AN EXAMINATION OF THE INFLUENCE OF ONE ASPECT OF
COGNITIVE STYLE, THE IMPULSIVITY-REFLECTIVITY
DIMENSION, UPON READING BEHAVIOR AT
THE ELEMENTARY SCHOOL LEVEL

A thesis submitted in partial satisfaction of the
requirements for the degree of Master of Arts in
Elementary Education: Reading Improvement

by

Irma Bierman

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The Thesis of Irma Bierman is approved:

Dr. Carole Dodgson

Dr. Raymond Jung

Dr. Douglas Robertson, Chairperson

California State University, Northridge
DEDICATION

This thesis is dedicated to Julie, Michael, and Laurie, whose children will benefit by more enlightened approaches to teaching reading.

I. B.
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I. B.
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ABSTRACT

AN EXAMINATION OF THE INFLUENCE OF ONE ASPECT OF COGNITIVE STYLE, THE IMPULSIVITY-REFLECTIVITY DIMENSION, UPON READING BEHAVIOR AT THE ELEMENTARY SCHOOL LEVEL

by

Irma Bierman

Master of Arts in Elementary Education

Among the cognitive processes that influence an individual's ability to reconstruct meaning from the printed page is cognitive style. More specifically, conceptual tempo, the impulsivity-reflectivity dimension of cognitive style affects the manner in which an elementary grader will process printed materials with respect to the amount of time taken to evaluate the solution hypotheses in high uncertainty response situations.

The Matching Familiar Figures Test, designed by Jerome Kagan, is used to determine conceptual tempo, impulsive or reflective, in all research reviewed by the author. This
test indicates the response style of the individual in selection and evaluation of solutions to tasks where a high degree of response uncertainty prevails.

A literary review of the research was conducted into four areas of reading behavior: reading readiness, beginning reading instruction, reading achievement, and oral reading. Empirical evidence demonstrating statistical significance was noted in each category of reading behavior supporting the hypothesis that students who demonstrate a more reflective conceptual tempo are more successful with respect to the four areas of reading researched, than students with an impulsive style of cognition.

The impulsivity-reflectivity dimension of cognitive style governs and determines the amount and organization of information which becomes available to the individual perceiver and affects the quality of his conceptualization in reading.

An understanding of the cognitive mechanisms or principles critical to reading should lead to the development of remedial procedures (techniques of strategy) which might alter the cognitive structures involved in, or train the individual to make better use of the cognitive approach most appropriate for facilitating the acquisition of competency ultimately leading to his most successful performance in reading.
AN EXAMINATION OF THE INFLUENCE OF ONE ASPECT OF COGNITIVE STYLE, THE IMPULSIVITY-REFLECTIVITY DIMENSION, UPON READING BEHAVIOR AT THE ELEMENTARY SCHOOL LEVEL

Chapter I

STATEMENT OF THE PROBLEM AND DEFINITION OF TERMS

Introduction

The nature of reading behavior has become a prime concern of educators. The literature is inundated with studies concerning perceptual processes and their relationship to reading behavior (Shapiro, 1976). Field dependence-independence, an aspect of cognitive style, is well represented in the literature (Drummond, McIntire, Minctons, 1978; Cohn, 1968; Witkin, 1962). However, few investigations have been made into the area of cognitive processes and strategies used when learning to read, even though recent research indicates the need for exploration into this area (Sawyer, 1974). Blanton and Bullock (1973), in their discussion of cognitive style and reading behavior, pointed to the need for more research into the exploration of cognitive style and its role in the determination of how a reader acquires meaning from printed materials.

The concept of cognitive style proposes that when perceiving, an individual's cognition is actively (as opposed to passively) selecting, sorting, and organizing
information according to his own systematic rules which are influenced by personality and motivational factors (Stantostefano, Rutledge, Randall, 1965).

Kagan et al. (1964), identified one aspect of cognitive style as conceptual tempo, the impulsive or reflective reaction which might occur in high uncertainty response situations where the answer is not immediately obvious and a choice must be made from several alternatives.

There is evidence that suggests that impulsive and reflective attitudes are stable response dispositions (Kagan and Kogan, 1970), while other research suggests that this aspect of cognitive style is modifiable (Zelniker et al., 1973: Egeland, 1974). Kagan's research (1965) into the connection between conceptual tempo and reading indicates that style of response is related to various aspects of the reading process.

Statement of the Problem

Blanton and Bullock (1973), have stated that recent research into the impulsive-reflective dimension of cognitive style have produced productive results for researchers and educators in their quest to better understand the reading process and how to help children read more effectively.

An understanding of the mechanism of conceptual tempo and its effect upon reading behavior will aid the educator to focus in upon his student's weaknesses and strengths and
prescriptively adjust his teaching methods for maximum productivity when teaching reading. In the test-taking situation, consideration of an individual's conceptual style will lead to more valid test scores and better placement. Early diagnosis of conceptual style may lead to early prediction of candidates with potential problems in reading. Prevention of these problems can be instituted before signs of retardation occur. When necessary, less desirable conceptual style (impulsive) may be retrained to a more reflective style leading to more effective reading behavior.

The purpose of this in-depth descriptive review of the literature was to examine the influence of one dimension of cognitive style, the impulsivity-reflectivity dimension, on the reading behavior of elementary school children.

**Definition of Terms**

For the purpose of this study, the basic terms are defined below:

**The Impulsive-Reflective Dimension of Cognitive Style.** In a problem solving process which involves response uncertainty, some children characteristically respond rapidly, but make many errors; these children are referred to as "impulsive." "Reflective" children, on the other hand, are typically slower to respond and err less. This cognitive construct is often measured by Jerome Kagan's Matching Familiar Figures Test (Epstein, Cullinan, Sternberg, 1977).

**Matching Familiar Figures Test.** This test was
developed by Jerome Kagan as a means for identifying the conceptual style of response as impulsive or reflective (Shapiro, 1976: Kagan, 1966). An in-depth explanation of this test and its administration is contained in Appendix A.

**Reading Behavior.** Reading behavior includes the fundamental aspects of the complex human skill of reading (Smith, 1971). For the purpose of this study, the aspects of reading identified as reading readiness, beginning reading instruction, reading achievement, and oral reading will be explored. "Reading" will mean decoding orthographic elements from the printed page with full comprehension.

**Reading Readiness.** Reading readiness is an assessment of the child's preparedness to synthesize his previously gathered skills and experiences in order to apply them to the task of reading successfully (Ruddell, 1974).

**Beginning Reading Instruction.** Beginning reading instruction includes the initial aspects of mastering a derived language process by means of a sequential series of skill developments leading to the ability to decode printed material with understanding (Heilman, 1972).

**Reading Achievement.** Reading achievement is a measure of growth of understanding based on an established standard, usually measured by test scores (Della-Piana, 1968).

**Oral Reading.** Oral reading is reading aloud to others. Reading aloud provides the opportunity for the teachers to diagnose the strengths and weaknesses in decoding and to
assess the student's ability to use these skills to convey the author's meaning to the listener (Goodman, 1969).

**Reading, A Psycholinguistic Process.** The reader utilizes three kinds of information simultaneously. The reader must have graphic input, of course, but he must also use syntactic and semantic information as well. He predicts and anticipates on the basis of this information, sampling just enough from the print to confirm his guess of what's coming, to cue more syntactic and semantic information. Redundancy and sequential constraints in language, which the reader reacts to, make these predictions possible (Goodman, 1967).

This review of the literature was conducted in an attempt to better understand one aspect of cognitive style, the impulsivity-reflectivity dimension, and to determine its effect upon reading behavior. The studies reported on were limited to elementary grades kindergarten through six.
Chapter II

CONCEPTUAL TEMPO AND READING READINESS

Introduction

Research into the relationship between conceptual tempo and reading readiness indicates that response style is related to aspects of the reading process (Kagan, 1965). It would appear likely that conceptual tempo would be related to readiness for reading since readiness programs, materials, and measures all contain problem solving situations which entail the selection and evaluation of solution hypotheses. The purpose of this chapter is to review the research literature concerning conceptual tempo and its relationship to reading readiness.

Review of Literature

Shapiro (1974) explored the relationship between reflection-impulsivity and performance on a standardized readiness measure, the Gates-MacGinitie Readiness Skills Test. More specifically, his purposes were as follows:

1. To determine whether reflective first grade boys performed differently on a reading readiness measure than impulsive first grade boys.

2. To determine the relationship between performance on a measure of reading readiness and reflection-impulsivity.

3. To determine the effects of visual discrimination
treatment on the performance of first grade boys on a measure of reflection-impulsivity and a measure of reading readiness.

At the beginning of the school year ninety first grade boys from a suburban elementary school were administered the Matching Familiar Figures Test (MFF) to determine their conceptual tempo. Thirty-seven boys were classified as impulsive and thirty boys were determined to have a reflective conceptual tempo. The subjects' tests were calculated for significance of difference between means for chronological age, mental age and intelligence quotients to determine whether there were pre-existing differences between the two groups. No significant differences were found. The sixty-seven subjects were then administered the Gates-MacGinitie Reading Readiness Skills Test.

Results of the statistical analyses indicated that the reflective subjects were significantly superior on complete test performance on six of the eight categories tested. These six categories were: Listening Comprehension, Visual Discrimination, Following Directions, Letter Recognition, Visual-Motor Coordination and Word Recognition. The categories of Auditory Discrimination and Auditory Blending held no significant differences. This completed the first stage of Shapiro's experiment.

In the second stage of his study, thirty-two impulsive subjects were randomly assigned to either a treatment or no
treatment group. The treatment group received visual discrimination training for twenty days consisting primarily of commercially prepared materials plus an enforced scanning strategy. Following the treatment period both groups were re-administered the same forms of Matching Familiar Figures Test and the Gates-MacGinitie Readiness Skills Test to determine the effects of treatment. The findings from the second stage of this experiment indicate that the visual discrimination treatment had a significant effect on performance on both the Matching Familiar Figures Test and the Gates-MacGinitie Readiness Skills Test.

Within the context of the limitations of this study it was concluded that:

1. Reflective boys in first grade perform significantly higher than impulsive first grade boys on untimed reading readiness measures which contain items calling for the selection and evaluation of solution hypotheses from an array of alternatives in which there is a high degree of response uncertainty.

2. Performance on a measure of reflection-impulsivity is significantly related to scores on an untimed reading readiness measure.

3. Visual discrimination treatment significantly improves performance by impulsive boys on an untimed reading readiness measure.

Shapiro isolated each subject's conceptual style of
learning and related his conceptual tempo to individual performance on a reading readiness measure. An analysis of Shapiro's results led Shapiro to conclude that reflective first grade boys did significantly better than their impulsive counterparts on the total measure of reading readiness which contained items of high response uncertainty.

Margolis (1974) explored the effects of an impulsive or reflective conceptual tempo upon the auditory perceptual reading readiness and intelligence test performance of kindergarten children. Aims of the study were as follows:

1. To determine whether impulsive children performed differently than reflective children on selected measures of auditory discrimination, auditory memory, sound blending, auditory-visual integration, reading readiness and intelligence.

2. To determine whether there were significant auditory, perceptual and reading readiness differences between impulsive and reflective kindergarten children when intelligence was held constant.

3. To determine whether an interaction between conceptual tempo and sex affected performance on any of the measures employed.

The subjects chosen were a sub-sample of forty-four children taken from a kindergarten sample of eighty-five middle class children. All of the original sample were given Kagan's Matching Familiar Figures Test to determine
conceptual tempo. Those who were deemed neither impulsive nor reflective were excluded from the study. The sub-sample was classified on the dual variables of conceptual tempo and sex. Four groups resulted: impulsive boys, impulsive girls, reflective boys and reflective girls. Eleven children from each group were randomly selected for participation in the study.

Each subject received a battery of auditory perceptual, reading readiness, and intelligence tests. These tests included:

1. Wepman's Auditory Discrimination Test.
2. The Illinois Test of Psycholinguistic Ability.
3. Birch and Belmont's Auditory-Visual Integration Test as modified by Margolis.
4. The Kindergarten Auditory Screening Test.
5. Metropolitan Readiness Test.
6. Peabody Picture Vocabulary Test.
7. Columbia Test of Mental Maturity.

To determine whether performance of reflective and impulsive children differs when equated for intelligence, both verbal and non-verbal intelligence scores were simultaneously held constant.

Margolis' major findings indicated that:

1. There were no significant differences between reflective and impulsive kindergarten children on any of the auditory perceptual and reading readiness measures with
Peabody Picture Vocabulary Test scores and Columbia Mental Maturity Scale scores statistically controlled.

2. The interaction between conceptual tempo and sex was not found to significantly affect performance on any of the tests administered. Neither was sex alone found to be a significant factor influencing test performance.

3. Additional findings indicated that on both the Peabody Picture Vocabulary Test and the Columbia Mental Maturity Scale impulsive children responded significantly faster than their reflective counterparts. An analysis of covariance indicated that on the Columbia Mental Maturity Test Intelligence Quotient alone appeared responsible for negating significant differences on auditory perceptual and reading readiness measures. Furthermore, Columbia Mental Maturity Test response time accounted for a significant thirty-eight percent of the Columbia Mental Maturity Scale Intelligence Quotient variance. In contrast, Peabody Picture Vocabulary Test response time accounted for a nonsignificant four percent of Peabody Picture Vocabulary Test Intelligence Quotient variance.

From the findings of this research we can conclude that:

1. Reflective children perform significantly better than impulsive children in kindergarten when given the Wepman Auditory Discrimination Test, the sound blending portion of the Illinois Test of Psycholinguistic Ability,
Birch and Belmont's Auditory-Visual Integration Test, modified, the Kindergarten Auditory Screening Test and the Metropolitan Readiness Test. Impulsive children respond more rapidly than their reflective peers on the modified Birch and Belmont Auditory-Visual Integration Test and make more errors. Kagan's findings indicated that an impulsive conceptual tempo will manifest itself in response uncertainty situations, with reflective children performing better than their impulsive counterparts. Conceptual tempo needs to be considered or controlled when young children are required to perform on high response uncertainty instruments such as the auditory-visual integration test used in this study.

2. Reflective kindergarten children do not perform significantly better than their impulsive counterparts on the Wechsler Intelligence Scale for Children, Digit Span Subtest.

3. Reflective children do perform significantly better than their impulsive counterparts on the Peabody Picture Vocabulary Test and the Columbia Test of Mental Maturity.

4. Reflective children do not perform significantly better than their impulsive peers on the Wepman Auditory Discrimination Test, the sound blending portion of the Illinois Test of Psycholinguistic Ability, the modified Birch and Belmont Auditory-Visual Integration Test, the
Kindergarten Auditory Screening Test and the Metropolitan
Readiness Test, when intelligence is statistically con-
trolled.

5. There are no significant interactions between con-
ceptual tempo and sex on any of the tests used.

Margolis (1976) again explored the relationship
between auditory-visual integration, reading readiness and
conceptual tempo. Margolis' purpose was to ascertain the
magnitude of the relationship between auditory-visual
integration and reading readiness test performance at the
kindergarten level and to determine whether the tendency to
act impulsively or reflectively influenced either test
performance.

Eighty-five white middle class suburban kindergarten
children who had passed the Snellen Chart examination for
visual acuity and a pure tone audiometric sweep check test
were chosen as the sample. Their mean age was 5.75 years.

The Matching Familiar Figures Test (MFF), a modified
version of Birch and Belmont's Auditory-Visual Integration
Test (MAVI) and the Information, Comprehension, Similari-
ties and Vocabulary subtests of the verbal portion of the
Wechsler Preschool and Primary Scale of Intelligence
(WPPSI) were individually administered in three separate
testing sessions as a part of a larger study. On the basis
of their Matching Familiar Figures Test performance, eleven
children were randomly assigned to each of four categories:
impulsive female, impulsive male, reflective female, reflective male. The Matching Familiar Figures Test and the modified version of Birch and Belmont's Auditory-Visual Integration Test (MAVI) were given to the whole sample, while the WPPSI subtests were administered to those identified and assigned to the various conceptual tempo groups. Approximately one month later, the Metropolitan Readiness Test was administered.

To ascertain whether a child was impulsive, reflective or neither, his performance on the Matching Familiar Figures Test was compared to the total group median for mean response time and total number of errors. Children were impulsive if they responded more quickly than the median response time (6.85 sec.) and made more errors than the median error score (22 errors), reflective if they responded more slowly and made fewer errors, and neither if they were at the median or did not fall into either category.

The MAVI consisted of five demonstration items with instructional procedures for errors, ten new items of seemingly less complexity than the ones on the original Birch and Belmont test, and the original ten items tested on the Birch and Belmont Auditory-Visual Integration Test. The MAVI stimulus cards were shielded from the child's view and were immediately made available once the examiner completed the acoustic tap pattern for the child to identify. Loud distinct taps with no acoustic residue were
unobtrusively produced out of the child's view by striking a long, hard stick against a hard tile floor. The child had no opportunity to observe the examiner's arm or hand movements. As with Birch and Belmont's procedure, there was a half-second pause between short intervals and a one-second pause between long ones. Each stimulus card was 5"/8" and was vertically divided by two dark lines into three parts. Each third contained one special pattern whose component parts were made with dark asterisks.

The examiner initiated the action by saying, "Listen, I'm going to tap out a pattern. When I'm done tapping you point to the pattern I tapped on the card I'll show you." The examiner tapped and then presented the first sample card with the patterns * and **. If the child responded correctly, the examiner pointed to the correct pattern and said, "You're right. I tapped two times close together." If the child made an error, an instructional procedure was employed. After the examples, all items were administered without specific feedback. Once the auditory pattern was completed the appropriate stimulus card was shown. Only first choices were considered. Response time was unobtrusively measured with a stop watch.

MAVI variance accounted for twenty-nine percent of the Metropolitan Readiness variance. Neither score could accurately predict the other. Similarly, for reflective and impulsive children the intelligence and the MAVI measures
appeared to be essentially measuring different factors, as they shared only thirty-one percent common factor variance.

From conceptual tempo theory, it was expected that impulsives would respond on the basis of less information and a less rigorous evaluation of the possible solution hypotheses. This would be manifested as relatively more rapid MAVI response times and concomitantly more errors. They responded significantly faster and made significantly more errors than the reflective children.

Moreover, when the impulsive and reflective tempo groups were equated for MAVI response time, the reflective group maintained raw score superiority. From this it may be reasoned that: (1) an impulsive performance was a function of strategy as well as response time; (2) equating for time was not tantamount to equating for effort or concern; (3) the cross-modal integrative abilities of the impulsive children, as measured by the instrument used, were not as highly developed. The first interpretation receives support from Drake (1970) who concluded from photographing eye movements of subjects taking the MFF that "the same-aged impulsive and reflective subjects employed different strategies from the very beginning."

The significant Metropolitan differences found in favor of reflective kindergartners were attributable to initial WPPSI Verbal IQ differences. Although the verbal differences between the conceptual tempo groups were not
significant, the Metropolitan differences in favor of the reflective children were not maintained when groups were equated for WPPSI Verbal IQ. In other words, the WPPSI variance of the tempo groups, when extracted from the Metropolitan performance, was enough to negate the readiness differences originally found. This suggested that at most Metropolitan Readiness Test performance was only slightly to moderately affected by conceptual tempo.

An analysis of the Metropolitan Readiness and MAVI tasks and Kagan's conceptualization of situations in which conceptual tempo should be most operative may help explain why readiness differences were negated when the influences of WPPSI Verbal performance were extracted, while MAVI differences were maintained. Kagan (1965) has observed that conceptual tempo refers only to situations with some degree of response uncertainty (several response alternatives are available simultaneously and one must be selected). It seems to follow that an instrument from which the answers can be obtained but are not as obviously or immediately resolvable should be more highly associated with conceptual tempo than one of lesser uncertainty. In many instances on the Metropolitan the child is not actually faced with a situation in which he must seriously consider several alternatives. Success on five of the six subtests depends primarily upon recalling previously acquired knowledge, distinguishing among familiar material, or copying
increasingly more complex configurations without having to make a choice among other configurations. Possession of the knowledge on four of the six subtests often eliminates the need to consider other response alternatives. In essence, many Metropolitan subtests and items do not provide the child with response alternatives in which he must actively consider several alternatives.

In contrast, on the MAVI the child cannot use previous knowledge to rapidly dismiss some or all of the alternatives. To be consistently successful he must carefully examine and compare the visual spacial patterns to each other and the original acoustic tap he is holding in his mind. This creates a high response uncertainty situation of the type described by Kagan (1966) needed for tempo to become most evident. Thus it would seem consistent with conceptual tempo theory that impulsivity would manifest itself to a much greater extent on the MAVI than on the Metropolitan Readiness Test.

Margolis' (1976) findings strongly suggest that conceptual tempo be considered and/or controlled when young children are required to perform on high response uncertainty instruments of a non-linguistic nature, such as the auditory-visual integration test used by Margolis in this study. Failure to do so might unknowingly allow conceptual tempo to influence both test performance and the conclusions drawn from such data.
Summary of Research

The following are a summary of the results of the studies reported thus far:

1. Shapiro (1974) sought to determine whether there were any differences in performance on measures of reading readiness between impulsive and reflective first grade boys. An analysis of his results led Shapiro to conclude that reflective first grade boys did significantly better than their impulsive counterparts on a total measure of reading readiness which contained items of high response uncertainty.

2. Margolis (1974) also examined the effects of impulsive and reflective conceptual tempo on reading readiness. His subjects were kindergartners. Margolis confirmed Shapiro's findings that reflective subjects do perform better on measures of reading readiness than do impulsive subjects.

3. Margolis (1976) explored the relationship between auditory-visual integration, reading readiness and conceptual tempo. His subjects were kindergartners. His findings suggest that when children are asked to perform on high response uncertain-tests of a non-linguistic nature (such as the auditory-visual integration test) conceptual tempo should be considered and/or controlled.

Implications for Education

Several implications arise from these studies:
1. Performance on a reading readiness test does not necessarily accurately portray a child's true ability (Shapiro, 1974: Margolis, 1974: Margolis, 1976). If these scores are to be taken for diagnostic or instructional purposes they must be used with caution. Teachers involved in beginning reading instruction might need to evaluate deficiencies in readiness skills using a means which does not involve situations containing a high degree of response uncertainty.

2. Before testing for placement in the early primary grades good use can be made of Kagan's Matching Familiar Figures Test in determining conceptual tempo of new students (Margolis, 1974).

3. Children with impulsive conceptual tempo should not be given the same battery of tests as their reflective counterparts when placement and teaching strategies are being considered (Margolis, 1974: Shapiro, 1974).

4. Presenting an impulsive child with materials that involve high risk response uncertainty might present them with improper instruction for their learning needs. This type of information may only serve to reinforce inaccurate processing and responding behavior in these children (Shapiro, 1974: Margolis, 1974: Shapiro, 1976).

5. Given the proper visual discrimination training and some better scanning techniques, the teacher may be able to promote impulsives in the primary grades to show greater
success on measures of reading readiness (Shapiro, 1974). Compensatory training might be beneficial to children with impulsive conceptual tempos so that they can succeed on tasks which call for the selection and evaluation of solutions in situations where there is a high degree of response uncertainty.
Chapter III

CONCEPTUAL TEMPO AND BEGINNING READING INSTRUCTION

Introduction

At the age of six the beginning reader is confronted with many discrimination problems involving high response uncertainty. Several solution possibilities are usually elicited from the stimulus word, and the child may or may not stop to consider their differential validity before responding. A reasonable expectation, therefore, would be that children who are cognitively reflective types would commit fewer word recognition errors than those who are cognitively impulsive.

The concept of cognitive style implies that an individual approaches the task of reading with his own established patterns of behavior. These patterns allow him to deal with the environmental stimuli. The way in which an individual processes the perceptual input of print to perceive meaning from it, will thus be affected by his cognitive pattern of perception.

This chapter reviews the literature relating conceptual tempo to beginning reading instruction.

Review of Literature

Kagan (1965) explored the relationship between conceptual tempo and an aspect of beginning reading instruction, reading recognition, in an experiment where response
latency is measured in complex visual discrimination tasks involving a standard stimulus and a fixed set of response alternatives are presented to the child. The response alternative that matched the standard was not immediately apparent to the child. The time lapse from presentation of alternatives to the child's first response was recorded.

Previous data gathered by Kagan (1966) from many groups of children grades one through four indicated that response latencies increase and recognition errors decrease with age. Also, at each age there are consistently high negative correlations between response latency and frequency of recognition errors in discrimination tasks using either familiar objects or geometric designs. Reflective children, who take long decision times, always make fewer errors than impulsive children who make quick decisions. Traditional test scoring rarely accounts for decision making time when scores are calculated.

Kagan's studies (1965) attempted to determine whether measures of reflection-impulsivity gathered in the first grade would be a prognosis of reading performance one year later.

Experiment One. Sixty-five boys and sixty-five girls in the first grade of three public schools were the subjects. The subjects were primarily middle class and from a city of under 100,000 close to an Air Force base. Two adult female experimenters tested each child individually in a special
room provided by each of the schools. Two test sessions, separated by a lapse of a week, were given to each subject. Each session lasted fifty minutes. Test descriptions, in order of their administration follows.

**Session One Tests**

1. **Design Recall Test (DRT).** A simple design was shown to each child for five seconds. After removal of the standard and a lapse of fifteen seconds an array of eight, nine, or ten stimuli was presented. Each child was asked to find the design identical to the standard. If he erred he was made aware of this, and asked to choose another stimulus. Scoring was based on the total number of errors and the average response latency for each of the twelve test items.

2. **Haptic Visual Matching Test (HVM).** Each subject was asked to explore with his fingers, a three inch wooden form which he could not see. When he withdrew his hands, he was presented with a visual array of five objects, one of which was the standard that he had explored with his fingers (haptically). Familiar as well as geometric objects were presented on the twenty item test. Three variables were recorded: (1) haptic exploration time, (2) response time to selection of an alternative from the visual array, and (3) total number of errors.

3. **Matching Familiar Figures Test (MFF).** Basically similar to the DRT, this test illustrated familiar designs
rather than geometric ones, and no memory requirement was recorded. The subject was shown a picture, the standard, and asked to select a picture identical to the standard from an array of six other pictures. The standard always remained available to the subject. Variables scored were the total number of errors and the average response time to the first selection made on each of the twelve test items.

4. **Wechsler Intelligence Scale for Children** (WISC). The information and vocabulary scales of the WISC were given to each child and the average scaled score for each child was computed.

**Session Two Tests**

1. **Visual Analysis.** This task assessed the degree to which the child could attach a familiar label to component parts of a complex unfamiliar visual stimulus while associating the label with the whole stimulus pattern. Each stimulus contained three distinct components, background, figural form and element. The background part was a repetitive pattern and the figural part referred to the shape into which the discrete elements fell. The elements were small discrete geometric shapes that traced out the figural pattern.

   In the administration of this task the subjects first learned to associate one of the four colors with each of the four complex designs. When the subject reached criterion, eight consecutive trials, he was given a response-
transfer task in which he was shown separate illustrations of the background, element and figural component, each without any perceptual support of the others. The subject was then asked to state which color was correct for that stimulus. The transfer task contained two illustrations of each of the three components for each of the four designs, yielding a total of twenty-four stimulus items. During the transfer series swatches of the four colors were in front of the child to insure that correct labelling of the separate components was not due to forgetting of the response units. The variables scored were the number of ground, figural and element components labelled correctly.

2. Reading Ability. Each child was tested for letter and word recognition. Each of the twenty-six letters of the alphabet was printed on 3"/5" cards for the letter recognition test. The cards, presented to the child by the examiner at random, were to be read aloud by the subject. If the subject was mistaken, he was informed of the correct response.

In the word recognition test the subject was shown a card that contained five words in lower case letters. The examiner said one of the words on the card and the subject was asked to point to it. The examiner read one of the words from each of the cards presented to the subject. If the subject's response was incorrect the examiner told him so, and he was asked to try again. Variables scored were
response time to the first selection and total number of errors.

When results were tabulated, it was noted that the WISC scores for the entire group spanned the full range from dull-normal to superior. Word recognition errors were negatively related to response time on the MFF for both sexes. In addition, high error scores on the MFF and the HVM each predicted high word error scores. The child who displayed long decision making times and low error scores on the MFF was most accurate in recognition of words.

Verbal ability, as one might expect, also predicted the quality of reading performance. However, the relation of a reflective tendency (long response time on the MFF) to reading errors remained significant after the influence of verbal skills was partialled out.

The correlations discussed above were for both boys and girls. Highly verbal children show the most dramatic results when the correlations for subjects high or low were on verbal skills were studied. The low verbal children had acquired minimal reading skills, and a lack of basic ability to read rather than a preferred conceptual strategy was the primary determinant of reading errors. Response uncertainty is minimal where no solution hypotheses are elicited, and under these conditions reflection is of no advantage.

The relationship between letter error and reflection was considerably lower than the relationship between word
error and reflection for most of the children. Among the low verbal boys there was a negative relationship between response time on the MFF and letter errors. This finding concurs with the previous statement that the influence of reflective delay is maximal when the student has already learned the rudiments of the skill necessary to perform the task, but has not overlearned the skill to the point where delayed responding does not facilitate an initially accurate solution. Low verbal boys were relatively weak in the ability to read words but had acquired reasonable mastery of the individual letters of the alphabet. The task of recognizing letters contained some response uncertainty, and an impulsive disposition should have lead to high error scores.

Kagan found a consistent interesting generality for error scores and response times across the three recognition tasks (DRT, MFF and HVM). Correlations involving the MFF were the highest. In large measure this may be due to the fact that the MFF task generated larger and more variable response time. As usual, there were negative relationships between response time and errors on the three tests with the highest correlations occurring for the MFF.

In general no significant sex differences for any of the variables was noted. Rate of error for each of the three matching tests was approximately equal, MFF as earlier noted, produced the longest response latencies.
Subjects showed no dramatic preference for ground, figural or element response on the visual analysis test scores, however ground components were most often recognized.

Error and response time can generally be combined for an index of reflection. Although length of response time is the most reasonable operational index of the construct of reflection, there is the added implication that a period of reflective delay facilitates performance on a recognition task. Using this statement as a guide, in considering a subject's placement on the reflection-impulsivity continuum, it is necessary to also consider those subjects who showed both long response time and many errors and quick response time and few errors on the word recognition task. The latter should be differentiated from the child who impulsively generates high error scores.

There was a minimal relationship between the tendency to articulate the individual components of the designs and either word or letter errors. This result suggests that either a tendency toward visual analysis does not facilitate recognition of English words, or, as is more likely, this construct of measuring visual analysis is not an appropriate predictor of the disposition to analyze familiar letter or word forms.

Experiment Two. One year later forty-six boys and fifty-six girls from the original sample of sixty-five from each sex were seen in the spring of their second year of school.
Two new adult female examiners who did not know the subject's positions on the reflection-impulsivity continuum tested the same subjects. Each subject was given the MFF and a new test of reading ability.

Each subject was administered the same version of the MFF taken one year earlier. Mean response time and total number of errors was computed for each child. In addition the examiner coded the number of times that the subject's head and eyes moved up to study the standard prior to his first hypothesis. The mean number of such head-eye fixations was the third variable derived from this test. To test reading ability each subject was given four short story read-aloud paragraphs and told to skip any unrecognizable or unknown words.

The subjects' scores were recorded by the examiner. Elapsed reading time and all errors of omission were noted. Types of errors were assigned to ten categories.

1. Mispronunciation--the child attempted to sound out a word but could not pronounce it correctly.

2. Meaningful substitution--although the subject mispronounces an actual word he retains the actual meaning of the sentence.

3. Non-meaningful substitution--the subject does not retain the original meaning of the sentences, but alters it.

4. Partial-identity substitution--the subject substitutes a word that has partial graphemic similarity to the
original word ("nose" for "noise").

5. Self-corrections—the subject corrects a word that he initially misreads.

6. Skips a line—an entire line is skipped by the subject.

7. Intrusion—the subject adds a word or phrase that is not included in the test.

8. Intentional omission—the subject intentionally omits a word he cannot decode.

9. Impulsive omissions—the subject omits a word by mistake.

10. Suffix errors—the subject neglects to read a suffix on a word or adds a suffix that is not graphemically represented.

Computation of results indicated that failure to recognize a word due to lack of knowledge (#8) was the most frequent error on the reading test. Four times as many errors were made in this classification by subjects below the median on verbal skills than were made by the more verbally adept (48 versus 13 errors). Partial identity substitution (#4) was the next most frequent error (some graphemic similarity to the original word was expressed). Suffix error (#10) was the third most frequent category of error. The remaining categories occurred unfrequently. Subjects with higher verbal skills corrected themselves more often than those who were less verbally facile.
The categories associated with an impulsive attitude were combined. Partial identity errors, meaningful and non-meaningful substitutions, and suffix errors were included as impulsive characteristics because with each of these type errors the child has an hypothesis about the word, but gives an incorrect response. Insufficient reflection upon the validity of the hypothesis is assumed to be the cause for an incorrect response. Partial identity errors as a separate category, plus meaningful substitution, non-meaningful substitution and suffix errors, pooled as a group of three as a second category made up the two error scores together with the total error score were correlated with the index of reflection-impulsivity gathered concurrently and the year before. Correlations were computed between the response time and errors on the MFF and the HVM and the three reading error variables for the sexes separately and for the subjects high and low on verbal skills.

Results indicated that children classified as impulsive (in contrast to reflective) in grade one made the greatest reading errors at the end of grade two. The relationship between the MFF errors and reading errors was higher for girls of high verbal skills than for those with low verbal skills. Correlations with the MFF response time were in the expected direction, but not as significant as the MFF error scores.
Kagan assessed the degree to which an impulsive or reflective disposition in grade one predicted change in reading performance over the year, independent of the original reading level. It was determined that there was no relationship between MFF response time or MFF errors in the first grade and the degree of improvement in reading performance over the year.

The stability of a reflective attitude on the MFF over a one year period was also evaluated. There was a satisfactory stability of response time across the year period \( r = .48 \) and \( .50 \) for boys and girls respectively; \( p < .01 \).

There was a noticeably high relationship between the number of head-eye fixations of the standard and mean response time \( r = .92 \) and \( .91 \). This result agrees with the other data where coefficients between eye fixations of the standard and mean response times were in the nineties. Results of these independent studies indicate that subjects are cognitively considering alternative responses during the delay period (Kagan et al., 1964).

This work confirmed Kagan's prediction that primary children who delayed their responses over alternative hypotheses in situations with high response uncertainty would be more accurate in word recognition than children who impulsively responded without considering the validity of their response. A preferred cognitive disposition for reflection or impulsivity is extremely influential at the
intermediate level of reading, where the basic components
have been learned, but not mastered to the point where mul-
tiple hypotheses are not elicited by a new symbol. Thus,
subjects with below average verbal resources who had mas­
tered the alphabet to a degree where there was response
uncertainty, had a low level of skill when reading words
because they could not elicit the multiple hypotheses nec­
essary to make successful prediction when they were con­
fronted with a card containing English words.

The validity of these ideas rests heavily on the
assumption that children with a longer delay of response on
tasks like the MFF are using the time to consider alterna­
tive solution possibilities. The high correlation between
the number of head-eye fixations between the standard and
response latency to the first selection on the MFF indi­
cates that the subject was apparently mulling over the
alternative solutions during the long delay, and response
delay time was a good index of decision time.

In summary, when first grade children were given
measures of reading skill and indexes of reflection-
impulsivity and later retested for the same conceptual
tempo and skills in grade two, Kagan found that impulsive
children, in contrast to reflective ones, made many errors
and displayed fast decision times in selection of their
response alternatives in design matching tests. These same
impulsive subjects made more recognition errors when
reading English words presented to them than reflective subjects. Highly verbal subjects made fewer reading errors in fast decision times than low-verbal subjects. Reading errors in grade two correlated positively with reading measures of impulsivity in design matching tests given in grade one. Fast response time was a better predictor for boys and high error scores a better predictor for girls.

Erikson and Otto (1973) also studied the effects of impulsivity and reflectivity upon the word recognition skills of beginning readers. They wished to determine the best method of teaching word attack skills. In their experiment, impulsives and reflectives were given a list of similar or dissimilar words. The researchers hypothesized that in order to learn the similar word list, impulsive subjects would require identification of more than a single letter cue and need relatively many acquisition trials. Focus of attention on relevant cues, plus the practice derived from learning them, should then have resulted in accurate word recognition on the transfer tasks. It was also hypothesized that the impulsive subjects would respond to minimal cues, rather than by analyzing the validity of their hypotheses by further scanning their words. These subjects would learn the dissimilar list in relatively few trials, and, as a consequence, do poorly on word recognition transfer tasks. A third hypothesis proposed by the authors was that because a reflective child would tend to
analyze more details and linger over alternatives longer, he would do well on word recognition transfer tasks, no matter which list he learned, and that he would learn either type list in about the same number of trials.

Eighty kindergarten children in three different Wisconsin elementary schools were assigned to different "aptitude by treatment" cells on the basis of sex and performance on the Matching Familiar Figures Test (MFF). The children had a mean age of 70.8 months. A wide span of middle class occupations and incomes were represented. The MFF was given to determine conceptual tempo, impulsive or reflective. The median MFF response time was 7.85 seconds and the median error score was sixteen. Those subjects who scored below the median on response time and above the median on errors were classified as impulsive. Those subjects who scored above the median on response time and below the median on errors were classified as reflectives.

Two lists of words were employed in the experiment. The first list was a low similarity task list (LST) of four words, comprising sixteen letters. The second list was a high similarity list (HST) using only four letters. Both lists are pictured below.
This test was developed by Otto and Pizzullo (1970-1971).

The word recognition task consisted of the original word and two variations: the original word with a different second letter and with a different final letter. The subject needed to recognize the word only. Similarity of confirmation of the substituted letters to the original ones was considered more important than whether the change produced a real word. Each set of three words was printed on a 6"/9" card, with the position of the original word being varied in the columns in both lists.

The generalization task included four new four letter words each with a new letter systematically substituted across possible positions for each acquisition list.

Each child was shown the word cards and asked to repeat each word as it was said by the experimenter. On
the actual acquisition trials the child was asked to say each word before the experimenter.

   When the child acquired the list (actual word recognition) the experimenter pronounced the original word and the subject attempted to identify the correct word list with two distractors. Both correct and incorrect responses and response time were recorded.

   To demonstrate the generalization the subjects were asked to read the word presented by the experimenter. Refusals, generalized responses, extra-list words and intra-list word responses other than the generalized words were recorded. A generalized response occurred when the subject responded with the original word from which the stimulus varied by one letter.

   Ten boys and ten girls, randomly selected from each of two kindergarten classes at each of the three schools were then selected and tested in isolation on the list words. If they could read the list words from previous knowledge they were not included in the study. Thus the study was conducted.

   With respect to trials to acquisition the high similarity list took significantly more trials to learn than the low similarity list. Examiners expected that the difference in number of acquisition trials between the two lists would be greater for impulsive than reflective children. This indicates that the effect of intra-list
similarity is more powerful than the effect of conceptual tempo. The more careful information-processing behavior of the reflective children could not overcome the difficulty encountered differentiating between the highly similar words, and therefore, like impulsive children, they required significantly more trials to learn the highly similar words.

With respect to word recognition, the subjects who learned the HST gave significantly more correct responses than the subjects who learned the LST. Reflectives gave significantly more responses than impulsives.

The prediction was that the difference in correct responses between the two lists would be greater for impulsives than for reflectives. This, however, was rejected because the reflective subjects who learned the HST gave more correct word recognition responses than the reflectives who learned the LST. Impulsive subjects, regardless of which list they learned, gave about the same number of correct responses. On word recognition tasks impulsive subjects performed about the same as they did on the MFF. Both tests have high response uncertainty built in. The word recognition task contained three similar choices, the MFF contained six similar choices. Despite the greater number of trials to acquisition, impulsives responded with less careful scrutiny than reflectives. With respect to the generalized response, impulsives who learned the HST
gave a similar number of incorrect responses as the subjects who learned the LST.

The generalized task was not as similar to a high response uncertainty situation as was the MFF and the word recognition task. Impulsives' and reflectives' cognitive styles are most evident in this high risk situation. The required generalization task demanded decoding a word, different by one letter, from a word previously decoded. This may be why conceptual tempo had little effect on this task situation.

Significant correlations were noted between response time on the MFF and the word recognition task ($r = .68; p < .01$), and the MFF and the false generalization task ($r = .49; p < .01$). Response times for the two reading tasks also correlated significantly ($r = .495; p < .01$).

The authors of this study found that on a reading task impulsive subjects tend to do poorer than reflective subjects. They needed more time to acquire the lists, gave significantly fewer ($p < .05$) correct word recognition responses, and tended to make false generalizations more frequently ($p < .10$). These differences seem to be attributable to the two styles of information processing behavior. Some reading problems may thus be caused by mismatching a child's particular mode of response and the response pattern necessary for adequate word recognition. Cromer's (1970) difference model of reading difficulty assumes that
the child should:

read adequately if the material provided were consistent with his behavioral patterns, that is a change in either the material to be read, or in his patterns of responding, would result in better reading.

The data from the word recognition task seems to indicate that reflective subjects benefit more from the HST treatment than impulsive subjects. Given a child with reflective conceptual tempo, it may be more beneficial for him to use highly similar word lists to enhance his word recognition skills in beginning reading rather than low similarity lists.

Summary of Research

The following are a summary of the results of the studies reported thus far:

1. Kagan (1965) researched the relationship between beginning reading instruction and conceptual tempo. He predicted that reflective first grade children would make fewer word recognition errors than impulsive children. The results of his experiment showed that word recognition errors were negatively correlated to response time on the Matching Familiar Figures Test for both sexes.

One year later he retested one hundred and two children from the original sample for conceptual tempo and oral reading ability. Kagan hypothesized that impulsives gave incorrect responses because they did not reflect upon and evaluate their hypotheses about words. He also noted that
subjects classed as impulsives in grade one, had the highest reading error scores in the second grade. Kagan concluded that the tendency of a child to respond rapidly in situations of high response uncertainty may be a determinant in the quality of that child’s reading ability.

2. Erikson and Otto (1973) in another study of word recognition skills in beginning readers hypothesized that reflective kindergartners would be more accurate in recognizing words presented in patterns of high or low intralist similarity. Results of this study indicated that the degree of intra-list similarity had little effect on the word recognition skills of the impulsive subjects, however, reflective subjects performed better on the lists of high similarity, than reflectives learning lists of low similarity. Erikson and Otto concluded that reflective children would benefit more in reading acquisition by learning words from lists of high similarity than reflectives learning lists of low similarity.

Implications for Education

Several implications arise from this research:

1. These findings suggest that the child's tendency to make fast decisions in situations with high response uncertainty is a determinant of quality of reading performance, and remedial programs should recognize the relevance of this aspect of cognitive style (Kagan, 1965: Erikson and Otto, 1973).
2. A diagnostic evaluation of children with reading problems should include an assessment of whether the child can discriminate a specific design from an array of similar ones (Kagan, 1965: Erikson and Otto, 1973). Generally a child who is unable to draw a complex design has little difficulty discriminating it from a group of similar ones, making a conceptual deficit faulty (Kagan, 1965). Rather, the inability to draw a complex design, as in Bender-Gestalt designs) may be associated with an impulsive disposition. Experiment one and experiment two (Kagan, 1965) reviewed in this chapter, indicate the importance of conceptual tempo on reading and suggest that a diagnostic evaluation of children with reading difficulties needs to include an assessment of this dimension.

3. Remediation work with children retarded in reading should include reflection training when it seems appropriate. Possibly such training could teach such impulsive children to delay response and consider hypotheses with a more reflective disposition. This training may improve reading performance greatly. Such training in kindergarten reading readiness programs should be very valuable (Kagan, 1965: Erikson and Otto, 1973).

4. For reflective students, learning lists of similar words does seem to result in superior word recognition skills (Erikson and Otto, 1973). These findings also indicate that reflective students perform better on word
recognition tasks than impulsive children do. It would seem that educators should be aware of this problem, and should try and find teaching strategies most beneficial to meet the individual needs and differences of beginning readers in order to maximize their word recognition skills.
Chapter IV

CONCEPTUAL TEMPO AND READING ACHIEVEMENT

Introduction

Differences in cognitive styles of perceiving and conceptualizing may be as critical as differences in general intellectual, social, and emotional characteristics. The literature to be reviewed in this chapter explores the possibility that the dimension of cognitive style known as impulsivity-reflectivity may influence success in academic achievement in the area of reading.

Review of Literature

Research into the effect of impulsivity-reflectivity on reading achievement has been conducted by Lesiak (1970). Lesiak investigated the relationship between impulsivity-reflectivity and achievement in the areas of word recognition, ability in general reading comprehension, ability in critical reading and ability in rate of reading comprehension.

A representative random sample of 120 children in grade one and 120 children in grade five were drawn from the first and fifth grade population of three school districts in a rural county in Ohio. There were an equal number of males and females. Each of the 240 children was individually administered the Matching Familiar Figures Test to determine the subject's level of impulsivity or
reflectivity. Subjects considered impulsive or reflective, as measured by this test, were then selected for this study. Ninety-one first graders, forty-eight girls and forty-three boys were classified as either impulsive or reflective. The subjects were then placed into two sample groups for analysis of data. As the first group, the random group, fifteen impulsive and fifteen reflective subjects were randomly selected from each grade and sex classification. The continuum group, the second group, was formed by selecting the fifteen most reflective and the fifteen most impulsive subjects for each grade and sex category.

Four tests were given to each subject selected from the first and fifth grade. As a measure of intelligence, the California Test of Mental Maturity was given. Word recognition ability was measured by the Huelserman Word Discrimination Test. The comprehension section of the Gates-MacGinitie Reading Test yielded scores in general reading comprehension and the Ohio State University Critical Reading Test was administered to measure ability in critical reading. Fifth grade students were given an additional test, the Van Wagenen Rate of Comprehension Scale, to yield a measure of rate of comprehension.

The Pearson product-moment correlation procedure and an analysis of covariance were the statistical procedures used in analysis of the data. Significance was established at the .05 level of confidence.
The results of this study indicate that the reflection-impulsivity dimension is an important variable in beginning reading instruction.

1. Reflective first grade girls in the continuum group scored significantly higher than impulsive first grade girls in word recognition ability, general reading comprehension, and ability in critical reading.

2. Reflective first grade boys in the continuum group differed significantly from impulsive first grade boys in ability in critical reading.

3. There were no significant differences found between impulsive and reflective children in word recognition ability and general reading comprehension.

4. When considering male and female first grade subjects who were randomly selected and all fifth grade subjects, no significant differences were found between reflective and impulsive subjects and any of the dependent variables.

Lesiak found significance between the grade one children's reading achievement scores and their relationship to conceptual tempo of the primary student.

1. First grade girls with a reflective conceptual tempo performed better on all three measures of reading ability than did their impulsive counterparts.

2. Reflective first grade boys, on the other hand, only performed better on the measure of critical reading
when compared to impulsive first grade boys.

3. No significant trends were noted for subjects in the fifth grade.

Lesiak concluded that impulsivity-reflectivity was a more important factor in reading acquisition than it was for more fluent readers.

Lesiak's conclusion might be explained by Smith's (1971) differentiation between reading at the early stages of acquisition, and reading at the middle elementary grade levels. The first situation requires the reader to glean visual clues from configurations of letters in the visual array and to categorize or name them according to his newly acquired cognitive categories. Reading, at this early level, presents the student with a great deal of response uncertainty. At the more fluent level, the middle elementary grade reader does not need to rely on visual clues completely. He uses his past experiences to interpret sequences of words syntactically and semantically and does not rely upon visual information as much as the new reader. The fluent reader brings more of his own past experience to the reading situation, and he eliminates alternatives to meaning using non-visual sources of information. There may be less response uncertainty built into the visual array of the more fluent reader, which may account for the non-significant data that Lesiak found with the fifth grade subjects.
In a similar study, Johnson (1969), examined the effect of response style on reading achievement for fourth and sixth grade boys. The primary purpose of this study was to determine whether elementary grade boys with dissimilar conceptual tempos would reflect significant differences in grade point average and in their performance on the kinds of standardized achievement tests that are commonly used in the schools. Other issues considered in the study were: (1) analyses of intercorrelations among conceptual tempo, achievement and I.Q. measures and (2) comparisons of fourth and sixth grade boys with respect to conceptual tempo test indices.

Two hundred and twenty-two boys drawn from the entire fourth and sixth grades of two elementary schools in the Willoughby-Eastlake School System in Ohio were the sample population. At both grade levels, four conceptual tempo subgroups were formed on the basis of response latencies and recognition errors to Kagan's Matching Familiar Figures Test. The subjects were grouped by their scores, above or below the median, for response latency and total number of errors in recognition on the Matching Familiar Figures Test. Median splits on the two Matching Familiar Figures Test variables produced four groups at each grade level. Those groups included subjects who were fast and inaccurate, fast and accurate, slow and inaccurate, or slow and accurate. Following this division, achievement and intelligence test
data were collected from the students' cumulative records. Teacher grades over two grading periods and the six sub-tests of the California Achievement Test provided the achievement measures; the California Short-Form Test of Mental Maturity provided a measure of intelligence.

The major findings of the correlational analyses were:

1. A significant negative correlation was found at both grade levels between the Matching Familiar Figures Test error and response latency scores.

2. Response latencies were essentially independent of all other intelligence and achievement measures.

3. Matching Familiar Figures errors, on the other hand, showed low but significant associations with intelligence and achievement test measures.

4. In contrast to the total sample, Matching Familiar Figures Test latencies for the fast-accurate sub-group at grade four correlated positively and significantly with Non-Language and total Intelligence Quotient measures.

Cross-grade comparisons indicated that: The sixth grade boys, as compared with the fourth grade boys, made significantly fewer recognition errors on the Matching Familiar Figures Test, but did not differ significantly on Matching Familiar Figures Test response latencies.

Within grade comparisons of the four tempo sub-groups at grade four resulted in non-significant mean Intelligence Quotient differences and non-significant achievement
differences on eight of ten measures.

At grade six:

1. The reflective (slow, accurate) sub-group scored significantly higher on the reading vocabulary and reading grade point indices than did the impulsive fast, inaccurate) sub-group, and these achievement differences were not accompanied by significant sub-group differences in intelligence.

2. The other significant F values on the achievement measures at grade six tended to reflect the relatively high mean IQ of the fast accurate sub-group, and the relatively low mean IQ of the slow inaccurate sub-group.

Most of the data gathered by Johnson was inconclusive. However, Johnson did note that sixth grade reflectives scored higher than impulsives of the same grade on reading achievement in the area of reading vocabulary.

The data from this study indicates that conceptual tempo does not seem to be a factor in reading achievement in the later years of elementary school.

King (1972) examined the effects of grouping by cognitive style on reading achievement. The subjects for this study were ninety-six male and eighty-one female white middle class suburban community children. Each child was individually administered Kagan's Matching Familiar Figures Test at the end of grade one, to determine impulsivity or reflectivity. Each first grade class was given the
Metropolitan Achievement Test (MAT), Primary I, Form B, as a measure of reading. Eighty-three children, taken from the first sample group, at the beginning of grade two, grouped according to cognitive style, comprised the experimental group. The subjects were divided into four groups, and designated: impulsive-high error, impulsive-low error, reflective-high error, reflective-low error.

The children were taught during the second grade by teachers who had been instructed in seminars concerning the reflection-impulsivity dimension of cognitive style. The materials were the same for all the groups with the exception that teachers were expected to modify their teaching strategies for types of work book pages or problem solving situations involving high risk uncertainty. The treatment by grouping the experimental children was designed to facilitate recognition of cognitive style and to reduce planning demands for teaching strategies.

At the end of grade two all subjects were post-tested on Kagan's Matching Familiar Figures Test and the Metropolitan Achievement Test Primary II, Form C as a measure of reading. The subjects pre and post standard scores for Word Knowledge, Word Discrimination and Reading, taken from the Metropolitan Achievement Test were submitted to an analysis of covariance to test the null hypothesis that no significant differences in reading scores measured by forms B and C of the Metropolitan Achievement Tests existed between
the experimental group and the control groups of impulsive and reflective students. No significant differences were noted as a result of an analysis of covariance. Changes in the Matching Familiar Figures Test scores were not statistically analyzed, but were used to note trends consistent with the related literature of cognitive style.

It was concluded that grouping by cognitive style had no effect on the reading progress of the experimental groups in grade two. Though not statistically significant, it was noted that the impulsive subjects of the experimental group made the most reading gains and showed a trend toward more reflectivity with less errors post-tested on the Matching Familiar Figures Test. The group showing the most gains had been randomly placed with an experienced reflective teacher.

Summary of Research

The following are a summary of the results of the studies reported thus far:

1. Lesiak (1970) found that reflective first grade girls performed better on all three measures of reading ability than did their impulsive counterparts. Reflective first grade boys, on the other hand, only performed better on the measure of critical reading when compared to impulsive first grade boys. No significant trends were noted for all fifth grade subjects. Lesiak concluded that conceptual tempo was a more important factor in reading
acquisition than it was for the fluent reader.

2. Johnson (1969) examined the effect of response style on reading achievement for fourth and sixth grade boys. The only variable of significance in reading achievement was found to be reading vocabulary. Sixth grade reflectives scored higher than impulsives of the same grade. Other results were inconclusive.

3. King (1972) examined the effect of grouping by cognitive style on reading achievement. The eighty-three second grade subjects, grouped by their conceptual response style, were taught by teachers who had been trained to teach according to the student's impulsive or reflective attitude. Post-testing for achievement in reading revealed that there were no significant differences in reading scores. King concluded that grouping by response style was not sufficient to produce improvement in reading skills. It was observed, however, that the subjects randomly assigned to a reflective teacher showed the greatest gains in reading achievement.

Much of the research in the relationship of reading achievement to impulsivity-reflectivity, from the data gathered, has been inconclusive. However, even though conceptual tempo does not seem to be a factor in reading achievement in the later years of elementary school, a reflective attitude, or training in reflectivity would seem to be effective in early reading success.
Implications for Education

Several implications arise from these studies:

1. Grouping alone is not considered sufficient to improve reading skills (Lesiak, 1970; Johnson, 1969; King, 1972). It would seem that an altered pattern of teaching strategy, tailored to the individual needs of impulsive students would increase their reflectivity and help them to make greater gains in reading achievement.

2. A further implication can be made from Lesiak (1970) with regard to teacher training. Candidates for teacher training may need to be screened with respect to their cognitive response styles. Those students with a more impulsive conceptual tempo might need to submit to reflectivity training in order to become more effective teaching candidates.
Introduction

Reading involves language and cognitive processes which are reflected in oral reading behavior. This chapter is a review of the literature concerning conceptual tempo and its relationship to oral reading behavior.

Review of Literature

Butler (1972), examined the relationship between cognitive style and oral reading. More specifically, Butler explored the relationship between the impulsivity-reflectivity dimension and various aspects of reading behavior: miscue frequency, semantic acceptability of the miscues, hesitation and repetition frequency, and self-corrections.

The subjects were drawn from nine classrooms in three suburban schools near a large midwestern city. The subjects were selected by identifying sixty-five average readers from a population of one hundred and nine second grade boys on the basis of their scores on the Reading subtest of the Metropolitan Achievement Test (2.2-3.3). From this group of "average" readers, fifteen boys identified as reflective, and fifteen boys identified as impulsive by Kagan's Matching Familiar Figures Test constituted the experimental group.
To provide a basis for controlling intelligence and comprehension ability, the California Test of Mental Maturity and the California Achievement Test were administered. Then, individually, each subject was tape recorded while orally reading a basal reader story. These oral readings generated 2,813 miscues, 626 hesitations, and 877 repetitions which were later coded onto a typescript of the story and subsequently analyzed according to the correction and semantic acceptability components of the Goodman Taxonomy of Reading Miscues (1969).

An analysis of the data, using the Chi square procedure, t-tests, one way analysis of covariance, Pearson product-moment correlation and partial $r$ correlations revealed the following significant findings:

1. The reflective subjects made more repetitions than the impulsive subjects made, even when the differences in non-verbal intelligence were controlled (measures of non-verbal intelligence were significantly higher for reflective subjects than for impulsive subjects.

2. The reflective readers corrected a greater percentage of their miscues compared to the impulsive reader's self-correction of miscues. This was true of the total body of miscues, even when the intelligence factor was controlled.

3. However, when only one-time miscues were considered, the differences were significant only when the
intelligence factor was not controlled.

4. Group membership (impulsive or reflective) correlated with the percentage of miscues corrected in the direction of the reflectives correcting more of their miscues.

5. In a related finding, non-verbal intelligence scores correlated positively with the percentage of miscues semantically acceptable but not corrected.

No significant differences were found between the two groups with regard to these items:

1. The number of miscues (one-time or total), even when the means were adjusted for differences in non-verbal intelligence.

2. The percentage of miscues that were semantically acceptable within the context of the total passage which included miscues made acceptable through self-correction.

3. The number of hesitations.

4. The relative number of hesitations followed by correct identification of the word, omission, or other miscues. Wide variation was observed from individual to individual within each group on each of the dependent variables.

Hood and Kendall (1974) did a qualitative analysis of oral reading miscues of reflective and impulsive second graders. The purpose of this study was to identify second graders performing at the same reading level who were impulsive or reflective, and to analyze their oral reading
miscues for significant differences with respect to conceptual tempo.

All the subjects were second graders in the same mid-western city, whose teachers had chosen a certain grade level reader for their instruction. Fifty second graders, twenty-five impulsive and twenty-five reflective, as identified by Kagan's Matching Familiar Figures Test, were then taped as they read test passages aloud. An examiner audiotape recorded their readings and noted errors in the children's oral reading. Their miscues were coded for: word order changes, substitutions of meaningful words, insertions, omissions, skipped words and punctuation. Each miscue was categorized as graphically similar or dissimilar, as corrected or uncorrected and as to its contextual appropriateness.

The results indicated that:

1. No significant differences were found between reflective and impulsive children in the proportions of graphically similar and contextually appropriate miscues.

2. Impulsive children tend to correct fewer unacceptable miscues than reflective children.

3. Reflective children tended to correct more graphically dissimilar miscues that were appropriate within a portion of the context but not within the total context of a sentence.

4. Reflective subjects tended to correct more
unacceptable miscues.

The results of this study were similar to Butler's (1972) in that there seems to be a trend for second grade reflectives to correct more of their reading miscues than for second grade impulsives to go back and analyze their errors with correction in mind.

Readence (1975) investigated the influence of impulsivity-reflectivity on the type of cue systems a reader uses to construct meaning from print. Oral reading miscues generated by "average" third graders were analyzed for graphic similarity, phonic similarity, syntactic acceptability and semantic acceptability by means of the Reading Miscue Inventory (Goodman and Burke, 1972).

The sample population for this study included readers drawn from both sexes, and included readers who were not just predominantly impulsive or reflective, but also those who fell on the continuum as mixed (impulsive-reflective) cognitive style. Forty-one third grade readers, twenty-four boys and seventeen girls, of "average" reading ability were identified by means of their scores on the Stanford Reading Test, Primary Level II (1973), and validated by means of informal teacher estimates of their ability. The Reading Miscue Inventory (Goodman and Burke, 1972) and Kagan's Matching Familiar Figures Test were administered to the subjects. The subjects were asked to read the selected passages orally. Oral reading was terminated when the
subjects had generated at least twenty-five oral reading miscues. The subjects' miscues were coded and examined for degrees of graphic similarity, phonic similarity, syntactic acceptability and semantic acceptability. Medians for the Matching Familiar Figures Test response times and error scores were computed. On the basis of that data subjects were classified as impulsive, reflective or mixed impulsive-reflective. The data were further examined to find similarities or differences employed by the three groups of subjects in their effort to reconstruct meaning from the selected passages.

An analysis of the data gathered resulted in the following findings:

1. There was no statistically significant relationship between sex and cognitive style with regard to the subjects' use of the linguistic cue system of language.

2. No statistically significant relationship was found between boys and girls in their use of the linguistic cue systems of language. Sex did not appear to be a factor in the study.

3. There was a statistically significant relationship (p < .05) between impulsive, mixed impulsive-reflective and reflective readers with respect to their use of the linguistic cue systems. Using discriminant functions coefficients, it appeared that the graphophonic cue system caused the significant effect for cognitive style.
Summary of Research

The following are a summary of the results of the studies reported thus far:

1. Butler (1972) examined the relationship between cognitive style and oral reading. He conducted a psycholinguistic study of the oral reading skills of impulsive and reflective second grade boys of average reading ability while controlling for intelligence and comprehension. He found that reflective readers made more repetitions and corrected a greater percentage of their miscues than their impulsive counterparts. No significant difference was found between impulsive and reflective readers regarding the number of miscues that were semantically acceptable.

2. Hood and Kendall (1974) also analyzed the oral reading miscues of impulsive and reflective second graders. Their research noted that reflectives corrected more graphically dissimilar miscues and more miscues that were appropriate within a portion of the context, but not within the total context of the sentence. These findings tend to be supportive of Butler (1972).

3. Readence (1975) investigated the influence of impulsivity-reflectivity on the type of cue systems a third grade reader uses to reconstruct meaning. An analysis of data revealed that there were no statistically significant relationships between cognitive style and sex with regard to the subjects' use of the linguistic cue systems.
However, a statistically significant relationship was found between subjects of varying cognitive style with regard to their use of the linguistic cue systems.

**Implications for Education**

Implications of these findings suggest:

1. Reflective students tend to analyze more carefully and correct reading errors more frequently when reading aloud (Butler, 1972: Hood and Kendall, 1974: Readence, 1975). The results of this research suggest that impulsive second grade children would benefit from reflective search strategy training when attempting to read aloud. In the primary grades reading is generally a struggle to interpret graphophonic cues. A great deal of high risk uncertainty is generated in an oral reading situation. More effective search strategies would tend to slow the impulsive reader down to the point where he can make more effective decisions word to word, leading to better reading comprehension.

2. In a read-aloud situation, where the feedback from the listener is immediate, success experienced by a cognitively impulsive reader with increased scanning strategies would tend to generate further motivation to apply the newly learned technique and correct the haste of the impulsive reader in an uncertain situation.
Chapter VI

SUMMARY OF FINDINGS

Summary of the Review of the Literature

In the past it has generally been accepted that age and verbal intelligence, as represented by the availability of vocabulary and a greater repertoire of knowledge affect individual differences in the form and quality of cognitive products.

Each child has his own method of dealing with school situations. In academic areas we refer to this manner in which the child approaches learning tasks as his own cognitive style. Researchers involved in studies of cognitive styles of learning during the last thirty years indicate that differences in styles of perceiving and conceptualizing may be as critical as differences in intellectual, social and emotional characteristics.

One aspect of cognitive style involved in problem solving situations identified by Jerome Kagan (1964) is conceptual tempo. Kagan has stressed the point that the individual's conceptual tempo, hereafter known as the impulsivity-reflectivity dimension, is most readily evident in situations where a number of choices are available and there is a high degree of uncertainty as to which choice may be correct.

The reflectivity-impulsivity dimension describes the
response style involved in selecting and evaluating the solution to problems in which a high degree of response uncertainty prevails. A reflective child processes information in a systematic manner and considers his choices carefully before responding. The impulsive child, on the other hand, spends little time pondering over the solution, thereby committing more errors than the reflective child.

Research into the relationship between conceptual tempo and reading indicates that response style is related to aspects of the reading process (Kagan, 1965). This thesis investigated the hypothesis that the dimension of cognitive style known as conceptual tempo might influence the success or failure of elementary grade readers with respect to four aspects of reading behavior: (1) reading readiness, (2) beginning reading instruction, (3) reading achievement, and (4) oral reading. Each of these aspects of reading behavior was considered because, depending upon the nature of their presentation, each one might be fraught with response uncertainty. A summary of the findings for each of the four areas as reported in the literature follows.

**Indications of Research Concerning Conceptual Tempo and Reading Readiness**

Shapiro (1974), in exploring the relationship of reading readiness skills to reflection-impulsivity wished to determine whether there were any differences in
performance on measures of reading readiness between impulsive and reflective first grade boys. Shapiro noted that reflective boys did significantly better than their impulsive counterparts on the total measure of reading readiness which contained items of high response uncertainty. Additionally, the boys' performance on the Matching Familiar Figures Test was significantly related to the total score of the reading readiness measure. The greater the number of errors on the Matching Familiar Figures Test, the lower the score on the readiness measure.

Margolis (1974) also examined the effects of impulsivity-reflectivity on reading readiness. Using the Matching Familiar Figures Test and the Metropolitan Readiness Test on kindergarten subjects, Margolis confirmed Shapiro's findings that reflective subjects do perform better on measures of reading readiness than do impulsive subjects. The research of Shapiro (1974) and Margolis (1974) seem to confirm the influence of conceptual tempo in early reading success.

Indications of Research Concerning Conceptual Tempo and Beginning Reading Instruction

Early research into the relationship between conceptual tempo and reading was conducted by Kagan (1965). He predicted that reflective children would make fewer word recognition errors than would impulsive children. Measures of impulsivity-reflectivity and tests of word recognition
were administered to one hundred and thirty first grade subjects, half boys, half girls. An analysis of the results indicated that word recognition errors were negatively correlated to response time on the Matching Familiar Figures Test for both sexes.

One year later children from the original sample were retested on the Matching Familiar Figures Test and asked to read orally four paragraphs to assess types of word recognition errors. Kagan found that the oral reading errors most characteristic of impulsive subjects were partial-identity errors, meaningful and non-meaningful substitutions and suffix errors. He hypothesized that impulsives gave the wrong answers because they did not reflect upon and evaluate their hypotheses about words. Additionally, it was found, that subjects classified as impulsives in the first grade had the highest reading error scores in the second grade. Kagan concluded that the tendency of a child to respond rapidly in situations of high response uncertainty may be a determinant in the quality of that child's reading ability.

In another study of word recognition skills in beginning readers Erikson and Otto (1973) identified impulsive and reflective kindergartners and assigned them to learning words presented in patterns of high or low intralist similarity. Results of the study showed that the degree of intralist similarity had little effect on the word
recognition skills of impulsive subjects. However, reflective subjects performed better on the list of high similarity than the reflectives learning list of low similarity. Erikson and Otto concluded that reflective children would benefit in reading acquisition by learning words from lists of high similarity. These findings also support Kagan (1965) that reflective children make fewer word recognition errors than impulsive children.

Recent psycholinguistic insights into defining and describing the reading process may apply to the conceptual tempo theory. Reading is a form of problem solving where the reader must generate and test hypotheses to reconstruct meaning from print. To be successful, in reconstructing meaning, the reader must be a decision maker who selects linguistic clues, consider prior experiences and apply his language skills, all toward generating selective differential hypotheses. Response uncertainty is high when the basic components of reading have been learned, but not mastered to the point where multiple hypotheses are not elicited by a new symbol. A preferred disposition for reflection or impulsivity at this beginning reading stage is maximally influential for success or failure.

Indications of Research Concerning Conceptual Tempo and Reading Achievement

Lesiak (1970) conducted research into reading achievement at the first and fifth grade level. Each of the boys
and girls were given measures of word recognition, comprehension and critical reading. Lesiak found that first grade reflective girls performed better on all three measures of reading ability than did their impulsive counterparts. Reflective first grade boys, on the other hand, only performed better on the measure of critical reading when compared to impulsive first grade boys. Lesiak did not note any significant trends for fifth grade subjects. It appears that impulsivity seems more of an influential factor in initial reading acquisition than it is for more fluent readers.

In a similar study, Johnson (1969) examined the effect of response style on reading achievement for fourth and sixth grade boys. The only variable of significance in reading achievement was found to be reading vocabulary. Sixth grade reflectives scored higher than impulsives of the same grade level. Other results were inconclusive.

King (1972) examined the effect of grouping by cognitive style on reading achievement at the second grade level. Selected second graders, grouped by their response style classifications, were taught by teachers who were trained to teach according to the subject's impulsive or reflective attitude. End of the year post-testing for achievement in reading revealed that there were no significant differences in reading scores. King felt that grouping according to response style was not sufficient to
produce improvement in reading skills. Subjects who had been assigned to a reflective teacher made greater gains in reading achievement than those who had not been assigned to a teacher of this conceptual tempo.

Much of the research into the relationship between reading achievement and impulsivity-reflectivity has been inconclusive. However, even though conceptual tempo does not seem to be a factor in reading achievement in the later years of elementary school, a reflective attitude, or training in reflectivity, would seem to be related to early reading success.

**Indications of Research Concerning Conceptual Tempo and Oral Reading**

Butler (1973) examined the relationship between cognitive style and oral reading. He conducted a psycholinguistic study of oral reading behavior of impulsive and reflective second grade boys of average reading ability while controlling for intelligence and comprehension. Oral reading errors were analyzed according to Goodman's (1969) taxonomy. The data from this study indicated that reflective subjects corrected a greater percentage of their miscues and made more repetitions than impulsives, even when the differences in non-verbal intelligence were controlled. Response time on the Matching Familiar Figures Test correlated positively with the number of miscues made, and the number of errors on the Matching Familiar Figures Test
correlated negatively with the number of miscues corrected. No significant difference was found between impulsive and reflective subjects with regard to the number of miscues that were semantically acceptable.

Hood and Kendall (1974) analyzed the oral reading miscues of impulsive and reflective second graders also. They found no significant differences between impulsives and reflectives with regard to the proportion of graphically similar miscues or contextually appropriate miscues. Differences were found in the proportion of corrected miscues. Reflectives corrected more miscues that were graphically dissimilar and more miscues that were appropriate within a portion of the context, but not in the total context of a sentence. Reflective subjects appeared to correct more unacceptable miscues. Hood and Kendall (1974) agree with the findings made by Butler (1972) concerning correction of miscues by reflective subjects. Reflective subjects tend to show a more analytic approach and better search strategy with respect to oral reading.

Readence (1975) investigated the influence of impulsivity-reflectivity on the type of cue systems a reader uses to reconstruct meaning from printed material. Third grade boys and girls were identified as to their conceptual tempos and taped as they read orally. Analysis of the data revealed there were no statistically significant relationships between cognitive style and sex with regard to the
subjects' use of the linguistic cue systems. Sex did not appear to be a factor either. However, a statistically significant relationship between subjects of varying cognitive style was found. A conjecture was made that the graphophonic cue system caused the significant effects of cognitive style.

The data included in this study support the hypotheses that: (1) reading behavior is affected by the conceptual tempo of cognition, (2) elementary students who have a reflective style of cognition are more successful with respect to reading behavior than elementary students with an impulsive conceptual tempo. Although the reflection-impulsivity dimension, or conceptual tempo, was shown to generalize to reading skills in the elementary grades, in no way do the results indicate that reflective children are more ready to receive reading instruction. In situations where there is low-risk response uncertainty impulsives may function in a manner equal to reflectives. These findings indicate that when a high degree of response uncertainty exists, it is the nature of the task which influences performance by impulsive subjects and not the tasks themselves.

The research cited in this review of the literature seems to strongly support the fact that the Matching Familiar Figures Test measures conceptual tempo accurately. However, none of the literature examined in connection with the Matching Familiar Figures Test revealed data concerning
its standardization, reliability, or validity. The conclusions drawn are predicated upon the statistical validation of this test and should be viewed with caution.
Chapter VII

IMPLICATIONS, RECOMMENDATIONS

Implications

An important implication of this study reaffirms a warning often issued to classroom teachers: namely, that performance on a reading test may not accurately portray a child's true ability with respect to the reading skills reviewed and must be interpreted with extreme caution if it is to be used for evaluative or instructional purposes. Due to the influence of an impulsive conceptual tempo, teachers who are involved in teaching reading skills would be wise to check deficiencies in those skills taught by means which do not involve the selection and evaluation of solutions in a situation which contains a high degree of response uncertainty.

A second implication involves the use of reading materials which contain problems calling for the selection and evaluation of solution hypotheses in settings where a high degree of response uncertainty prevails. With children who have impulsive conceptual tempos these materials might present them with improper instruction for their learning needs. Additionally, this type of material may only serve to reinforce the inaccurate processing and responding behavior of these children.

An implication from this data pertains to diagnostic
and remedial procedures with children who are retarded in acquisition of reading skills. It is a common practice among school psychologists diagnosing a reading retardation problem to administer a task like the Bender-Gestalt, find an association between poor graphic reproduction of a design and reading deficit, and leap to the conclusion that the child's retardation is a result of perceptual-motor deficit arising from diffuse brain damage. The psychologist does not usually pause to evaluate whether the child can discriminate a specific design from an array of similar ones. In most cases, the child who cannot draw a complex design has minimal difficulty discriminating it from a set of similar stimuli and the diagnosis of perceptual deficit is often misleading. This suggests that poor Bender-Gestalt scores may arise from an impulsive disposition and any diagnosis of perceptual capability concerned with reading problems should include an assessment of this dimension. Remedial programs should acknowledge the relevance of this disposition.

Recommendations

Impulsive children tend to do more poorly than reflective children on reading tasks involving high risk uncertainty. This may be attributable to the different information processing behavior of reflective and impulsive children. Some of these reading difficulties may be due to a mismatch between a child's usual mode of response and the
response pattern necessary for success on tasks required. Possibly a change in the material, to make it consistent with his behavior pattern or a change in the child's behavior pattern would result in better reading behavior. This is an interesting problem for future research to resolve. Would it be more feasible for the educator to change the material or the child's conceptual tempo, or would a combination of the above reduce the difference existing between impulsive and reflective information processing. While we are waiting for the question to be resolved academically, knowing that reflectives perform with greater success at the primary levels than do impulsives, teachers should consider remedial regimes for impulsives in their classes to train them to perform more reflectively with respect to reading tasks.

Many of the errors of impulsive children are characterized by failure to "track" visually through a form or a word. They fail to attend to the context of what is being read. Perhaps these children should engage in visual tracking exercises to slow them down. These exercises would slow the impulsive down, force him to attend to details, and provide a built-in checking mechanism which demands a concern for accuracy. Such materials appear tailor-made for children with an impulsive cognitive style for problem solving. To go even further, perhaps a curriculum should be designed to assist impulsive children during
the primary grade levels. In such a program content might not be stressed until they have learned to respond to tasks with more reflective strategies.

For the purpose of this study, reading was considered a psycholinguistic process involving sampling and inference. "Educational guessing" is required in order to read with comprehension. In the middle elementary grades (3-6), teachers often interpret an incorrect inference as indicative of insufficient knowledge and do not usually appreciate the role of an impulsive attitude in determining the quality of the inferential process. This may be another valid reason for training such students with reflective strategies for reading, particularly when new concepts are introduced to facilitate the general quality of the response required.

It might prove very useful to the educator to identify his students' response styles before reading instruction is provided. Curriculum planning might need to be adjusted to the conceptual tempo of individual students.

At present, testing to determine conceptual tempo is generally done via the Matching Familiar Figures Test on an individual basis. Time and great expense per student are both involved. However, clearer definition of psychological differentiation does seem to ultimately aid the reader. Researchers should gear their efforts to the development of an efficient, group administered instrument which could be
used to identify cognitive style within groups of elementary school entrants as a part of entrance testing. It seems more feasible to identify conceptual tempo when readiness and beginning reading are involved than in the later grades since it has been shown to affect reading acquisition skills greatly.

Further research is needed to identify teaching strategies most appropriate to meet individual differences in order to maximize the reading skills of both impulsives and reflectives.

The Matching Familiar Figures Test measures a well developed task-strategy. It would be of interest to know how these strategies evolved, and whether impulsives differ in degree or manner in which plans for task-solutions develop as a function of increasing experience with test items. It would also be interesting to ask whether there might be some developmental sequence from something like the impulsive child's strategy to the reflective child's strategy and the impulsive adult's approach to the reflective adult's orientation.

The results of this review of the literature indicate that a fresh interpretation of educational philosophy toward the teaching of reading in the elementary grades is necessary. Perhaps we need to attend more to conceptual process and less to reading content if we hope to reach one hundred percent success with all our elementary candidates
for literacy. Our elementary schools must function to extend the child's repertoire of ways to solve problems with more accuracy and to make him more flexible in his use of cognitive style as the situation demands.

The trend of this research suggests that educators look beyond the question of, "What has he learned to read?" A more basic and potentially fruitful question would be, "How does he learn to read?"
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APPENDIX A
Appendix A

DISCUSSION CONCERNING THE MATCHING FAMILIAR FIGURES TEST

Kagan's Matching Familiar Figures Test consists of twelve items. The subject sees each item, a standardized figure, plus an array of six alternative figures. Five of the alternatives are variations of the standard, one is an identical match to the standard. The subject must choose the alternative which exactly matches the standard (Shapiro, 1976).

Response time of child's first answer and the total number of errors across the twelve item test are the critical variables scores.

Impulsive children grades one through four have a mean response time between four and ten seconds and make about fifteen to twenty errors. Reflective children have a mean response time between thirty and forty seconds and make between two to six errors (Kagan, 1966).

This test indicates the response style of the individual in selection and evaluation of solutions to tasks where a high degree of response uncertainty prevail. A reflective child considers information in a systematic manner, processing his choice slowly before responding. An impulsive child gives little time to the processing of a solution, and therefore commits more errors than a
reflective child.
Sample items from the Matching Familiar Figures Test