and extended employment. A client's enrollment in the work adjustment training program indicates that he has potential for community employment. All the clients selected for this investigation were enrolled in the work adjustment training program of the sheltered workshop.

The age range for subject selection was from eighteen to thirty years of age. The five subjects who participated in the investigation actually ranged in chronological age from nineteen to twenty-seven years of age. All subjects possessed normal hearing which was determined by the examiner after administering an audiometric screening evaluation to each individual subject. The speech frequencies of 500, 1000, and 2000Hz. were tested at 25dB. in a reasonably quiet room at the Center. The intelligence of the subjects was also used as a criterion for selection. The intelligence range for subject selection was from an intelligence quotient of fifty to eighty; each eligible subject had a Wechsler Adult Intelligence Scale (Wechsler, 1955) administered by a qualified psychologist or psychometrist not more than four years prior to the study. The range in intelligence of the five selected subjects was actually from sixty-two to seventy-eight. Table 1 displays the actual chronological age, intelligence quotient as meas-

ured by the WAIS and the date of the most recent WAIS evaluation for each subject who participated in the investigation.

TABLE 1.--Listing of Chronological Age, WAIS Full Scale Intelligence Quotient and Date of WAIS Evaluation for Each Subject Who Participated in This Study

Subject	Chronological Age	<u>WAIS</u> Full Scale Quotient	Date of <u>WAIS</u> Evaluation
A	19	78	8-16-72
B	27	70	8-01-73
C	25	73	1-25-73
D	25	74	1-15-74
E	21	62	9-27-73

Selection of Speech and Language Measures

Various speech and language measures were selected on the basis of the following criteria:

- a. the test measures a typically tested ability,
- b. the test is commercially available to clinicians,
- c. the test provides for standardaized administration,
- d. the test yields one or more raw scores that can be compared.

"The test of articulation is a basic tool of the speech

pathologist. Through its use they describe and evaluate an important dimension of an individual's speech performance." (Templin and Darley, 1969, p. 1). The Templin-Darley Tests of Articulation was chosen on the basis of the above criteria. The examiner adhered to standard administration and scoring procedures suggested in the manual. Responses were recorded as follows:

✓ = correct response
/e/f/ = substitution

X = distortion
- = omission

For the purposes of this investigation, the raw score was equal to the number of correct responses; no analysis of errors was attempted.

Auditory discrimination abilities are commonly tested by speech clinicians. The Goldman-Fristoe-Woodcock Test of Auditory Discrimination is designed to "...produce measures of speech-sound discrimination ability, relatively unfounded by other factors. It provides a measure of auditory discrimination under ideal listening conditions plus a comparative measure of auditory discrimination in the presence of controlled noise." (Goldman, Fristoe, Woodcock, 1971, p. 4) This measure provides for standardization of administration through the use of a prepared cassette. One advantage of this discrimination test for use with retardates is that a pointing response is all that is necessary. The training procedures outlined in the manual were first presented to each subject. The test was then administered according to

standard procedures. Raw scores for both the quiet and noise subtest were tallied.

Speech clinicians typically measure another parameter of language, that of sentence length and complexity. The Length-Complexity Index (LCI) is a "...linguistic measure designed to make a composite analysis of sentence length and complexity. Both length and complexity are considered together (not independently) according to a numeric weighting system." (Miner, 1969, p. 225) The verbal directives listed in Appendix A were used to elicit language samples; the scoring procedures outlined by Miner (1969) were utilized to determine the four scores, LCI, Noun Phrase₁ Index (NP₁I), Noun Phrase₂ Index (NP₂I) and Verb Phrase Index (VPI). All responses were tape recorded to insure accuracy of transcription.

Speech pathologists usually attempt to determine an approximate level of a client's verbal comprehension or receptive vocabulary; however, it was difficult to locate an adequate test of comprehension or receptive vocabulary that was applicable to the sheltered workshop employee. For this investigation, a modified form of the Peabody Picture Vocabulary Test (Dunn, 1965) was utilized to obtain a quantifiable measure of receptive vocabulary. The modification procedure described by Love (1964) contains every third word from one to 100 and every tenth word from 100 to 150 of Form A of the PPVT; a total of thirty-nine stim-

ulus items were included in the modification. However, compared to Love's procedure, standard administration procedures were followed in that the subject was required to point to the picture of the object that was named. Each of the thirty-nine items was presented to the subject. Appendix B includes a copy of the test form used in this investigation.

Tests which measure specific learning abilities are common among special populations. The Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy, and Kirk, 1968) was also selected for this investigation. Standard administration and scoring procedures indicated in the manual were adhered to. Only the raw scores of the various subtests were tallied and summed; the sum of the raw scores was used in comparison with other tests.

"Speech has sometimes been described as a matter of stringing sounds together to make syllables, stringing syllables together to make words and stringing words together to make sentences. While this is an oversimplified statement of a complex motor process, it does serve a useful purpose in isolating and identifying the small sequential learning tasks involved in the bigger job of learning to speak." (Griffith, Miner, Strandberg, 1973, p. 7). In order to evaluate these sequential learning tasks, various rhythmic and syllable sequences selected from the Language Master Syllable Training Unit (Griffith, Miner, Strandberg, 1973) were presented to each subject to duplicate. The Syllable

Training Unit provides 223 rhythmical and syllabic sequencing tasks that are pre-recorded on Language Master cards; however, the number of tasks for this evaluation was decreased from the original 223 tasks to fifty-four evaluation tasks. All of the rhythmic tasks were used, and every fifth (#15, 20, 25, etc.,) syllable task was included. Appendix C includes a copy of the sequential tasks that were presented in this investigation. The Language Master cards were played in full view of each subject for the rhythmic tasks, and each subject reproduced the rhythm with rhythm sticks. Because some of the subjects were able to read, the visual portion of the cards was hidden for the syllable tasks. The directions for the tasks were as follows:

- a. rhythmic tasks: You will hear some rhythms; after you have listened to the whole rhythm, you are to repeat the rhythm that you heard with your sticks. Each card will be played only once. Listen.
- b. syllable tasks: You will hear some sounds; after you have listened to all of the sounds on a card, you are to repeat the sounds that you heard. Each card will be played only once. Listen.

Two raw scores were computed for these tasks. The number of correct responses on the rhythmic tasks equalled the rhythmic raw score. The number of correct responses on the syllable tasks equalled the syllable raw score. The subject's articulation could have affected his performance on the syllable tasks; therefore, to be consistent, distor-

tions were counted as correct, but substitutions or omissions were counted as errors.

In addition to the above tests, speech pathologists may also administer a test of visual perceptual abilities. While previous studies have indicated that the retarded have more sensory defects, there is a paucity of information that relates to specific differences within the numerous operations of the processes. The quantitative effect of these minor problems may be a major factor in school and vocational performance and the client's limited ability to communicate these problems substantiate the need for constant indepth sensory assessments on the part of the educational system (Chiappone and Libby, 1972). One of the less obvious characteristics of the eyes is the speed of eye movements or visual dexterity. Trembly (1971) states that "Although all learning problems are serious matters, the lack of visual dexterity is not only one of the greatest problems, it is also one of the least known among teachers and students." (p. 19). He suggests that all teachers measure the visual dexterity of all students. Because of the importance of visual dexterity, an exercise of visual tracking (dexterity) was included in this investigation. This task measures visual discrimination, left to right direction and skill in following a line of print. Two exercises from the Visual Tracking Workbook of the Michigan Tracking Program (Geake and Smith, 1962) were selected

for the evaluation. The task consisted of a series of non-sense words that appeared in paragraph form and the subject was instructed as follows:

This is an exercise in which you are to find the letters of the alphabet and draw a line through them. Each line of make-believe words contains some letters which go together in the alphabet. You are to begin with the first letter "a" in the first line and draw a line through it. Then find the first "b" after the "a" which you have drawn the line through and draw the line through the "b", too. Then find the first "c" after the "b", then the first "d" and keep on going like that. Every line has one letter that you will need. If you go through a whole line without finding any letters that you need, then you know that you have made a mistake. Find your mistake and then continue to the end of the alphabet.

All subjects were given a practice exercise; during this practice exercise, the examiner gave minimal cues, if necessary. During the second exercise the examiner pointed to each letter at the top of the page until it was found. In addition, she pointed to each line of print as the subject scanned it. The second exercise was timed. In addition to the rate, there were twenty-six possible points (one point for each letter of the alphabet in the correct order.) If a subject missed one letter, he was not penalized for the remaining letters provided they were in the correct order. Refer to Appendix D for a copy of the visual tracking test form.

All of the above-mentioned tests were assigned a number. A table of random numbers was used to determine the order of presentation of the measures to each subject. Refer

to Appendix E for the presentation order of language tests to each subject.

Selection of Work Tasks

The various job tasks were selected with the aid of the vocational evaluator at the sheltered workshop. Three criteria were used to select the tasks. Each task had to be representative of the types of tasks provided in a sheltered workshop environment, each task had to require a number of different skills and the performance of each task had to be quantitatively and qualitatively measureable.

The first of the four job tasks to be selected is called "Whole Stock." The subject was presented a tray of 200 small flash bulbs (four of these bulbs fit in the commercially available flashcube); his job was to inspect each bulb and to transfer all good bulbs (without pink dots) to a smaller packing tray. Each packing tray holds 100 bulbs that are separated by cardboard dividers. Performance on this task was measured by the number of trays the subject packed in one work period. Failing to secure the cardboard divider completely in the tray constituted an error; the number of errors were tallied and provided a qualitative measure of performance.

The second job task is termed "Crack-Outs"; this task requires a sequence of motor behaviors. The subject was first required to place a used flashcube in a cutting de-

vice, and crack the cube on all four sides. He then had to separate the cube from the filament base. All bulbs remaining on the filament base had to be inspected; all burned, loose or pink bulbs were removed and placed in a can of water. The filament bases had to be inspected; there were separate trays for cocked and uncocked filament bases. All of the bulbs had to be removed from the uncocked bases. Performance on this task was measured by the number of crack-outs completed per work period. Failing to completely separate the filament base and cube or damaging the base constituted errors; the number of errors were tallied and provided a qualitative measure of performance on this task.

The third job task is called "Filament Repair." In this job, the subject had to inspect uncocked filament bases of flash cubes; if necessary, the subject cocked the filaments with the use of a metal tool. Each repaired filament was placed on a tray with a capacity of 100 filaments. Performance on this task was measured by the number of trays the subject repaired per work period. Placing a filament in the tray without repairing it constituted an error; the number of errors were tallied and provided a qualitative measure of performance on this task.

Even though all of the subjects were familiar with all of the job tasks, each began working on the assigned task one hour before the evaluation. The evaluation period was from 12:30 to 2:15 p.m. for each of seven days; because of

subject absences the seven day period was required. The order of presentation of job tasks to each subject was randomly selected; however, because of certain contract schedules of the sheltered workshop, this order of presentation was not always maintained. Appendix E includes the presentation order of the job tasks to each subject.

CHAPTER IV

RESULTS AND DISCUSSION

The performance scores of five adult retardates on seven selected speech and language measures were compared with their performance scores on four selected job tasks. The subjects ranged in chronological age from nineteen to twenty-seven years and ranged in intelligence from 62 to 78 in intelligence quotients.

The performance scores were compiled and analyzed statistically for the purpose of answering the questions posed at the outset of this study. A non-parametric statistic, the Kendall-Tau correlation coefficient (Downie and Heath, 1965) was applied to the obtained data to determine if statistically significant relationships existed between the language measures and the work tasks, between the language measures themselves and between the work tasks themselves. In this chapter, the specific statistical results are reported and discussed.

Table II contains the rank orders of each subject's scores on each of the language measures and on each of the work tasks. Refer to the abbreviation key on page 44 for all of the abbreviations used in the following tables of this chapter.

ABBREVIATION KEY

- T-D - The Templin Darley Tests of Articulation
- GF'WN - Goldman-Fristoe-Woodcock Test of Auditory Discrimination, Noise subtest
- GFWQ - Goldman-Fristoe-Woodcock Test of Auditory Discrimination, Quiet subtest
- LCI - Length-Complexity Index
- NP₁I - Noun Phrase One Index
- NP₂I - Noun Phrase Two Index
- VPI - Verb Phrase Index
- PPVT - Peabody Picture Vocabulary Test, modification
- VT - Visual Tracking
- VTQ - Visual Tracking Quality
- ITPA - Illinois Test of Psycholinguistic Abilities
- RS - Rhythmic Sequencing
- SS - Syllable Sequencing
- CO# - Rate of production of Crack-Outs
- COQ - Quality of production of Crack-Outs
- FR# - Rate of production of Filament Repair
- FRQ - Quality of production of Filament Repair
- WS# - Rate of production of Whole Stock
- WSQ - Quality of production of Whole Stock
- CL# - Rate of production of Celotex Labeling
- CLQ - Quality of production of Celotex Labeling

Table II--Listing of Rank Order of Scores for Each Subject
on Each Language Measure and on Each Work Task

<u>Subject</u>	<u>T-D</u>	<u>GFWN</u>	<u>GFWQ</u>	<u>LCI</u>	<u>NP₁I</u>	<u>NP₂I</u>	<u>VPI</u>	
A	5	1	2	3	4	3	4	
B	1	3	3	4	3	4	2	
C	3	2	1	2	1	1	3	
D	2	4	5	1	2	2	1	
E	5	5	4	5	5	5	5	
	<u>PPVT</u>	<u>VT</u>	<u>VTQ</u>	<u>ITPA</u>	<u>RS</u>	<u>SS</u>		
A	3.5	1	2.5	2	4	1		
B	2	3	2.5	4	1.5	2.5		
C	1	2	2.5	1	3	2.5		
D	3.5	4	2.5	3	1.5	5		
E	5	5	5	5	5	4		
	<u>CO#</u>	<u>COQ</u>	<u>FR#</u>	<u>FRQ</u>	<u>WS#</u>	<u>WSQ</u>	<u>CL#</u>	<u>CLO</u>
A	1	2	2	2	1	1	1	2
B	3	2	3	2	2	3.5	2	1
C	2	2	1	2	3	3.5	3	5
D	5	4	5	4	5	3.5	5	3
E	4	5	4	5	4	3.5	4	4

The formula for the Kendall-Tau correlation coefficient was applied to the rank orders to determine significant relationships. Following are the results of each comparison and their interpretations.

Comparison of Language Performance and Work Performance

Table III contains a listing of the Kendall-Tau coefficients for the relationships between language performance scores and work performance scores. Refer to page 44 for the key to the abbreviations used in this table.

Table III--Kendall-Tau Correlation Coefficients for Determining Relationships Among Measures of Language and Work Performance

	A	B	C	D	E	F	G	H
1	-.40	0	-.10	+.30	-.20	-.40	-.20	+.40
2	+.80	+.80	+.60	+.70	+.60	+.40	+.60	0
3	+.80	+.40	1.00	+.50	+.60	+.20	+.60	-.40
4	0	+.20	+.20	+.10	+.20	0	-.20	+.10
5	0	0	+.20	+.30	-.40	-.20	-.20	0
6	+.20	-.20	+.40	+.30	0	0	0	-.20
7	-.40	0	-.20	+.10	-.20	-.20	0	+.40
8	+.30	+.60	+.50	+.60	+.10	-.10	+.10	+.10
9	+.80	+.80	+.60	+.70	+.60	+.40	+.60	-.20
10	+.20	+.40	+.20	+.40	+.20	+.30	+.20	+.20
11	+.40	+.40	+.60	+.50	+.20	+.20	+.20	-.40
12	-.30	0	-.10	+.20	-.10	-.20	-.10	+.50
13	+.90	+.60	+.70	+.50	+.90	+.40	+.90	-.10

Refer to page 48 for explanation of code used in this table.

Key to Code Used in Table III

1 - T-D	8 - PPVT	B - COQ
2 - GFWN	9 - VT	C - FR#
3 - GFWQ	10 - VTQ	D - FRQ
4 - LCI	11 - ITPA	E - WS#
5 - NP ₁ I	12 - RS	F - WSQ
6 - NP ₂ I	13 - SS	G - CL#
7 - VPI	A - CO#	H - CLQ

A correlation coefficient of .95 or higher was considered statistically significant for this study. According to this criterion, only one relationship was statistically significant. The correlation coefficient for the relationship between the subject's scores on the Goldman-Fristoe-Woodcock Test of Auditory Discrimination, Quiet subtest and his rate of production on filament repair was 1.00. This value was significant at the .0083 level of confidence according to Siegel's tables (Siegel, 1956, p. 285). This would indicate that a subject's ability to discriminate in a quiet environment is closely related to his rate of production in filament repair. The examiner is unable to explain why this particular job task would be so closely related to discrimination in quiet environments.

It would seem beneficial to study each of the language measures and discuss both the magnitude and the direction of the correlation between these measures and work performance. The following conclusions can be drawn from the results in Table III.

1. Templin-Darley Tests of Articulation - There does not appear to be a positive relationship between the ability measured by the Templin-Darley and any of the work tasks. Most of the correlations are negative, and all are extremely weak.
2. Goldman-Fristoe-Woodcock Test of Auditory Discrimination - Although there were no correlations that met the criterion designated for statistical significance by this investigation, the higher positive correlations found indicate a need for further investigation. Both rates of production and the quality of production of crack-outs appear to be related (coefficient of .80 is significant at the .042 level) to the subject's ability to discriminate words in a noisy environment. Somewhat weaker relationships (coefficients of .70, .60, .60 and .60, respectively, which are significant at or beyond the .117 level of confidence) are noted between discrimination in a noisy environment and quality of production of filament repair, rate of production of filament repair, rate of production of whole stock and rate of production of Celotex labeling.
3. Goldman-Fristoe-Woodcock Test of Auditory Discrimination, Quiet subtest - Although the relationship between discrimination in quiet and rate of production of filament repair was the only statisti-

cally significant correlation, there were some other relationships noted. The rate of production on crack-outs appears to be related (at the .042 level of confidence) to word discrimination in a quiet environment. Although a relatively weak correlation (coefficient of .60 is significant at the .117 level) exists, the rate of production of both whole stock and Celotex labeling appears to be related to discrimination in a quiet environment.

4. Length-Complexity Index - There does not appear to be any significant relationship between verbal expression as measured by the LCI and the performance on any of the work tasks.
5. Noun Phrase One Index - There does not appear to be a significant relationship between the Noun Phrase One Indices of the subjects and their performance on any of the work tasks.
6. Noun Phrase Two Index - The Noun Phrase Two Index does not appear to be significantly related to performance on any of the work tasks.
7. Verb Phrase Index - Verbal expression as measured by the verb phrase index does not seem to be closely related to performance on any of the work tasks.
8. Peabody Picture Vocabulary Test, modification - Although not meeting this investigation's criterion for statistical significance, the ability

measured by the PPVT modification form seems to somewhat related (at the .117 level of confidence) to quality of production of both crack-outs and filament repair.

9. Visual Tracking - Visual tracking seems to be positively related to the production rates on all of the tasks and to the quality of production on a few of the tasks. A coefficient of .80, which was significant at the .042 level, expressed the relationship between visual tracking and rate and quality of production of crack-outs. Coefficients of .60 (significant at the .117 level) expressed the relationship between visual tracking and rates of production on filament repair, whole stock and Celotex labeling.
10. Visual Tracking Quality - There does not appear to be a notable relationship between this ability and any of the work tasks.
11. Rhythmic Sequencing - There does not appear to be a notable relationship between this ability and any of the work performance tasks. However, it is interesting to note that five of the coefficients are negative.
12. Syllable Sequencing - Although the correlations of this ability were not statistically significant

according to this investigation's criterion, syllable sequencing ability as measured in this study seemed to be closely and positively related to rates of production on all four work tasks. Coefficients of .90 (significant beyond the .042 level of confidence) expressed the relationships between syllable sequencing and the rates of production on crack-outs, whole stock and Celotex labeling. The coefficient for the relationship between rate of production of filament repair and syllable sequencing was .70 (significant beyond the .117 level).

It would seem that the adult retardate's performance on certain language measures, specifically, the Templin-Darley Tests of Articulation, Length-Complexity Index, Peabody Picture Vocabulary Test modification, Illinois Test of Psycholinguistic Abilities and a rhythmic sequencing task is not closely related to his performance on four selected work tasks. It appears that syllable sequencing abilities, visual tracking abilities and auditory discrimination abilities as measured by the Goldman-Fristoe-Woodcock Test of Auditory Discrimination are more closely related to the adult retardate's work performance.

This examiner feels that since work performance seems to require a sequence of motor behaviors that involve a number of discriminatory processes then it is logical that

sequencing and discrimination abilities would be more closely related to work performance than some other abilities.

Comparison of Performance Between Language Measures

Table IV contains a listing of the Kendall-Tau coefficients for the relationships between the performance scores of the language measures. Refer to page 44 for the key to the abbreviations used in this table. Refer to page 48 for the explanation of the code used in this table.

Table IV--Kendall-Tau Correlation Coefficients Among Scores of
Various Language Measures

	1	2	3	4	5	6	7	8	9	10	11	12	13
2	-.20												
3	-.20	+.60											
4	+.20	+.20	+.20										
5	+.20	+.20	+.20	+.60									
6	0	+.40	+.40	+.80	+.80								
7	+.60	-.20	-.20	+.60	+.60	+.40							
8	+.30	+.50	+.50	+.30	+.70	+.50	+.30						
9	-.20	1.00	+.60	+.20	+.20	+.40	-.20	+.50					
10	+.20	+.40	+.20	+.20	+.40	+.40	+.40	+.40	+.40				
11	-.20	+.60	+.60	+.60	+.60	+.80	+.20	+.50	+.60	+.40			
12	+.70	-.10	-.10	+.50	+.50	+.30	+.90	+.40	-.10	+.20	+.10		
13	-.30	+.70	+.70	-.10	-.10	+.10	-.30	+.20	+.70	+.20	+.50	-.20	

There was only one statistically significant (.95 or higher) correlation between any of the scores of these language measures when administered to a select group of five adult retardates. A perfect positive correlation (significant at the .0083 level of confidence) was found between visual tracking ability and word discrimination in a noisy environment. Perhaps the same kind of discriminations that are necessary for auditory discriminations in noise are also required in visual tracking skill.

It would seem beneficial to briefly study each of the language measures and discuss both the magnitude and the direction of the correlations between the various measures. The following conclusions can be drawn from the results in Table IV.

1. Templin-Darley Tests of Articulation - The relationship (coefficient of .70 is significant beyond the .117 level) between the Templin-Darley and rhythmic sequencing was stronger than any of the other comparisons. The Verb Phrase Index seems to be somewhat related (significant at the .117 level) to the Templin-Darley. The Templin-Darley test seems to be measuring a relatively unique ability when compared with the other measures.
2. Goldman-Fristoe-Woodcock Test of Auditory Discrimination, Noise subtest - The statistically significant relationship between the noise subtest and

visual tracking skills has already been mentioned. There seemed to be a somewhat weaker relationship (significant beyond the .117 level) between syllable sequencing and discrimination in noise. Two other relationships that could be mentioned exhibit coefficients of .60 which are significant at the .117 level. Discrimination in quiet environments and the abilities tested by the ITPA are related to discrimination in noise at this level. These abilities involve either discrimination or visual skills that would logically be related to visual tracking skills.

3. Goldman-Fristoe-Woodcock Test of Auditory Discrimination, Quiet subtest - Although no statistically significant relationships existed between this task and the other language measures, syllable sequencing (.70), ITPA performance (.60), visual tracking skills (.60) and discrimination in noise (.60) seem to be positively related to discrimination in quiet environments. These relationships were significant at or beyond the .117 level of confidence. All of these tasks seem to require various discriminatory processes.
4. Length Complexity Index - The Length-Complexity Index seemed to be positively correlated with the

other analyses of verbal expression. The LCI was related to the NP₁I, the VPI and the ITPA at the .117 level of confidence. The LCI was related to the NP₂I at the .042 level of confidence.

5. Noun Phrase One and Two Indices - These two analyses, like the LCI, were more closely related to the other verbal expression analyses and ITPA performance although none of these correlation coefficients were considered to be significant.
6. Verb Phrase Index - The Verb Phrase Index seemed to be closely related (coefficient of .90 was beyond the .042 level of confidence) with rhythmic sequencing. The examiner was unable to explain this relationship. The correlations between the VPI and the other analyses of verbal expression were weaker than they were for the other verbal analyses. There also seemed to be a weak positive relationship between the VPI and the Templin-Darley. It is interesting to note that although the magnitude of the correlation between the VPI and discrimination in both noisy and quiet environments is nonsignificant, the relationships are both negative.
7. Peabody Picture Vocabulary Test, modification - The Peabody Picture Vocabulary Test modification was somewhat related (beyond the .117 level of confidence) to the Noun Phrase One Index. One possible

explanation of this relationship is that the majority of vocabulary items on the PPVT are nouns and the NP₁ typically consists of nouns and modifiers.

8. Visual Tracking - Visual tracking skills were significantly related (1.00) with discrimination in noise. Other weaker relationships were found between visual tracking skills and discrimination in quiet (.60), ITPA performance (.60) and syllable sequencing skills (.70). All of these relationships were significant at or beyond the .117 level of confidence. The interpretation of these relationships has already been discussed.
9. Visual Tracking Quality - The quality of performance on the visual tracking exercise does not seem to be closely related to any of the other language measures. Visual tracking quality, for the purposes of this investigation, consisted of marking the letters of the alphabet in the correct order. It does not seem unusual that this ability would not be closely related to the other language abilities.
10. Illinois Test of Psycholinguistic Abilities - The ITPA seems to be weakly related to discrimination in noise, in quiet, the Length-Complexity Index, Noun Phrase One Index and visual tracking (coefficients of .60 which are significant at the .117 level).

ITPA performance seems to be more closely related (at the .042 level) to Noun Phrase Two Index. The examiner is unable to explain this relationship.

11. Rhythmic Sequencing - As was mentioned above there seems to be a positive relationship (significant beyond the .042 level) between rhythmic sequencing skills and the Verb Phrase Index. There seems to be a weak relationship between rhythmic sequencing skills and articulation ability as measured by the Templin-Darley.
12. Syllable Sequencing - Three positive relationships have already been noted. Syllable sequencing skills appear to be somewhat related to discrimination in noise, to discrimination in quiet and to visual tracking. Syllable sequencing appears to be independent of rhythmic sequencing.

From these results it would seem that although only one statistically significant relationship was found between the language measures, language measures that observe certain discrimination abilities (auditory discrimination, visual tracking and syllable sequencing) are more closely related to each other than those language measures that observe other behaviors.

Comparison of Performance Between Work Tasks

Table V contains a listing of the Kendall-Tau correlation

coefficients for determining relationships between performance scores of the work tasks. Refer to page 44 for the key to the abbreviations that are used in this table. Refer to page 48 for the explanation of the code used in this table

Table V--Kendall-Tau Correlation Coefficients Among Performance Scores on Various Work Tasks

	A	B	C	D	E	F	G
B	+.50						
C	+.80	+.50					
D	+.40	+.70	+.40				
E	+.80	+.50	+.60	+.50			
F	+.70	+.50	+.50	+.50	+.70		
G	+.80	+.50	+.60	+.50	1.00	+.40	
H	0	+.10	-.30	+.10	0	0	0

There was only one statistically significant (.95 or higher correlation) between the performance scores of any of the work tasks when presented to a select group of five

adult retardates. A perfect positive correlation (significant at the .0083 level of confidence) existed between the rates of production of Celotex and whole stock. Both of these tasks require speed and eye-motor coordination.

The following conclusions can be drawn from the results in Table V.

1. The rates of production of the three other tasks when compared to the rate of production of crack-outs seem to be positively related. The relationships are significant at the .042 level of confidence. The rates of production of the tasks compared with the other tasks are not significantly related. The relationship between crack-out production and the other task productions would seem to be due to the fact that speed is the most outstanding feature of crack-out production and it is important in the other tasks also.
2. The rate of production and the quality of production of whole stock seem to be related (beyond the .117 level of confidence). This might indicate, as the examiner observed, that whole stock performance is relatively free from errors.
3. The quality of production of filament repair and the quality of production of whole stock seem to be related (beyond the .117 level). Both of these

jobs have one skill in common, that of inspecting filament bases.

4. The rate of production of crack-outs and the quality of production of whole stock seem to be related (beyond the .117 level of confidence). The examiner is unable to account for this relationship.

From these results it would seem that the relationship between the rates of production of Celotex labeling and whole stock is statistically significant. The rates of production of three other job tasks seem to be related to crack-out production rate. The rate and quality of whole stock production appears to exhibit a positive relationship.

In summary then, it would seem that syllable sequencing, visual tracking and auditory discrimination abilities are positively related to work performance of the adult retardate. Correlation coefficients of .80 or higher represent the magnitude of these relationships (significant between the .042 and .0083 levels of confidence. The various tests that measure these abilities also seem to be somewhat related. The job tasks that rely heavily on speed of movement seem to be more closely related than the various other tasks.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this investigation was to determine if statistically significant relationships existed between the performance scores of adult retardates on selected language measures and on selected work tasks. Seven speech and language measures and four job tasks were presented to the subjects for comparison.

Five sheltered workshop employees were randomly chosen from a group of sheltered workshop clients at the Coles Training and Development Center in Charleston to participate in this investigation. All subjects met the criteria of program placement, age, intelligence and hearing acuity in the speech frequencies.

The seven speech and language tests that were selected for this investigation met the criteria of measuring a typically tested behavior, of being available to clinicians, of providing standardization of administration and of yielding raw scores that are comparable. The seven measures that were selected included The Templin-Darley Tests of Articulation, The Goldman-Fristoe-Woodcock Test of Auditory Discrimination (noise and quiet subtests), the Length-Complexity Index (Noun

Phrase One Index, Noun Phrase Two Index and Verb Phrase Index), the Peabody Picture Vocabulary Test (modification of Form A), a visual tracking task (including a quality measurement), the Illinois Test of Psycholinguistic Abilities and a sequencing task (including both a rhythmic and syllable sequencing measure). The order of presentation of language measures to each subject was randomly selected.

The four job tasks that were chosen for this investigation met the criteria of being representative of the types of tasks found in a sheltered workshop, of being representative of a number of different skills and of being quantitatively and qualitatively measurable. The tasks that were chosen for this study included Crack-Outs, Filament Repair, Whole Stock and Celotex labeling.

The performance scores of the language measures and the work tasks were compiled and ordered in ranks. The Kendall-Tau coefficient of correlation was applied to the ranks to determine the magnitude and direction of the relationships between performance of language measures and work performance, between the language measures themselves and between the work tasks themselves. There were 210 correlations made to determine these relationships. Specifically, the following relevant questions were asked at the outset of this investigation:

1. Is there a statistically significant relationship between the adult retardates' scores on a typical

battery of speech and language tests and his work performance on a representative sample of work tasks?

2. Is there a statistically significant relationship between the scores of various speech and language tests that are typically used by speech clinicians in evaluating the speech and language of the adult mental retardate?
3. Is there a statistically significant relationship between the performance scores of four similar but not identical job tasks of the adult mental retardate?

Conclusions

The above statistical analyses concerning the relationships between the language scores and work performance of adult retardates were interpreted as follows:

1. Regarding the relationship between performance on language measures and work performance:
 - a. There was a statistically significant relationship between the performance on the Goldman-Fristoe-Woodcock Test of Auditory Discrimination, Quiet subtest and the rate of production of filament repair.
 - b. It appears that syllable sequencing abilities, visual tracking skills and auditory discrimi-

nation abilities as measured by the Goldman-Fristoe-Woodcock Test of Auditory Discrimination are related to the adult retardates' work performance and warrant further investigation.

- c. The adult retardate's abilities that are measured by the Templin-Darley, the Length-Complexity Index, the Peabody Picture Vocabulary Test, the Illinois Test of Psycholinguistic Abilities and rhythmic sequencing tasks are not related to his work performance.

2. Regarding the relationship between the various language measures:

- a. There was a statistically significant relationship between the adult retardate's performance on the visual tracking task and on the noise subtest of the Goldman-Fristoe-Woodcock Test of Auditory Discrimination.
- b. The language measures used in this investigation appeared to be testing independent behaviors although there was some relationship between the measures that evaluated auditory discrimination, syllable sequencing and visual tracking skills.

3. Regarding the relationship between the various job tasks:

- a. There was a statistically significant relation-

ship between the rate of production of Celotex labeling and the rate of production of whole stock.

- b. The rate of production of crack-outs and the rates of the other three work tasks seem to be related and warrants further investigation.
- c. With the exception of the whole stock task, the rate of production does not seem to be related to the quality of production for the job tasks used in this investigation.

Implications for Future Research

1. A more intensive study modelled after the present investigation is warranted. A larger population of adult retardates should be used. Expansion of the auditory discrimination, syllable sequencing and visual tracking tasks would be beneficial. These abilities seemed to be related to the work performance of the adult retardate.
2. More investigations of the speech and language abilities of the adult retardate and their relationship to community and vocational adjustment are necessary.
3. A reliable measure of visual tracking skills should be developed.
4. A reliable measure of syllable sequencing skills should be developed.

5. Although the Illinois Test of Psycholinguistic Abilities was not significantly related to any of the work tasks, it would seem beneficial to study the relationships between each of the subtests of the ITPA and the work performance of the adult retardate.
6. The speech pathologist working with the population of adult retardates should acknowledge the commitment to contribute to the information concerning the speech and language abilities of the adult retardate and the value of various therapeutic techniques.

APPENDIX A

VERBAL DIRECTIVES FOR LENGTH-COMPLEXITY INDEX

1. Tell me about your mother.
2. What do you and your friends like to do?
3. Tell me about your favorite jobs.
4. Tell me about your favorite game that you like to play.
5. Tell me about your favorite story.
6. Tell me about your family.
7. Tell me about your favorite TV program.
8. What do you usually do when you go outdoors?
9. If you had a whole day to do whatever you wanted, what would you do?
10. Tell me about some pets you wish you could have.
11. What do you do to help around the house?
12. If you could be anything in the world, what would you be and why?
13. Tell me about Christmas.
14. Tell me about your house.
15. If you had three wishes, what would you wish for?

Comments

1. If the subject does not hear you, repeat the verbal directive.
2. If a short response is evoked, say "Can you tell me more?"
3. Use "um-huh, good, that's right" as verbal reinforcers.
4. Present the test items in a random order.

APPENDIX B

PEABODY PICTURE VOCABULARY TEST
FORM A
MODIFICATION













CLIENT _____ RAW SCORE _____ DATE _____

- | | |
|-----------------------|-------------------------|
| 1. ____ (4) car | 21. ____ (3) directing |
| 2. ____ (2) girl | 22. ____ (3) lecturer |
| 3. ____ (2) clown | 23. ____ (1) stadium |
| 4. ____ (2) chicken | 24. ____ (1) stunt |
| 5. ____ (1) digging | 25. ____ (4) chemist |
| 6. ____ (1) drum | 26. ____ (3) porter |
| 7. ____ (1) fence | 27. ____ (1) wailing |
| 8. ____ (3) bush | 28. ____ (2) sentry |
| 9. ____ (4) weiner | 29. ____ (3) fragment |
| 10. ____ (4) arrow | 30. ____ (4) crag |
| 11. ____ (3) nest | 31. ____ (3) descent |
| 12. ____ (2) picking | 32. ____ (1) probing |
| 13. ____ (2) peacock | 33. ____ (4) confining |
| 14. ____ (1) whip | 34. ____ (1) amphibian |
| 15. ____ (3) eagle | 35. ____ (2) encumbered |
| 16. ____ (2) dial | 36. ____ (2) tartan |
| 17. ____ (1) signal | 37. ____ (4) gauntlet |
| 18. ____ (4) thermos | 38. ____ (4) raze |
| 19. ____ (3) tackling | 39. ____ (3) pensile |
| 20. ____ (2) ceremony | |

APPENDIX C

SYLLABLE TRAINING UNIT
Griffith-Miner-Strandberg
MODIFICATION

CLIENT _____ RAW SCORE _____ DATE _____

- | | | |
|---|-----------------------|---------------------|
| 1. _____  | 19. _____ tee-tee-tee | 37. _____ tri-tru |
| 2. _____  | 20. _____ tee-tay | 38. _____ fre-ste |
| 3. _____  | 21. _____ too-tee-toh | 39. _____ spa-blaI |
| 4. _____  | 22. _____ mi-mu | 40. _____ int-int |
| 5. _____  | 23. _____ im-it | 41. _____ est-ost |
| 6. _____  | 24. _____ mim-tim | 42. _____ pu-pu-pu |
| 7. _____  | 25. _____ de-do | 43. _____ ti-ti-pi |
| 8. _____  | 26. _____ ed-ek | 44. _____ tu-tu-pi |
| 9. _____  | 27. _____ ded-ked | 45. _____ pi-pu-ta |
| 10. _____  | 28. _____ pa-pe | 46. _____ re-re-re |
| 11. _____  | 29. _____ ap-al | 47. _____ re-re-se |
| 12. _____  | 30. _____ pap-lap | 48. _____ re-re-so |
| 13. _____ oh-oh-oh | 31. _____ ri-rae | 49. _____ re-re-ro |
| 14. _____ oh-oo-ee | 32. _____ ir-iz | 50. _____ se-so-naI |
| 15. _____ mah-mah-mah | 33. _____ rir-zir | 51. _____ dA-dA-dA |
| 16. _____ moo-moo-moo | 34. _____ saI-sA | 52. _____ lA-lA-lA |
| 17. _____ mah-moh-mee | 35. _____ aIs-aIn | 53. _____ lA-lA-lA |
| 18. _____ moh-mi-mah | 36. _____ saIs-naIs | 54. _____ dae-lA-li |

APPENDIX D

VISUAL TRACKING

The actual test copy was printed in one-eighth inch letters as compared to this print in one-sixteenth inch letters.

a b c d e f g h i j k l m n o p q r s t u v w x y z

Fgn acog zbof hdmi nush pow
 tryp kif nurc shd. Mo jins pem ruk.
 Rolb nsb ofn lijs buw rog sav. Nry
 hnuw wops riz lorn somt. Pojs yut
 zak robt tor slow euqur. Gabl er
 cag jefe sem uf nate boxr. Bugp ut
 cit que kicb ridg. Wab svz gfu wxyz.

Min___ Sec___

Neoz wtvx lky njt sjo uz aetr btc.
 gohn wormz kd eofr. Jho vqu yx vop lm.
 Apf oon bc. Pph ooq wca. Xzt ltoi.

Dojn Xzt dru w ol. Sma bbqo.
 doc bn wrar ogf tpu. Dec bgh ih cf. Ya
 dfe kcq tw gff. Bjf rb cff. Djc tvd.
 Pok sjdf kgect nja bu ceh. Lwnv heg
 rnwq kirx pf. Njaf rrxq qeb yne ponaz.

Min___ Sec___

APPENDIX E

ORDER OF PRESENTATION OF
LANGUAGE TESTS AND WORK TASKS

LANGUAGE TESTSWORK TASKS

Subject A

- | | |
|--|--------------------|
| 1. Length-Complexity Index (LCI) | 1. Crack-outs |
| 2. <u>Illinois Test of Psycholinguistic Abilities (ITPA)</u> | 2. Filament repair |
| 3. <u>Templin-Darley Tests of Articulation (Templin-Darley)</u> | 3. Whole stock |
| 4. Visual Tracking | 4. Celotex |
| 5. <u>Goldman-Fristoe-Woodcock Test of Auditory Discrimination (GFW)</u> | |
| 6. Rhythmic and Syllable Sequencing (Sequencing) | |
| 7. <u>Peabody Picture Vocabulary Test (PPVT)</u> | |

Subject B

- | | |
|--------------------------|--------------------|
| 1. <u>PPVT</u> | 1. Filament repair |
| 2. Sequencing | 2. Crack-outs |
| 3. LCI | 3. Whole-stock |
| 4. <u>ITPA</u> | 4. Celotex |
| 5. <u>GFW</u> | |
| 6. Visual Tracking | |
| 7. <u>Templin-Darley</u> | |

Subject C

1. Sequencing
2. LCI
3. Visual Tracking
4. Templin-Darley
5. PPVT
6. ITPA
7. GFW

1. Crack-outs
2. Filament Repair
3. Whole stock
4. Celotex

Subject D

1. GFW
2. Visual Tracking
3. Templin-Darley
4. Sequencing
5. PPVT
6. ITPA
7. LCI

1. Filament Repair
2. Whole stock
3. Crack-outs
4. Celotex

Subject E

1. Visual Tracking
2. Templin-Darley
3. ITPA
4. PPVT
5. LCI
6. GFW
7. Sequencing

1. Whole stock
2. Filament Repair
3. Crack-outs
4. Celotex

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