A STUDY OF THE RELATIONSHIPS AMONG CONCEPTUAL TEMPO OF TEACHERS, EDUCABLE MENTALLY RETARDED STUDENTS, AND READING ACHIEVEMENT

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PREFACE

This study is concerned with the investigation of the relationships among teacher conceptual tempo, student conceptual tempo, and reading achievement. The primary objective is to determine the existence of such relationships, and further to determine their relationship to reading achievement.

The author wishes to express his deep appreciation to his major adviser, Dr. Robert Mangum, for his encouragement and help "beyond the call of duty" during the past several years. Appreciation is also expressed to other committee members, Dr. Thomas Parish, Dr. Bill Elsom, Dr. William Scott, and Dr. Judith Dobson, for their assistance in this project.

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A special note of thanks is tendered to one who in many ways gave more than I; to my wife, Carol, I say thank you. Thanks also to the rest of my family who gave me encouragement and backing when it was needed.

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CHAPTER I

INTRODUCTION

This study is intended to explore the relationship of certain cognitive characteristics of teachers and students, and the relationship of these characteristics to the academic success of the student. The cognitive characteristic under consideration is conceptual tempo, the academic area under consideration is reading.

There has been a series of sutdies by Kagan (1965a, 1965b, 1965c; 1966) and his associates (Kagan, Moss, and Sigel, 1963; Kagan, Rosman, Day, Albert, and Phillips, 1964; Kagan, Pearson, and Welch, 1966a, 1966b; Yando and Kagan, 1970) which have defined conceptual tempo and attempted to identify cognitive and behavioral correlates. Until recently, however, little attempt has been made to extend the usefulness of the construct as a viable tool for use with mentally retarded students. It is the intent of this study to further demonstrate the existence of conceptual tempo in the retarded population, and to demonstrate its validity as an educational tool.

Nature of the Problem

The nature of the problem to be encountered in this study is the identification of a variable, or variables, which may be indicative of interaction between student and teacher. That is a variable which is significantly related to the reading achievement of the educable mentally

mentally retarded (EMR) student in a residential setting.

One of the primary goals of the social institution of education is a change in student behavior. It would seem that if there were no changes in students' behavior, either cognitive or overt, as a result of education, then education would have little reason for existing as a social institution. Whether this behavior is to be reflected in test performance, physical skill, or the acquisition of "knowledge", problems arise when students do not meet the educators' criterion for change.

When this happens educators start looking for causes for this "failure" to change. The following is a brief summary of four areas in which this "failure" has been sought. The summary will start with the student centered approach, and proceed through areas concerned with the organizational aspects of education, and the teacher. The Summary will terminate with a review of the interaction approach.

One of the first places in which the cause for this failure to change was sought was within the student. Note the initiation of intelligence tests devised by Binet and Simon in 1902 (Anastasi, 1968) in an effort to identify children who would not profit from certain subject matter or instruction. This foundation has given rise to the wide practices of testing for learning disabilities, intelligence, and skills, which, in effect, seem to say that the cause for the student's failure rests within the student.

The logical extension is that once the student's problem has been identified adequately the educator may then bring to bear techniques to help the student change. In this traditional view the problem is the student's and failure to meet the educator's criterion is evidence of a lack of effort on the part of the student. Where the problem is judged

to be too great to yield to direct pressure of parent or teacher the direction of the desired change on the part of the student may be altered. If the educational block within the student is too strong to go through, then the approach is to avoid the block by going around it.

In the first instance the inability to change to meet the educator's criterion is attacked with excitations. This is seen in the application of the paddle to the "seat of knowledge" in order to increase the efforts of the student. In the second instance the student is judged to be unequal to the task of changing. In this situation areas of education determined to be beyond his abilities are avoided and the student is "tracked" around difficult areas.

Another area being studied in order to identify causes for poor student performance has been the organizational aspects of the educational structure. The feeling has been that if we could "correctly" structure the educational experiences of some children, we could solve their poor performance problems. This has given rise to such practices as grouping by achievement levels and abilities, grade skipping, and nonpromotion. The assumption being that if only the "right" combination of courses could be found for an individual, his educational problems could be solved. Open schools, discovery learning, simulation games, and programmed instruction are some of the outgrowths of this attack strategy (Goodland, 1966).

It is possible to divide any educational system into three parts, the student, the teacher, and the organization aspects. We have seen that educational research focused on the student, that interest should, in turn, focus on the teacher seems natural. In the continuation of the search for the causes for the "failure" of students to change the teacher's

behavior has been an area of great interest. The extent of this interest in teacher behavior is evidenced by the 1950 Domas and Tiedman Bibliography which lists some 1,000 titles dealing with teacher competence, and the list of studies compiled by Getzels and Jackson (1963) who, starting with 1950, list more than 800 references dealing with teacher personality. One of the most controversial studies in this area is that of Rosenthal and Jacobson (1968) which researched the effects of teacher expectations on student evaluation. The implication here being that the student's academic performance may be effected as much by the teacher's expectations of the student as by the student's actual abilities. Another major input in this area has been that provided by Flanders (1970), and Amidon and Flanders (1961, 1967). Although Flanders' system is ostensibly one of interaction, the primary thrust of his investigation has been toward teacher training.

The area of concern reflected by the above studies is obviously teacher preparation. This orientation fosters more teacher training and requirements for advanced degrees, as if somehow better educated teachers would, by necessity, result in better educated students.

It is not suggested that the work done in the areas of student, teacher and the organizational aspects of education has not been worthwhile, nor is it suggested that changes in education which have been prompted by research in these areas have not been of benefit to some students. As the complexity of the problem under consideration becomes evident, investigators are attending more to the interactions of variables. The variables of prime concern are the previously mentioned student, teacher, and organizational aspects of education. Some of the interactions which have been investigated are: instructional techniques and

student personality (Oliver and Shaver, 1966), instructional methods and student perceptual differences, difficulty level of instruction and student personality characteristics (Teevan, 1965), and ability grouping with students of different personality characteristics (O'Connor, Atkinson and Harner, 1966). An area of interaction study which is gaining importance in research is that of cognitive styles, or somewhat synonymously, learning styles. The procedures suggested by these studies are generally the same as those of other interaction studies; that is, that the system be adapted to meet the individual learning styles of the student. This approach is implicit in studies relating to benefits of matching instructional styles (Shumsky, 1968; Rhetts, 1970; Bruner, Goodman, and Austin, 1956).

Educational research originally attended to the student as a source of the answers to questions of educational failure. In turn, the teacher, and the organizational aspects of education have come under scrutiny. In recent years investigators have concentrated their efforts in trying to determine how these three variables relate. And to determine if these relationships have a bearing on the education of the student.

The approach to remediation of educational problems outlined above has been mirrored in the educational history of the exceptional child. In an effort to maximize the educational experience of the student there is a movement in educational research toward the study of matching characteristics of the student.

The general nature of the problems of interaction studies in education are the same however, whether dealing with "normal" children in the traditional classroom or the institutionalized "exceptional" child. This problem is twofold: (1) the identification of the most significant

variables with respect to teacher, student, and educational organization for efficacious interaction, and (2) the effects of the interaction of these variables on the academic development of the student.

The nature of the problem to be encountered in this study is the identification of a variable which may be indicative of interaction between teacher and student. That is a variable which is significant for academic achievement in an institutional setting. The concern of the present study is centered with the construct of conceptual tempo, and the relationship of teacher/pupil conceptual tempo to reading achievement for the mentally retarded student receiving residential training.

Purpose of the Study

The purpose of this study is to investigate the relationship between conceptual tempo of teachers and their educable mentally retarded students. It is the further purpose of this study to investigate the relationship between conceptual tempo and reading achievement.

The predictive variables under consideration include: (1) conceptual tempo of students, and (2) conceptual tempo of teachers. The criterion variable of this study is reading achievement of the student.

Significance of the Study

A present estimation of the resident population of the United States is 207,775,000 (The 1973 World Almanac and Book of Facts). The mentally retarded population appears to stabilize at approximately three percent of the total population (Wirtz, and Guenther, 1957; Superintendent of Public Instruction, 1954). Based on the above figures, indications are that an excess of 6.2 million individuals in the United States are

suffering from mental retardation. With such a sizeable population, research which may aid in the search for means to develop the abilities of the retarded individual is in order.

The impetus in education is toward the individualization of the educational experience for the student in order that the benefit derived by the student from that experience may be maximized. Few areas of education need to insure the maximization of educational benefit more than those dealing with the academic education of the mentally retarded.

One problem of educating the retarded student is that the student's attention is easily diverted to nonessential aspects of the learning task. The educable mentally retarded student has difficulty in ignoring irrelevant aspects of his stimulus field in order to attend to aspects which are relevant to the completion of a given task. There appears to exist a twofold problem. The first half of the problem deals with time. How to get the educable mentally retarded student to stay with the task long enough to sort out the relevant from the irrelevant stimuli? The second half of the problem deals with the sorting operation. How to get the educable mentally retarded student to identify the essential elements in a stimulus array?

There are some indications that retarded children may benefit from training programs which deal with the focusing of attention (Stantostefano and Stayton, 1967), and visual discrimination training (Duckworth, 1972). This type of training reduces the response uncertainty of the impulsive individual. In short, this type of training sharpens the sorting skills of the impulsive child. As a result of the training given by Duckworth, children became less impulsive as measured by the Matching Familiar Figures test.

Kagan (1965a) demonstrated that children who had previously been identified as impulsive, on the basis of the MFF test, also had reading difficulties involving visual discrimination. Yando and Kagan reported, in 1968, the results of a study which were taken to indicate that under certain circumstances the conceptual tempo of a student shifted to match the conceptual tempo of his teacher. The subject populations of both of these studies were comprised of normal children who were students in public schools.

Two points are now in evidence: (1) conceptual tempo can be manipulated and (2) conceptual tempo is predictive of some reading

presented now are: Can the conceptual tempo of
etarded students be manipulated through modeling in a
by Kagan (1965a)? And, is the conceptual tempo pre-
fficulties for the educable mentally retarded student?
re the student is, the more time he spends interact-
ct and the more opportunity for meaningful inter-
take place (Kagan, et al., 1964). Having
tempo of an educable mentally retarded student,
letermine if the tempo can be modified. It may
change in conceptual tempo through modeling,
letermine if there is a relationship between
cable mentally retarded student and his

conceptual tempo of the retarded child has been
de ated by Duckworth (1972). However, manipulation for its own sake
has little significance with respect to providing meaningful information

for the educator of the educable mentally retarded student. One might proceed on the assumption that conceptual tempo as a cognitive style is not stimulus specific. Which is to say that the impulsive individual will respond quickly over a wide range of behavior. This, indeed, seems to be what is suggested by Kagan, Rosman, Day, Albert, and Phillips (1964). Thus, by manipulating conceptual tempo it should result in a change in several areas of behavior.

The question to be asked is; is conceptual tempo a variable which relates significantly to the academic achievement of the educable mentally retarded student? And if conceptual tempo does relate to academic achievement of the educable mentally retarded student, what aspects of conceptual tempo are critical to the relationship? Is it the aspect of time and delay in responding, or is it the sorting skills mentioned above? And to which academic skills does conceptual tempo relate

It would be most imprudent to start manipulating conceptual tempo prior to answering the questions above. The significance of the present study lies in its attempt to answer those questions. The present study will attempt to isolate and investigate the relationship between the time component of conceptual tempo and academic achievement in the area of reading achievement.

If conceptual tempo can be demonstrated to be predictive of reading problems with the educable mentally retarded child, and the conceptual tempo of the educable mentally retarded student is related to the conceptual tempo of his teacher, this information could provide a practical and inexpensive means of individualizing the student's education.

The student's educational experience could be individualized from the standpoint of increasing student/teacher contacts which facilitate the

students' behavioral acquisition of desirable aspects of conceptual tempo. Further individualization of the student's education might be provided through a new approach to the remediation of reading difficulties.

Definition of Terms

1. Cognitive style: Refers to "stable individual preferences in mode of perceptual organization and conceptual categorization of the external environment" (Kagan, et al., 1963, p. 43).
2. Conceptual tempo: Refers to a consistent tendency for the individual to display fast or slow response times in problem situations of high response uncertainty.
3. Reflectivity: Refers to a stable conceptual tempo indicative of those individuals which demonstrate long response latency.
4. Impulsivity: Refers to a stable conceptual tempo indicative of those individuals which demonstrate short response latency.
5. Mental retardation: Refers to "subaverage general intellectual functioning which originates in the developmental period and is associated with impairment in adaptive behavior" (American Association on Mental Deficiency, 1959).
6. Educable Mentally Retarded (EMR):

   > Refers to those individuals who possess potential for development in (1) minimum educability in academic subjects of the school, (2) social adjustment to such a point that he can get along independently in the community, and (3) minimum occupational adequacy to such a degree that he can later support himself partially or totally at the adult level (Kirk, 1962, p. 25).

Hypotheses Statements

In an attempt to resolve some of the questions previously raised with respect to the relationships among conceptual tempo of students, and teacher, and reading achievement the following null hypotheses are presented:

1. There is no significant relationship between the conceptual tempo of teachers and the conceptual tempo of their educable mentally retarded students.
2. There is no significant relationship between teacher conceptual tempo and student reading achievement.
3. There is no significant relationship between student conceptual tempo and reading achievement.
4. There is no significant relationship between mental age of the educable mentally retarded student and conceptual tempo.
5. There is no significant relationship between chronological age of the educable mentally retarded student and conceptual tempo.
6. There is no significant relationship between sex of the educable mentally retarded student and conceptual tempo.

Assumptions of the Study

Due to the unique characteristics of the population under consideration, and because of those conditions not within the control of the researcher, caution should be exercised in generalizing from the data generated in this study to other populations.

It is assumed that the student subjects of the population under investigation do not differ significantly one from the other with respect to conceptual tempo. It is further assumed that the educable mentally retarded subjects have not been placed with specific teachers on the basis of some criteria unknown to the experimenter. It is assumed that members of the educable mentally retarded population experience similar living routines at the residential training center, and that the living routines do not have a differential effect on the conceptual tempo of the students.

CHAPTER II

REVIEW OF RELATED LITERATURE

Cognitive Style

In an attempt to discover the relevant processes underlying cognition, several investigators have turned to the systematic study of styles of information processing. There are two information processing constructs which are germane to the present study, cognitive styles and conceptual tempo.

Cognitive style finds its antecedents, along with many other present day aspects of educational and psychological assessments, in the measurement of individual differences. As early attempts to establish relationships between perceptual characteristics and such things as general intelligence and learning performance failed, interest in the area dwindled (Sperry, 1972). During the latter 1930's and early 1940's, interest turned toward the study of consistency and predictability of personality with work done by Thurstone (1944) and others in the area of analysis of perceptual factors relating to personality and temperament.

During the years of the late 1940's and early 1950's, interest was revived in perception. Individual differences in perception, and their relationship to personality structures were of interest. The line of reasoning being that if cognition may be defined as "the process by which knowledge is acquired" (Kagan, 1971, p. 30), and if the way an individual

thinks and behaves is based on the information he has acquired, then distortions and differences in the information intake should be reflected in personality differences.

Individual or stylistic differences in the acquisition of knowledge have been conceptually categorized as cognitive styles. Cognitive style has been defined as "individual variations in modes of perceiving, remembering, and thinking" (Kagan, 1971, p. 30). Messick (1969, p. 105) likewise defines cognitive style as "information processing habits which represent modes of perceiving, thinking, problem solving, and remembering." The following cognitive styles have been extensively studied, and there is some degree of agreement as to the defining characteristics of the style in question. As presented by Messick (1972) some examples of the more agreed upon cognitive style are:

1. Field independence versus field dependence (Witkin, Dyk, Faterson, Goodenough, and Karp, 1962);
2. Scanning (Gardner and Long, 1962);
3. Bredth of categorizing (Pettigrew, 1958);
4. Conceptualizing style (Gardner and Shoen, 1962);
5. Cognitive complexity versus cognitive simplicity (Kelly, 1955);
6. Leveling versus sharpening (Holzman and Klein, 1954); and
7. Tolerance for incongruous or unrealistic experiences (Klein, Gardner, and Shlesinger, 1962).

Although a number of investigators have studied these cognitive styles, the present study is generally concerned with cognitive style, and specifically concerned with conceptual tempo as defined by Kagan (Kagan, Rosman, Day, Albert, and Phillips, 1964). Consistent with previous definitions of cognitive style is the one proposed by Kagan, Moss,

and Sigel (1963, p. 74): cognitive style refers to "stable individual preferences in mode of perceptual organization and conceptual categorization of the external environment."

There are three cognitive styles as described by Kagan and his coworkers: (1) descriptive-analytic, (2) relational-contextual, and (3) inferential-categorical. The descriptive-analytic individual tends to characterize objects in his environment on the basis of a functional relationship. The Inferential-categorical person prefers to form categorizations on the basis of inferences made about stimuli which he groups together. It was noted by Kagan in one of his early studies (Kagan, et al., 1963) that children who were classified as descriptive-analytic on the basis of responses to the Conceptual Styles Test (CST) tended to delay prior to responding.

In a series of studies reported by Kagan, Rosman, Day, Albert, and Phillips (1964) children, especially boys, exhibited the following behavioral correlates of a descriptive-analytic cognitive style: a capacity for sustained concentration in intellectual tasks, an absence of extreme task irrelevant motor activity, and a consistent tendency to inhibition of impulsive solution hypotheses in a series of varied problem tasks. In attempting to further isolate correlates of cognitive style, the Kagan group noted a tendency for individuals who had been classified as descriptive-analytic to delay in reporting solution hypotheses when presented with a problem which called for them to locate a figure embedded in a patterned background. The subjects who gave fewer analytic responses in cognitive style tests responded more quickly and tended to be incorrect more often than the analytic subject.

Conceptual Tempo

This consistent tendency to display fast or slow response times in problems of high response uncertainty was named conceptual tempo (Kagan et al., 1964). The major dimensions of conceptual tempo are reflectivity and impulsivity. As identified by Kagan, the reflective individual is one who responds slowly and is often correct, while the impulsive individual tends to respond more quickly and is often wrong. The instrument developed by Kagan for the measurement of conceptual tempo is the Matching Familiar Figures test (MFF). On this measure the individual is presented with a standard line drawing of a fmiliar figure; i.e., airplane, house, etc., and is instructed to match the standard to one of six similar figures. Only one of the six choice figures is identical to the standard. An example of this version of the Matching Familiar Figures test is presented in Appendix A. The time to the first response and the number of errors constitute the criterion measurements (Kagan, 1965a). Based on his use of the Matching Familiar Figures test, Kagan (1971) determined that the child identified as impulsive usually responds in ten seconds or less, and is generally incorrect, whereas the child identified as reflective will wait for approximately thirty seconds before responding, and is usually correct. These findings are based on Kagan's experience with the Matching Familiar Figures test, and are presented by him as guidelines for classification in the absence of formal standardization of the Matching Familiar Figures test.

It was additionally noted by Kagan, Pearson, and Welch (1966a) that on tests requiring inductive reasoning, impulsive children had faster completion times and high error scores than reflective children. It was

also reported that children tend to orient the head and eyes toward the standard approximately every three seconds. This orientation pattern tends to be invarient across various response latencies (Kagan et al., 1966a). The implication of the latter finding being that reflective individuals take longer to respond because they evaluate their hypotheses solutions longer.

In a study relating impulsivity and reflectivity to reading ability in primary grade children (Kagan, 1966a), it was predicted that children who reflected over hypotheses in situations with high response uncertainty would be more accurate in recognizing words than would impulsive children. The children were given the Matching Familiar Figures test at the start of the first grade. Six months later they were tested for letter recognition; one year later they were tested for word recognition and asked to read a short prose passage. Significant correlations were reported for Matching Familiar Figures response times, Matching Familiar Figures errors, response times and errors together and errors in the letter recognition tests, word recognition tests as well as the prose reading. An analysis of the type of word recognition errors and reading errors indicated the most common errors resulted from selection of incorrect hypotheses words; i.e., "trunk" for "truck," "noise" for "nose" and similar substitution erros.

In a 1968 study Yando and Kagan noted the relationship between teacher conceptual tempo and student conceptual tempo. Teachers were classified reflective or impulsive on the basis of an adult version of the Matching Familiar Figures test; their students were also classified reflective or impulsive on the basis of the children's version of the Matching Familiar Figures test. The children were retested again in the

spring of the academic year. Impulsive students who were taught by reflective, experienced (i.e., more than eight years teaching) teachers were more reflective by the end of the year; however, the shift was significant only for male students.

Two years later Yando and Kagan (1970) demonstrated the relative stability of conceptual tempo. After initially classifying over 200 children either reflective or impulsive, the children were retested every week for ten successive weeks. During the ten week period, the students were tested with successively more complex versions of the Matching Familiar Figures test. The correlations of weekly rankings proved significant at greater than the .01 level.

Recently the Matching Familiar Figures test, as a measure of conceptual tempo, has been used in studies dealing with the mentally retarded. In an attempt to discover relevant characteristics of descriptive-analytic cognitive style in a mildly retarded population (chronological ages = 8.7 - 13.11; mental ages = 4.5 - 10.5), Wyne, Coop, and Brookhouse (1970) employed the Matching Familiar Figures test to assess conceptual tempo. The authors report that conceptual tempo appears to be a more sensitive predictor of performance than the Sigel Cognitive Style Test (SCST) used to classify subjects as to analytic-descriptive style. The performance being predicted was the picture arrangement, picture completion, block design, and object assembly subtests from the Wechsler Intelligence Scale for Children (WISC).

Gozali (1969) used the Matching Familiar Figures test in a study of problem solving styles among educable mentally retarded children. With a population age range from eight to fifteen years and an IQ range from 55 to 78, the author determined that individuals with long response

latencies and few errors made constant efforts to solve test item problems. However, individuals with short response latencies tended to make more errors than reflective individuals. Duckworth (1972) determined that when educable mentally retarded children, identified as impulsive with the Matching Familiar Figures test, were given visual discrimination training, which incorporated high response uncertainty, they subsequently shifted significantly toward the reflective end of the conceptual tempo spectrum.

As previously mentioned, the present study deals with the relationship between teachers and students with respect to conceptual tempo. There is some evidence to suggest that: male student of reflective teachers tend to become more reflective (Yando and Kagan, 1968), and that reflective students experience fewer reading problems (Kagan, 1965a). However, these studies were accomplished with normal students as subjects. With the exception of the three studies previously mentioned, which dealt with institutionalized retarded children (Duckworth, 1972; Gozali, 1969; Wyne et al., 1970), the majority of the studies utilizing the Matching Familiar Figures test have dealt with populations of normal children. The present study deals with retarded children, specifically retarded children that have become institutionalized. The present study also attends to student/teacher relationships with respect to conceptual tempo, and the relationship of conceptual tempo to reading achievement. These areas of concern were not addressed in previous studies utilizing the Matching Familiar Figures test with retarded populations. Since the population of this study differs greatly from those used in the majority of conceptual tempo studies, it is necessary to consider some of the characteristics of the retarded individual. A brief review will be

given of the classifications of retardation and characteristics of the institutionalized retardate.

Mental Retardation

The American Association on Mental Deficiency uses the following definition of mental retardation supplied by Heber (1959, p. 3):

> Mental retardation refers to subaverage general intellectual functioning which originates in the developmental period, and is associated with impairment in adaptive behavior.

Subaverage general intellectual functioning refers to performance which is greater than one standard deviation below the population mean of the age group involved on measures of general intellectual functioning. The developmental period is taken to refer to the period from birth to age sixteen, and adaptive behavior refers to the ability of the individual to function in society (American Association on Mental Deficiency, 1959).

There are two primary classification systems for the identification of mental retardation; the first is based on the degree of intellectual impairment, the second is based on the learning ability of the individual. The IQ classification system of the American Association on Mental Retardation which is based on standard test of general intelligence; i.e., Stanford-Binet (S.B.), the Wechsler Intelligence Scale for Children (WISC), and the Wechsler Adult Intelligence Scale (WAIS), follows:

TABLE I

IQ CLASSIFICATION SYSTEM OF THE AMERICAN ASSOCIATION ON MENTAL RETARDATION

	Standard Deviation	IQ Range	
Borderline	- 1.01 to -2.00	83-68 S.B.	84-70 WAIS & WISC
Mild	- 2.01 to -3.00	67-52 S.B.	69-55 WAIS & WISC
Moderate	- 3.01 to -4.00	51-36 S.B.	54-40 WAIS & WISC
Severe	- 4.01 to -5.00	35-20 S.B.	40 WAIS & WISC
Profound	- to -5.00	20 S.B.	

The second basis for mental retardation classification is the learning ability of the individual with respect to educational attainment. The educable mentally retarded (EMR) individual is one who has potential for development in: 1) minimum educability in academic subjects of the school, 2) social adjustment to such a point that he can get along independently in the community, and 3) minimum occupational adequacy to such a degree that he can later support himself partially or totally at the adult level. The trainable mentally retarded (TMR) person is one who, due to subnormal intelligence, is incapable of learning in classes designed for the educable mentally retarded person, but who has potential for learning self care, adjustment to community and economic usefulness in a protected environment. The uneducable mentally retarded (SMR) individual is one who sever intellectual limitations preclude formal training. The IQ ranges for these categories are:

educable mentally retarded = 50 to 80; trainable mentally retarded = 20 to 49; uneducable mentally retarded = 20 (Kirk, 1962; Scheerenberger, 1964).

Within the general classification of mental retardation (MR), there exists two general categories -- organic and familial. Whereas mental retardation of an organic nature finds its etiology in cerebral pathology, the familial retardate presents a much different picture. The individual suffering from organic mental retardation is usually functioning with an IQ of about 35. The familiar retardate is usually mildly retarded, showing no reasonable indication of cerebral pathology and has evidences of retarded intellectual function in at least one parent, sibling, or other relative (Robinson and Robinson, 1964). As indicated by Zigler (1967), the IQ distribution of the two populations is far from identical. Whereas both groups have IQ ranges from 0 to 70, the mean of the group with organic pathology is approximately 35 while the average IQ for the familiar group is about 50. The IQ distribution for the organic retardate approximates a normal distribution, while the distribution for the familial group is negatively skewed with greater numbers of individuals as IQ approaches 70.

Not all retarded individuals are institutionalized. Distinguishing characteristics which differentiate the institutionalized mental retardate from the non-institutionalized mental retardate is that they are younger, have greater physical disabilities, lower IQ's, more adaptive behavioral difficulties, are from families with depressed income and living conditions (Appel and Tisdall, 1968; Eyman, O'Connor, Tarjan, and Justice, 1972). Males tend to be institutionalized in higher numbers

than females and the male populations tend to be approximately two years older than the female populations (Gerjuoy and Winters, 1969).

Given the heterogenity of the mentally retarded population and the greater inter-individual variability of mental retardates (Baumeister, 1968), it is preferable to use each individual as his own control in order to increase internal consistency and reduce error variance. Thus, the institutionalized mentally retarded population differs markedly from the non-institutionalized population. However, it does present more homogeneity, a somewhat controlled environment, and abundant sources of information for each individual, thus making the institutionalized mentally retarded population preferable for research (Gerjuoy and Winters, 1969).

Conceptual tempo as a characteristic of cognitive style has been investigated extensively with nonretarded subjects. Although meager, there is some evidence which has been interpreted as indicating educational relevance of conceptual tempo. At this time the investigation of conceptual tempo with retarded populations is slight, but the findings are indicative of the existence of conceptual tempo in the retarded population. The intent of the present study is the further investigation of conceptual tempo with a mentally retarded population and explore the educational relevance of the construct for the educable mentally retarded population. In order for knowledge of conceptual tempo to be educationally relevant, it would have to provide new information significant to the educational process for the mentally retarded child or provide an easier or less expensive means of gathering needed information than is now in practice.

CHAPTER III

METHODOLOGY

Subjects

The subjects used in this study were fifty-four educable mentally retarded (EMR) students, thirty-six males and eighteen females, at a residential training center, and three of their teachers. The student subjects ranged in IQ from 55 to 70. The chronological age range of the student subjects was from eight to sixteen years, and mental ages ranging from 4.9 to 9.1 years.

The student subjects were selected by the school administration on the basis of the IQ and age requirements presented by the experimenter. With one exception, these student subjects comprised the entire population of educable mentally retarded student at the school within the IQ and age ranges requested.

The teacher subjects were the academic instructors of the student subjects. Each teacher taught in a self contained classroom where they had contact with their students an average of two hours a day five days a week. The students had only one academic instructor per classroom, and did not move from room to room except for advancement. The teacher population consisted of two females and one male, all had been at the residential training center for at least two years.

Instrument

The conceptual tempo of the subjects was determined with the adult and children's versions of the Matching Familiar Figures (MFF) test. The adult Matching Familiar Figures test consists of two practice plates, which are the last two test plates on the children's version, and twelve test plates. On each test plate there are eight simple line drawings of a familiar figure; i.e., a graph, tree, dress, etc. The standard drawing is set at the top of the plate with remaining drawings arranged in two rows of four at the bottom of the plate. An example of the adult Matching Familiar Figures test may be inspected in Appendix B.

The children's version of the Matching Familiar Figures test also consists of two practice plates and twelve test plates. On each plate there are six simple line drawings of a fmiliar figure; i.e., house, doll, boat, etc. The standard drawing is set at the top of the plate with the remaining drawings arranged in two rows of three at the bottom. The child's version of the Matching Familiar Figures test may be inspected in Appendix A.

The Matching Familiar Figures test has a reported test retest reliability of .75 based on administration of the Matching Familiar Figures test once a week over a ten week period (Yando and Kagan, 1970). Congruent validity, although not directly studied, is provided on the basis of correlation coefficients between the Matching Familiar Figures test and three tests of inductive reasoning. All coefficients were significant at the .05 level for the populations studied. Correlation between the Matching Familiar Figures test and the Wechsler Intelligence Scale for Children, picture completion was .36. Correlation coefficient

between the Matching Familiar Figures test and the Hepatic Visual Memory Test was .76. A coefficient of .47 was found between the Matching Familiar Figures test and the Design Recall Test (Kagan et al., 1964).

Test scores from the Wide Range Achievement Test (WRAT) were used to determine the reading level of the student subjects. The Wide Range Achievement Test was first standardized in 1936 as a convenient tool for the study of the basic school subjects of reading, writing, spelling, and arithmetic computation. It was designed as an adjunct to tests of intelligence and behavior adjustment (Jastak, 1953). The reading subtest of the Wide Range Achievement Test possesses a split half, odd even reliability coefficient of .98 (Jastak, 1953), and a congruent validity with the California Achievement Test administered to educable mentally retarded subjects of .86 (Saxton, 1967).

The Wide Range Achievement Test is administered to each student at the residential center as part of a yearly evaluation. The reading scores from the Wide Range Achievement Test generate by this evaluation were used as the criterion variable. The reading subtest can be defined as recognizing and naming letters and pronouncing words (Jastak, 1953).

Procedure

The students were escorted individually by the experimenter to an office near the students' classroom which had been provided for the purpose of testing. The student subjects had been informed by their teachers that a man would be coming to the classroom and taking some of them out for testing. As evaluation is a continual process at the residential training center, there was no hesitance on the part of the students, nor did the testing create any observable disruption in the

classrooms. During the walk to the testing room, the experimenter discussed general topics of interest with the student subjects. Some of these topics included the weather, upcoming athletic games, and favorite school subjects. After seating the subject, the experimenter occupied a seat directly across the desk from the subject. The Matching Familiar Figures test was placed between the subject and the experimenter and the following instructions were given to the subject: "I am going to show you some pictures of some things that you have seen before." At this point the first practice plate was presented and the experimenter pointed to the standard item. "What I would like for you to do is find where the picture just like this one (indicating standard item) is hiding down here." At this point the experimenter indicated the six similar drawings. "When you have found the one that is just like the one above, point to it."

The subject was instructed to point to the correct drawing. If the choice was incorrect, the subject was shown the correct drawing and was presented with the second practice plate. The subject was told to "find where the picture is hiding." If the subject failed to indicate the proper item, he was shown the correct response and the first test plate was presented. The instructions were repeated for the first test plate but for no succeeding plates, nor was the correct response indicated for any test plate. The latency to first choice was recorded to the nearest half second. At the termination of the test the subject was thanked and escorted back to his classroom.

The teachers had previously been informed by the school administration that an approved study was going to be conducted with their students. The teachers were requested to cooperate fully with the

requests of the experimenter. Upon being introduced to the teachers, they were told that the study was an investigation of cognitive style, And that although neither the study nor the instrument would be discussed prior to completion of the collection of all data, information would be provided at a later date.

The teachers were administered the adult version of the Matching Familiar Figures test in the same office as the student administrations. At the presentation of the first practice plate the teachers were told the following:

> I am going to show you some figures that are familiar to you. Each item at the top (indicating the standard) is repeated below among these eight similar drawings. Your task is to indicate the one drawing among the eight that is exactly like the one above. Are there any questions?

None of the three teachers had questions and the remaining practice plate and test plates were presented. The latency of response to the first response for each test plate was recorded to the nearest half second.

The teachers were tested immediately following lunch prior to the resumption of classes. The children were tested throughout the mornings and afternoons over a two day period.

Statistical Analysis

The focus of this study is descriptive in nature. The stated purpose of this study is to investigate relationships between conceptual tempo of teachers and educable mentally retarded students. In addition, the further purpose has been stated to investigate the relationship between conceptual tempo and reading achievement. The stated hypotheses are addressed to answering questions concerning those relationships. As

such the statistical tests of choice are Chi Square, Pearson's product-moment test of correlation, and the Point Biserial test of relationship.

The data generated to test hypotheses one achieved a ratio level of measurement. However, the concern of the hypothesis was of the relationship between the two measures of conceptual tempo. Dealing with a restricted range of scores with respect to teachers, and with a question of relationship which is basically one of frequency, resulted in Chi Square as the statistical test used for hypothesis one. The Chi Square test of independence was used to determine if student conceptual tempo was independent of teacher conceptual tempo. Independence being indicative of a lack of relationship and dependence being indicative of relationship.

The data generated to test hypothesis number two was ratio with respect to the teachers' conceptual tempo. The data generated to assess students' reading achievement was interval in nature. The data was reduced to nominal level as what was being considered was a frequency of occurrence. The basic question related to hypothesis two was how many students within certain ranges of reading achievement are associated with specific teachers. The level of the data and the nature of the hypothesis resulted in the choice of a Chi Square test of independence being used to test hypothesis number two.

The data generated to test the significance of hypotheses three, four, and five was at least of an interval level. The questions were of relationships between two variables both of which achieved at least an interval level of measurement. As the analysis dealt with two measurements for each individual in the population, the Pearson product-moment

test of relationship was used to test hypotheses three, four, and five.

Hypothesis number six deals with the relationship between a continuous variable and a dichotomous variable. The continuous variable being conceptual tempo as measured by the Matching Familiar Figures test. The dichotomous variable being sex of student. To test the significance of the relationship between sex and conceptual tempo a point-biserial test of correlation was used.

A statistical probability level of .05 was arbitrarily chosen as the level of significance associated with rejection of the stated null hypothesis.

CHAPTER IV

TREATMENT OF DATA AND ANALYSIS OF RESULTS

The purpose of this study was to determine if a significant relationship existed between the conceptual tempo of a teacher and the conceptual tempo of his/her students. Another purpose of this study was to determine the significance of the relationship between the conceptual tempo and reading achievement. The study included an analysis of the relationship that exists between the teachers' scores of conceptual tempo, obtained with the adult version of the Matching Familiar Figures test (MFF), and student scores of conceptual tempo obtained with the child's version of the same test. The study also included an investigation of the relationship between the teacher's conceptual tempo and their students' reading achievement, as measured by the reading subtest of the Wide Range Achievement Test (WRAT). Further analysis was performed to determine the significance of the relationship between student conceptual tempo and: 1) reading achievement, 2) mental age, 3) chronological age, and 4) sex of student.

The hypothesis dealing with the relationship between teachers' and students' conceptual tempo will be considered first. Hypothesis two, dealing with the relationship between teacher conceptual tempo and reading achievement, will be considered next. This will be followed by a consideration of hypothesis three which deals with the relationship between student conceptual tempo and reading achievement. Hypotheses

four, five and six which are addressed to the relationship between conceptual tempo and mental age, conceptual tempo and chronological age, and conceptual tempo and sex will be considered in order.

The data upon which the analyses are based were generated in the following manners. For the Matching Familiar Figures test, latency to the first response was recorded to the nearest .5 second for each of the test plates. A mean latency score was calculated for each individual by summing across the twelve latency responses and dividing by twelve. This results in a single Matching Familiar Figures test score for each individual in seconds per response. The student Matching Familiar Figures test scores ranged from 1.17 seconds to 17.45 seconds with a mean of 6.87 seconds and a standard deviation of 4.47. Academic achievement in reading is expressed in grade levels with each grade level divided into units of ten. Thus, a student reading at a level compatible with the middle of the first grade would receive a reading score on the Wide Range Achievement Test (WRAT) of 1.5. The Wide Range Achievement Test scores range from 1.0 to 4.8 with a mean of 1.89 and a standard deviation of .898. For ease of computation, mental age for each student was converted to a decimal representation. Thus, a mental age traditionally represented as 8 - 6, being eight years, six months, would be converted to 8.5.

Tests of Hypotheses

Hypothesis 1: There is no significant relationship between the conceptual tempo of teachers and the conceptual tempo of their educable mentally retarded students.

The data generated to answer this hypothesis was analyzed through the use of a complex Chi Square followed by a contingency coefficient.

Table II represents the tabulations of the average response latencies on the Teachers' Matching Familiar Figures test indicating the teachers' conceptual tempo and response latencies of the students on the Students' Matching Familiar Figures test, the child's version of the same test. A, B, and C represent the three teachers in the sample and these average latencies were as follows: A = 8.67, B = 19.71, C = 26.91.

TABLE II

OBSERVED FREQUENCIES OF STUDENT LATENCIES
CATEGORIZED BY TEACHERS' AVERAGE
MATCHING FAMILIAR FIGURES
LATENCIES

Student Latency Intervals (Sec.)	Teachers' Latency Averages (Sec.) A 8.67	B 19.71	C 26.91
1 - 3.9	12	1	0
4 - 7.9	4	11	2
8 - 11.9	4	8	4
12+	0	1	7

X^2 = 41.051 (df = 6) Significant at 0.001 level
Contingency coefficient = .657

An examination of Table II indicates that the Chi Square value of 41.051 is significant to a probability level of 0.001. Therefore, the null hypothesis is rejected. That is, there does exist a significant

relationship between the conceptual tempo of the teachers and the conceptual tempo of their educable mentally retarded students as measured in this study. The contingency coefficient of this Chi Square is .657. The contingency coefficient is interpreted in a manner consistent with the interpretation of a Pearson product-moment correlation coefficient. The contingency coefficient is taken as an indication of the strength of the relationship signified by a Chi Square of 41.051.

Hypothesis 2: There is no significant relationship between the teachers' conceptual tempo and their educable mentally retarded students' reading achievement.

The data generated to answer hypothesis two was also analyzed with the used of a complex Chi Square. Table III represents the tabulation of the data. TMFF refers to the teachers' Matching Familiar Figures test scores, and A, B, and C represent the individual teacher. RA and the groupings thereafter refer to the students' reading achievement scores from the reading subtest of the Wide Range Achievement Test.

An examination of Table III reveals that the Chi Square value of 4.231 does not reach a .05 level of significance. The Chi Square test of independence performed on the data reveals that the relationship observed between the teachers' Matching Familiar Figures test scores, and the students' reading achievement scores could have happened more than five times in a hundred by chance. Thus, the results of this analysis fall below the acceptance level of .05. Therefore, hypothesis two is not rejected, and no indication of a significant relationship between teachers' conceptual tempo and reading achievement was obtained.

TABLE III

OBSERVED FREQUENCIES CATEGORIZED BY TEACHER MATCHING FAMILIAR FIGURES SCORES (TMFF) AND STUDENT READING ACHIEVEMENT SCORES (RA)

Student RA	TMFF A 8.67	B 19.71	C 26.91
1 - 1.3	7	7	2
1.4 - 1.8	6	5	6
1.9 - 2.3	4	4	1
2.4+	3	5	4

$x^2 = 4.231$ (df = 6) Nonsignificant at .05 level

Hypothesis 3: There is no significant relationship between student conceptual tempo and reading achievement.

The data generated to address hypothesis three was analyzed with the used of the Pearson product-moment test of correlation (r).

The correlation coefficient testing the relationship between students' reading achievement and their Matching Familiar Figures test scores is 0.137. This correlation coefficient does not achieve significance at the .05 probability level. Therefore, hypothesis three is not rejected. These results indicate that the present analysis produced no evidence to support the contention of a significant relationship existing between student conceptual tempo and reading achievement in this study.

Hypothesis 4: There is no significant relationship between mental age of educable mentally retarded students and conceptual tempo.

The data relating to hypothesis four was analyzed with the use of a Pearson product-moment test of correlation. The correlation coefficient indicative of the relationship between conceptual tempo and mental age was .098. This correlation coefficient does not achieve a .05 level of probability. As a result, hypothesis four is not rejected, since there was no indication of a significant relationship between the mental age of educable mentally retarded students and their conceptual tempo.

Hypothesis 5: There is no significant relationship between chronological age of educable mentally retarded students and their conceptual tempo.

A Pearson product-moment test of correlation was used to analyze the data relevant to hypothesis five. The correlation coefficient of relationship is .106 which does not achieve significance at the .05 probability level. In light of this result, hypothesis number five is not rejected since there was no indication of a significant relationship between chronological age of educable mentally retarded students and their conceptual tempo in this study.

Hypothesis 6: There is no significant relationship between sex of educable mentally retarded students and their conceptual tempo.

The data relating the continuous variable of conceptual tempo to the dichotomous variable of sex was analyzed with a point bi-serial test of correlation. The analysis yielded a correlation coefficient of -0.237. This correlation coefficient failed to achieve a probability of .05. Thus, the data does not support a rejection of null hypothesis number six

and since the existence of a significant relationship between conceptual tempo and sex was not confirmed.

Even though it was not formally stated in hypothesis form, the relationship between latency of response and number of correct responses was investigated. The mean latency response to the child's version of the Matching Familiar Figures test was compared to the number of correct responses. With two measures for each individual, a Pearson product-moment test of correlation was used to analyze the data. The resulting analysis produced a correlation coefficient of .351 which is significant at a level of 0.009. Thus, the educable mentally retarded population in this study responded to the Matching Familiar Figures test in a manner consistent with normal populations. That is, the individuals with the shorter response latencies also tended to make fewer correct choices on the Matching Familiar Figures test.

Summary

This chapter has presented a detailed analysis of the statistical treatment of the data. The following hypothesis was rejected: There is no significant relationship between the teachers' conceptual tempo and their educable mentally retarded students.

The following hypotheses could not be rejected:

1. There is no significant relationship between the teachers' conceptual tempo and their educable mentally retarded students' reading achievement.
2. There is no significant relationship between student conceptual tempo and reading achievement.

3. There is no significant relationship between mental age of educable mentally retarded students and conceptual tempo.
4. There is no significant relationship between chronological age of educable mentally retarded students and their conceptual tempo.
5. There is no significant relationship between sex of educable mentally retarded students and their conceptual tempo.

In addition to the formally stated hypotheses, the relationship between latency of response and number of correct responses was also investigated. The analyses of data resulted in a correlation coefficient of .351 which is significant at a probability level of 0.009.

CHAPTER V

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

General Review of the Study

Since one of the primary goals of education is change in the student, various investigative approaches have sought areas in which to provide greater influence for change. The change in question here being that of academic learning, or change in behavior which fosters academic learning. The area of focus for this study has been that of the student/teacher relationship. To the extent that this relationship may foster academic success it has been variously studied primarily as it relates to normal children in traditional classrooms. It has been the purpose of this study to investigate an aspect of the student/teacher relationship, particularly that relationship which exists between the institutionalized educable mentally retarded (EMR) student and his/her teacher. The aspect of that relationship under investigation has been conceptual tempo. A further purpose of this study has been to determine the significance of the relationship between conceptual tempo and reading achievement for that population.

Fifty-four educable mentally retarded students at a residential treatment center in Oklahoma (36 males, 18 females) and their teachers formed the sample group. The children ranged in chronological age from eight to sixteen, and in mental age from 4.9 to 9.1. The range of IQ's

for the students was from 53 to 74. Each student was individually administered the child's version of the Matching Familiar Figures (MFF) test as a measure of conceptual tempo. The Matching Familiar Figures test scores ranged from 17.45 to 1.17 with a mean of 6.87 and a standard deviation of 4.47. Each of the three teachers were also individually administered the adult version of the Matching Familiar Figures test as a measure of conceptual tempo. Access to the school records of the students was obtained from which were extracted the students' reading subtest scores from the Wide Range Achievement Test (WRAT). The reading achievement scores taken from the reading subtest of the Wide Range Achievement Test ranged from 1.0 to 4.8 with a mean achievement level of 1.89, and a standard deviation of .898. The student subject population, with one exception, comprised the entire population meeting those IQ and age requirements in the academic training school.

Six hypotheses were presented. These were concerned with: 1) the relationship between teachers' conceptual tempo and students' conceptual tempo; 2) the relationship between teachers' conceptual tempo and reading achievement; 3) the relationship between students' conceptual tempo and reading achievement; 4) the relationship between mental age and student conceptual tempo; 5) with the relationship between chronological age and student conceptual tempo; and 6) the relationship between sex of student and student conceptual tempo.

The results of the investigation are as follows: Only one of the six hypotheses was rejected. On the strength of an analyses of the data which produced a Chi Square of 41.051, the first hypothesis was rejected. There was a significant relationship between teacher and student conceptual tempo, as measured in this study.

Analyses of the data failed to provide compelling evidence for the rejection of hypotheses two through six. In this study there was no significant relationship observed between conceptual tempo of the teacher and the reading achievement of the students. Nor was there a significant relationship between conceptual tempo of the student and reading achievement in this study. The relationships between conceptual tempo and 1) mental age, 2) chronological age, and 3) sex of student were found to be nonsignificant in this investigation.

Discussion

When the results of the statistical analyses of the data were examined, three conclusions evolved. First, due to the demonstration of significance at the .001 level, hypothesis one was rejected. From that follows the conclusion that there is a significant relationship between the conceptual tempo of an educably mentally retarded student and the conceptual tempo of his teacher as measured in this study.

Secondly, due to the lack of significance at an acceptable level for rejection, hypotheses two and three are not rejected. From this it is concluded that for the population investigated the conceptual tempo of the teacher and the conceptual tempo of the student are independent of the reading achievement level of the student.

Thirdly, due to the failure of data to achieve significance at an acceptable level for rejection, hypotheses four, five and six were not rejected. Concluding from this fact that mental age, chronological age, and sex are independent of conceptual tempo for the population investigated in this study.

In the remaining portions of this discussion an attempt will be made to give reasons why the observed results differed from those results reported by others, and to attach meaning to those results which were observed. Why were the results of this study so disparate, in many respects, from those results previously reported or predicted by others who have studied conceptual tempo? And in light of this disparity on so many points, why was there concurrence on one point?

A point germane to the answering of these questions lies within the defining criteria of conceptual tempo and the measurement of those criteria. As noted earlier in this paper, and in various studies by Kagan (1965a, 1965b, 1965c, 1966a, 1966b, 1971), two criteria measures have been commonly used in determing conceptual tempo. Those criteria were latency and correctness of response on the Matching Familiar Figures test. In early students by Kagan et al. (1963, 1964), which chronicle the development of the Matching Familiar Figures test, latency of response was focused on as a behavioral correlate of a descriptive-analytic cognitive style. It was observed that when responding to items on tests used to determine cognitive style; i.e., Cognitive Style Test, Hepatic Visual Memory Test, Design Recall Test, some individuals delayed prior to responding. It was noted that the individuals which delayed were often the same ones identified as possessing a descriptive-analytic cognitive style. It was further observed that these same individuals were often correct in their responses. On the basis of these findings, the Matching Familiar Figures test was developed as a predictor of the descriptive-analytic cognitive style. The Matching Familiar Figures test used latency to response and correctness of response as criteria variables for predicting the descriptive-analytic cognitive style.

Subsequently, on the basis of a slight but significant correlation of .35 between latency of response and correctness of response, Kagan et al. (1964) dichotomized both criteria variables and forced them into the categories of reflective and impulsive. Kagan's (1964) criteria for reflective categorization of an individual were both slow response latency and correct respnnses. Conversely, the impulsive individual was identified as one who had fast response times and incorrect responses.

But how fas or slow must an individual be or how horrect must an individual be in order to be categorized as relfective or impulsive? This problem was solved by dividing any given population at the means of the two criteria variables and selecting the extremes. Thus, an individual must be both below the mean on response latency and above the mean on correctness in order to be classified as reflective. Likewise, an individual must be both above the mean on response latency and below the mean on correctness to be classified as impulsive.

Thus, of the four possible combinations available; i.e., fast/right, fast/wrong, slow/right, slow/wrong, Kagan chose to deal with only two: fast/wrong and slow/right. In one stroke Kagan ignored potentially half of any given population, and insured significant correlations between latency of response and correctness in his groupings. After examining some fifteen studies which utilized the Matching Familiar Figures test (Duckworth, 1972; Gozali, 1969; Kagan, 1965a, 1965b, 1965c, 1966a, 1966b, 1971; Kagan, Moss and Sigel, 1963; Kagan, Rosman, Day, Albert and Phillips, 1964; Kagan, Pearson and Welch, 1966a, 1966b; Wyne, Coop and Brookhouse, 1970; Yando and Kagan, 1968, 1969), the author was able to find only two instances where the results were not reported only in terms of reflective or impulsive categories. Which is to say that means, standard deviations,

and various statistical tests were performed on the data of, and reported for, only the reflective or impulsive groupings. The two exceptions to the rule of reporting data only for the reflective and impulsive groupings were the 1964 study of Kagan et al. and the study of Wyne et al. (1970) which dealt with a retarded population. It is inferred that these two studies used the fast/right and slow/wrong groupings as well as the fast/wrong and slow/right groupings. The basis for this inference is found in correlation coefficients which were reported for latency to response and correctness of response. These coefficients were based on the entire range of scores for the population prior to dichotomization of the variables. Although implying that conceptual tempo is a continuous variable which manifests itself throughout the population, the studies above, with exceptions noted, have used a very select group to represent that population.

As previously mentioned, conceptual tempo is defined in this study in terms of latency to response only. The full range of scores from the Matching Familiar Figures test were used in the analyses of the data, and the variable of conceptual tempo was not dichotomized. Keeping this in mind, it is interesting to note that the correlation between latency of response and correctness of response of .351 reported in this study is very close to the .35 reported by Kagan et al. in 1964. But the coefficient is no where near the magnitude of .65 and .75 reported for correlations of the same variables in the reflective and impulsive categories in a later study (Kagan, 1966a).

Thus, it is possible that contrary to the implication of previous reports (Kagan, 1965a, 1965b, 1965c), the construct of conceptual tempo is a significant correlate of cognitive style only for the very restricted

samples investigated by Kagan. Even though it is implied by Kagan and others (1964) that latency of response is an adequate measure of conceptual tempo and that the dichotomized variable is equal to the continuous variable, this appears not to be the case for conceptual tempo as measured in this study. And the results obtained in this study differ from those obtained or predicted by Kagan.

As predicted by Kagan (1965a), conceptual tempo should be predictive of reading problems. As measured in this study, this was not the case. Reading problems of the type indicated would seem to be more related to problems of discrimination rather than latency of response. This would appear to be a situation related more to the accuracy of response rather than latency of response. Less that thirteen percent of the variance of the latency of response scores for the population in this study is accounted for by the relationship to correctness of response. Therefore, the relationship between latency and correctness is too weak to significantly predict reading problems with latency alone. The magnitude of the relationship could be increased by dealing with reflective and impulsive groups; however, this would be at the expense of generalizability of the results. It is believed that the failure of conceptual tempo, as measured in this study, to relate significantly to reading achievement, chronological age, mental age, and sex is due at least in part to the differences in the selection criteria used to generate populations for the present study and studies by Kagan (1965a, 1966a).

It is believed that the reason for the differences between the correlations may be found in the differing criteria for selection into the sample groups. Correlations based on the full range of sample scores are comparable at .35 and .351. However, inclusion into the reflective

or impulsive groups was based on meeting the slow/right and fast/wrong criteria (Kagan et al., 1964). This selection produced high correlations or .65 and .75 for the variables within the two groupings (Kagan, 1966a). Thus, the present measurement was based on the implied pervasiveness of conceptual tempo rather than restricted preselected impulsive or reflective groupings. This also calls into question Kagan's (1966b) contention that conceptual tempo is a profitable means of individualizing instruction for brain damaged and reading retarded children. When the entire range of scores were used for analyses in the present study, conceptual tempo appeared unrelated to reading achievement, one of the primary academic skills.

Although the population used was different from those with which the Matching Familiar Figures test was developed, it is a population which has been used in at least three other studies (Duckworth, 1972; Gozali, 1969; Wyne et al., 1970). It is interesting to note that although data is not reported for the entire populations, Wyne et al. (1970) do report a correlation between latency of response and correctness of response of .34 for the full population. This compares with a correlation of .35 reported for the same variables for an entire study population by Kagan (1964) and the correlation of .351 reported in the current study. Thus, although ranges of scores and means have not been reported, there does appear to be a relationship of a consistent magnitude between latency and correctness of response across the differing populations.

If the foregoing is true and the difference in criterion, measurement and population selection obviated significant results, then how is the significant relationship between conceptual tempo of students and teachers explained. These results are consistent with trends

reported by Yando and Kagan (1968). The male to female ratio in this study was two to one. As noted by Yando and Ziegler (1971) and Ziegler (1967), retarded children and especially males tend to be more sensitive to cues provided by an adult than do normal children of the same mental age. This study utilized a student population of individuals who are sensitive to actions of adults. The teacher population was comprised of three adults who were warm, nurturing, socially superior individuals who have had contact with the students five days a week, and in some instances, for more than a year. As pointed out by Bandura, Ross and Ross (1963) and Bandura and Walters (1963), conditions such as these are very conducive for the acquisition of behavior through modeling. The teachers, through their behavior, modeled different styles of interacting with the environment. The teachers in this study were not modeling reflective or impulsive conceptual tempos as defined by Kagan (1965a). It must be remembered that Kagan's definition of the reflective tempo was slow and correct, and the impulsive conceptual tempo was defined as fast and incorrect. These teachers did not model incorrectness of responding, but they did model tempo of responding. The teachers only modeled two of the four fast/slow, right/wrong categories. These were fast/right and slow/right. It is believed that the right/wrong continuum is a characteristic of instruction whereas the fast/slow continuum is a characteristic of the tempo of response. This tempo appears to be unrelated to reading skills, chronological age, mental age, and sex for the population utilized in this study. Thus, it is postulated that the students may have acquired a tempo of response through modeling teacher behavior, a tempo which is independent of correctness of response.

Recommendations

The following recommendations will be given concerning future studies which may hopefully address themselves to some of the problems encountered in this study.

In the present study of conceptual tempo two possibilities were considered by the experimenter. The first option was for the experimenter to spread the variables by using only the extremes of the measurement ranges. This appears to be the practice adhered to by Kagan and his followers. This practice had the benefit of increasing the likelihood of achieving significant results. However, at the same time, the generalizability of the results were reduced since they may not be applicable to the larger population as a whole.

The other option was to use a broader range of scores which were more representative of the population. This practice decreased the likelihood of achieving significant results. But the results were more accurately generalizable to the population from which the sample was drawn. The second option was the one chosen in this study.

In view of these two options, it is recommended that a future study compare data generated by both methods. It may be possible to determine limits imposed on the data by the two methods, and conceivably devise a means of incorporating the advantages of both methods such that more than two levels of conceptual tempo may be identified with some accuracy.

Future studies must also become involved with directly demonstrating the reliability and validity of the instrument, especially for retarded populations. It is Kagan's (1966a, p. 22) contention that:

> The brain-damaged child, as well as the reading-retarded child, is more prone to be impulsive than reflective and his inferior intellectual performances are more often the result of impulsivity than inadequate verbal or knowledge resources.

This statement is made in spite of the inability of the author to find any information dealing with the standardization of the Matching Familiar Figures test for normal children, let alone for a brain damaged population. A correlation coefficient of .70 was presented as representing the strength of the relationship existing between response times on the Matching Familiar Figures test and scores from the Bender Visual Motor Gestalt Test (BMVGT) for diffuse brain damage (Kagan, 1965b). However, an extensive search of the literature has failed to locate the study or data upon which this assertion is based. As mentioned previously, at least three other students (Duckworth, 1972; Gozali, 1969; Wyne et al., 1970) have utilized the Matching Familiar Figures test with retarded populations. One of these (Gozali, 1969) presented information which would be helpful in the comparison of Matching Familiar Figures test results for other retarded populations; i.e., a correlation based on complete sample data. Recommendations are, therefore, made for studies dealing with the standardization of the Matching Familiar Figures test. Especially studies of standardization which employ retarded populations.

In view of the results reported in this study and certain characteristics of the retarded child reported elsewhere (Yando and Ziegler, 1964; Ziegler, 1967), it is recommended that further study be directed toward the social interaction variables in the educable mentally retarded classroom. One must not forget that social skills as well as academic skills are learned in the classroom. For these educable mentally

retarded students, it is no small accomplishment for many of these to simply sit still long enough to receive instruction.

If modeling is the basis for the observed relationship between students and teachers, then it is felt that subsequent investigators may achieve better results by concentrating their labors in the area of social interaction. It is also well to remember that although the relationship between student and teacher conceptual tempo was significant beyond the .001 level of probability, the relationship accounted for only 43 percent of the variance. The causes for the unaccounted for variance may be found in the conceptual tempos of other significant adults in the student's life.

It is further recommended that study be given to the longitudinal aspects of conceptual tempo. Since a student may spend several years with a given teacher or in a certain living cottage, it is possible that his conceptual tempo, as defined in this study and by Kagan (1965a), may change over time. Measurements taken at the student's introduction to the residential training center and at spaced intervals would aid not only in the identification of the test instruments' reliability, but may also help in the identification of variables which effect fluctuations in conceptual tempo.

Conceptual tempo was defined in this study in a manner focusing on latency to response. As conceptual tempo was defined by Kagan (1965a), latency to response represents only half of the defining measurement variables, the other half being correctness of response. By choosing to deal with the fast/wrong and slow/right pairings, Kagan has implied that since it is better to be right, it is also better to be slow. How then to account for the fast/right and slow/wrong individuals? If these

pairings were chosen, the implication would be that fast is better than slow. The prevailing emphasis in most classrooms has indeed seemed to favor the fast/right student. However, it is still better to be slow/right than fast/wrong or slow/wrong. The educational relevance of conceptual tempo would seem to be found in the identification of those students whose tempo of responding are related to the incorrectness of their responses. That is, identifying the slow/wrong and fast/wrong students. These would be the students who evaluate a response so long that they confuse themselves and arrive at an incorrect solution and the student whose need to be quick is so great that he responds before allowing sufficient time for adequate comparison of possible responses. Further study should be conducted with the intent of providing additional information about conceptual tempo for the purpose of aiding the educable mentally retarded student in moving further toward the "right" end of the right/wrong continuum irrespective of latency to response.

As with many studies, this one raises more questions than it answers. Not only have additional questions been raised, but previous results have come under some doubt. Previous results have been reported to indicate that conceptual "increases with age, is stable over time, and manifests pervasive generality across tasks" (Kagan, 1965b, p. 159). These results were not confirmed in this study for conceptual tempo.

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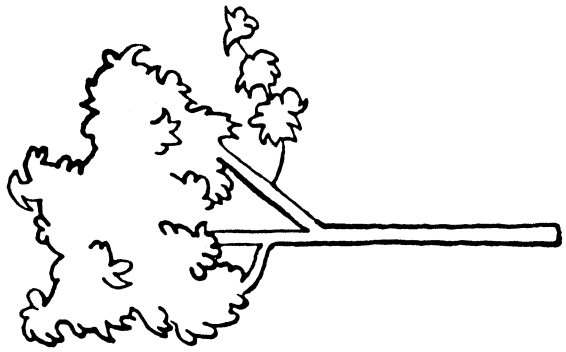
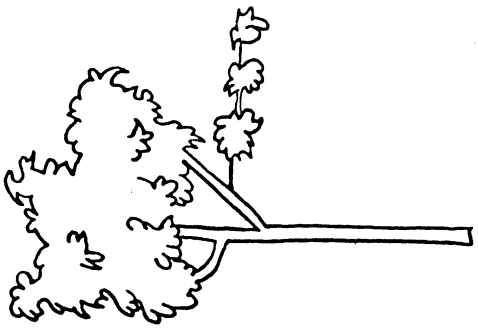
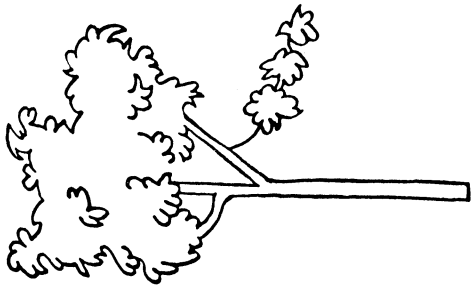
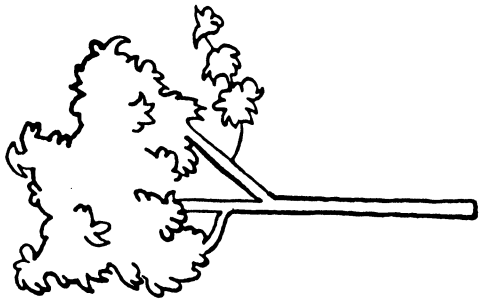
APPENDIX A

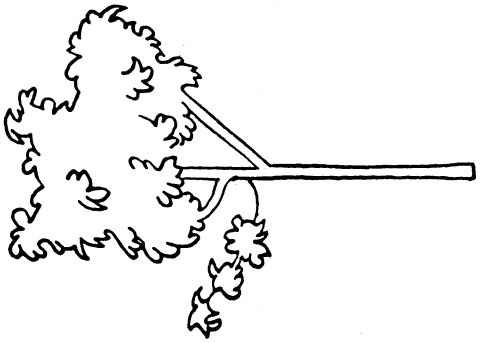
CHILDREN''S MATCHING FAMILIAR FIGURES

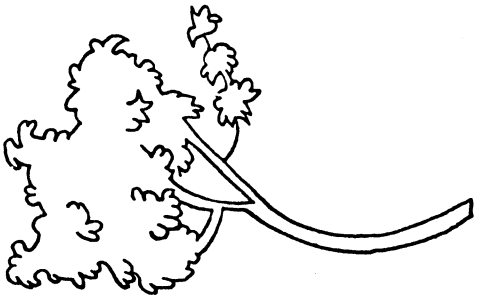


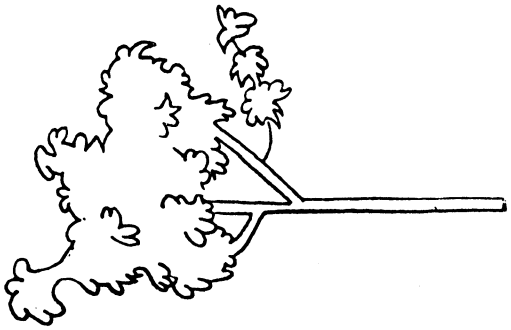






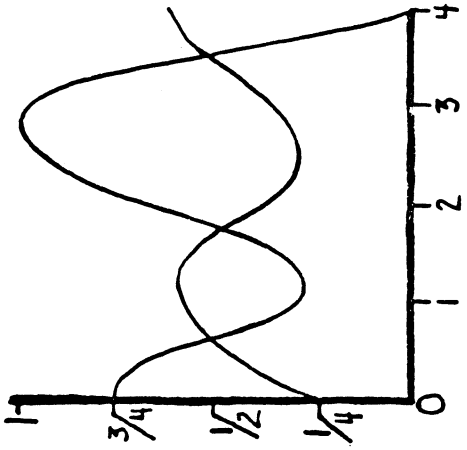






APPENDIX B

ADULT MATCHING FAMILIAR FIGURES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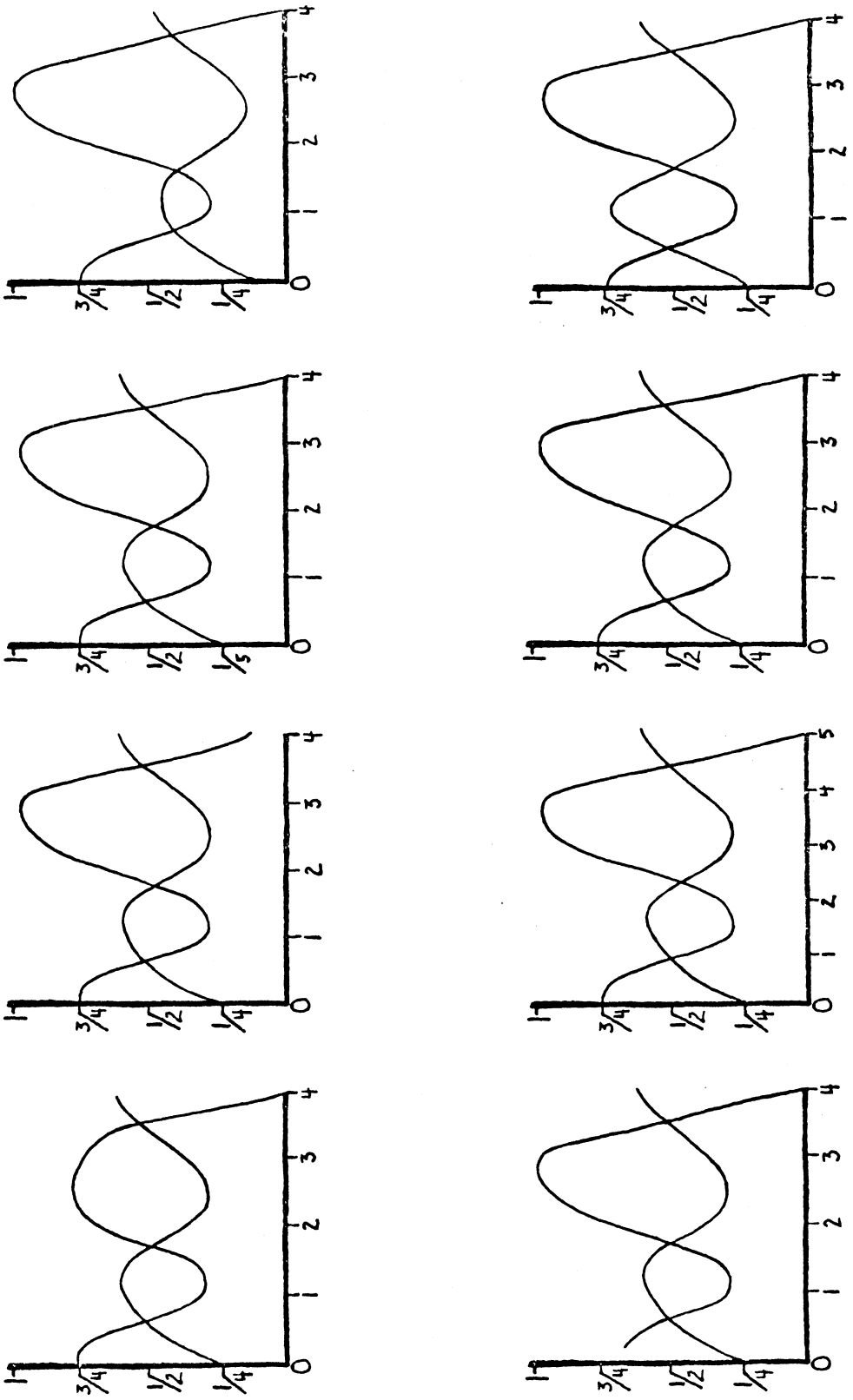
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APPENDIX C

RAW DATA

Sex	Student Matching Familiar Figures S/MFF	Correct	Teacher Matching Familiar Figures T/MFF	Reading Achievement R/A	Chronological Age	Mental Age
M	7.00	3	19.71	1.6	12	6.8
M	6.96	1	19.71	1.6	9	5.4
F	6.21	3	19.71	1.3	8	4.9
M	6.16	1	19.71	2.4	10	5.3
M	6.13	4	19.71	1.2	10	6.0
M	6.13	3	19.71	1.4	13	8.5
M	5.92	5	19.71	2.9	10	6.4
M	5.88	4	8.67	1.8	11	6.6
F	5.29	3	26.91	4.2	13	8.9
F	5.04	3	19.71	1.2	10	6.2
M	5.00	3	19.71	1.3	10	5.4
F	4.29	4	8.67	1.4	10	5.9
F	4.13	3	8.67	1.9	12	7.4
M	4.00	3	8.67	1.6	13	7.4
F	3.96	3	19.71	2.1	10	7.4
F	3.21	0	19.71	2.0	11	7.5
M	3.08	2	19.71	1.7	12	7.6
M	2.91	5	8.67	1.4	13	7.1
F	2.75	3	19.71	1.5	12	6.4
M	2.46	5	8.67	1.3	15	8.9
M	2.42	1	8.67	1.9	12	6.6
M	2.25	3	8.67	1.0	13	7.4
M	2.00	3	8.67	1.9	10	6.9

Sex	S/MFF	Correct	T/MFF	R/A	CA	MA
M	17.45	9	19.71	2.8	12	7.0
M	17.17	1	26.91	1.8	13	9.1
M	15.88	8	26.91	2.3	13	7.2
F	15.63	4	26.91	3.2	14	7.8
M	15.42	3	26.91	2.4	13	7.2
M	15.21	4	26.91	1.3	13	7.9
M	13.21	6	26.91	3.0	14	8.5
F	10.92	7	19.71	2.4	9	5.0
M	10.88	2	26.91	1.6	13	7.3
M	10.75	7	19.71	2.8	12	8.3
M	10.46	6	19.71	2.0	11	7.0
F	9.71	2	26.91	1.8	13	7.4
F	9.63	4	26.91	1.3	14	8.5
M	9.63	7	8.67	1.4	13	8.0
M	9.08	4	8.67	1.3	12	7.3
M	8.83	1	26.91	1.8	13	7.3
M	8.58	3	8.67	1.1	13	7.8
M	8.29	6	19.71	1.3	9	6.3
F	8.13	6	19.71	2.1	12	6.6
M	7.79	5	19.71	1.2	10	6.1
M	7.71	2	26.91	1.8	13	7.9
M	7.38	3	19.71	1.4	12	7.1
M	7.00	1	26.91	1.7	14	7.6
F	1.96	5	8.67	2.1	13	8.8
F	1.83	5	8.67	1.8	12	7.1

Sex	S/MFF	Correct	R/MFF	R/A	CA	MA
M	1.83	5	8.67	4.8	16	8.8
M	1.67	3	19.71	1.0	11	6.3
F	1.67	2	8.67	1.2	15	8.3
F	1.63	2	8.67	1.3	13	7.4
F	1.54	4	8.67	1.1	13	8.0
M	1.17	3	8.67	4.8	12	7.4

VITA

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Doctor of Education

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