

LANGUAGE DIFFERENCES BETWEEN REFLECTIVE AND IMPULSIVE  
FOURTH GRADE CHILDREN

by

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Chapter I  
STATEMENT OF THE PROBLEM

Introduction

The disparities found in the literature about the language abilities of reflective versus impulsive responders prompted the investigations reported in this study. Upon the publication of his Matching Familiar Figures (MFF) test, Kagan (1965) reported that the reflective and impulsive children identified by the test tended to differ in error rates on problem solving tasks, when language ability was controlled. Kagan, Pearson and Welch (1966) found that impulsives made more errors than reflectives on inductive-reasoning tests when verbal ability was statistically controlled. Studies by subsequent researchers, however, reported evidence or conclusions that suggested that language ability may be a differentiating factor between the two groups (Gentile, 1969; Meichenbaum & Goodman, 1971; Wen, 1972).

In order to provide further information about differences in language performance between reflective and impulsive responders, three language measures were administered to 57 fourth grade children that were classified as reflective (N = 27) or impulsive (N = 30) on the basis of the results of the MFF. Scores from a standardized achievement test were used to compare differences in the means between groups when assessed language performance and intelligence were controlled.

The data analyses utilized both inferential and descriptive statistical procedures and the results were discussed in terms of their validity for educational purposes as well as for their implications for future research.

### Purpose of the Study

The discrepancies reported in the literature about the relationship between reflective and impulsive responding and language ability needed clarification. By directly addressing the differences between the two groups in language performance, it was reasoned that information important to both elementary classroom teachers and future researchers in the field might be made available. In pursuit of these objectives, three questions were examined.

- 1) Do impulsive children exhibit lower levels of language performance than reflective children?
- 2) When intelligence and tested language ability levels are controlled, do impulsive children still tend to score at a lower level than reflectives on a standardized achievement test?
- 3) Do the impulsive children in the sample tend to make different kinds of errors on language performance tests than the reflective children?

Implicit in the findings relative to the major purposes of this study, information was provided concerning several additional questions.

- 1) What directions should be taken in future research on the language-reflectivity-impulsivity relationships?
- 2) Which one, or combination of, the language measures used in the study could teachers use to determine levels of language performance of their children?
- 3) Are there particular areas of language performance identified by the selected language measures that were especially difficult for either group?

#### Significance of the Study

On the impulsive-reflective continuum the impulsive child may be described as one who consistently displays a tendency to respond quickly to problem solving situations without reflecting upon his solutions. As reported in Chapter II, he characteristically does not evaluate the quality of his responses and his error rate is higher than that of his more reflective counterpart. Identifying the factors that contribute to errors made by children in problem-solving situations is a primary concern of the educator. This study of impulsive-reflective children and their respective language abilities was undertaken because there appeared to be contradictory findings in the research concerning the importance of language ability as a factor in the response styles of the two groups.

The functions of language in an educational context have been discussed by Lewis (1969) who states:

First, language not only serves the purposes of 'clear thought.' It is true that alone, not in communication with

anyone, we use language for recalling what has happened; for recording for the future; for solving problems; for anticipating and planning. Any of this may be overt, in writing or in speaking to ourselves; or it may be covert, within ourselves, imagined language, "inner language." These are among the ways in which language may not only help to achieve habits of clear thought but may also serve a wide range of cognitive tasks, over the whole of our intellectual life. (pp. 26-7)

That facility in a language system is a prerequisite to intellectual development, has been posited by Vygotsky, Bernstein, and Whorf (Cazden, 1972).

The word calls the child's attention to the object and its parts. It organizes his perceptions of the object and disposes him to act toward it in a particular way. The word becomes a symbol for the child when it can represent the object, whether or not the object is present in the child's immediate perceptual field. When the child is capable of using symbols, his capacity for thought changes.

The symbol alters the child's relationship to experience. What was initially perhaps a conglomeration of unknown, undefined people, objects, and events through language becomes a regularized, dependable set of relationships: self-other relations; space-time orientations; object-class relations; sets of logical possibilities. Language adds yet another dimension for thought. It provides the child with the opportunity to extend himself beyond immediate experience, to identify and capitalize on past mistakes, and, in general, to anticipate experience rather than be tied to it. (Phillips, Dunham, Brubaker, & Butt, 1970, p. 37)

Cazden (1972) was careful to point out that correlations found in research between language and cognition do not prove causation. Piaget has theorized that action and interaction between the child and his environment is a prerequisite to development of thought structures but that language might play a facilitating role in the process as the child develops his particular thinking processes (Schwebel & Raph, 1973).

As a result of work with analytic versus nonanalytic first and second graders it was concluded that reflective and impulsive responders differ in their

tendency to reflect over alternative solutions or classifications in situations in which several response alternatives are available simultaneously, and the tendency to analyze visual arrays into their component parts. These 2 dispositions are relatively independent of each other, orthogonal to verbal skills; and each influences the frequency of errors in perceptual recognition tasks. (Kagan, Rosman, Day, & Phillips, 1964, p. 1)

The finding that verbal skills were independent of the tendency toward reflection over alternative solutions was based upon a verbal ability level as defined by the scores obtained on the Information and Vocabulary subtests of the Wechsler Intelligence Scale for Children (WISC). Neither of these measures are indicative of a full range of language capability of the subjects but they do reflect exposure to and internalization of varying levels of language comprehension.

In the same study, a Design Recall Test was administered. The second graders were significantly better able to select the correct design from the variants than the first graders. The researchers concluded that the ability of second grade children to remember the design might have been facilitated by the availability of language labels that enabled the child to classify the design (Kagan, et al., 1964). That conclusion seemed to this researcher to be contrary to their previously stated finding that the tendency to reflect over alternative solutions in situations in which several response alternatives were available simultaneously was independent of verbal ability.

Kagan, Pearson and Welch (1966) also concluded that the impulsive child's tendency to make more errors on inductive-reasoning problems was related to the fact that the impulsive child did not pause to evaluate the quality of his inferences. They found that:

When partial correlations were computed between MFF response time and errors on picture completion, extrapolation, and guessing tests, with WISC verbal ability partialled out, the resulting correlations were  $-.20$ ,  $-.36$ , and  $-.32$  for boys and  $-.44$ ,  $-.28$ , and  $-.28$  for girls (all coefficients larger than  $.23$  are significant at  $p < .05$  for two tails). These data indicate that the relation between reflection and accurate performance on inductive-reasoning tests holds even when verbal ability is statistically controlled. (Kagan, Pearson, Welch, 1966, p. 592)

Perhaps these results from two of the earliest studies on reflective-impulsive children tended to restrict the amount of research in the area of language-impulsivity-reflectivity relationships. Other evidence found tended to indicate that some aspects of language ability were a correlate of impulsive-reflective responding.

Gentile (1969) administered the Illinois Test of Psycholinguistic Abilities (ITPA) to 80, third grade boys classified as impulsive or reflective using the MFF. Two subtests of the ITPA proved to differentiate significantly between the impulsive and reflective subjects--the Auditory-Vocal Association and the Auditory-Vocal Automatic subtests. The term auditory-vocal channel, as used by the authors of the ITPA, is explained as "the course by which sensory impressions are received through the ear and responses expressed verbally" (Kirk & Kirk, 1971, p. 21). Auditory association, then, is the ability to relate concepts presented orally. The degree to which communication behavior is organized within the individual

determines whether the individual is functioning at the representational or automatic level. The representational level requires a higher level of language skill than does the automatic level.

The representational level includes behavior which requires the more complex mediating process of utilizing symbols which carry the meaning....The automatic level includes communication behavior requiring less voluntary but highly organized and integrated patterns. This includes such activities as visual and auditory closure, speed of perception, ability to reproduce a sequence seen or heard, rote learning, synthesizing isolated sounds into a word, and utilizing the redundancies of experience. (Kirk & Kirk, 1971, p. 22)

The authors also mention several difficulties that children with auditory association disabilities may be expected to exhibit. They may have difficulty categorizing objects verbally. They may have limited ability to use similes, metaphors, and generalizing statements. Understanding puns, proverbs, and parables are particularly difficult for them. Gentile's study indicated that at least some factors of language ability were correlated with impulsive and reflective styles of responding, contrary to the earlier findings of Kagan and his associates.

Three other studies were found that provide evidence of a possible language-impulsivity-reflectivity relationship. Schwebel (1966) investigated social-class differences in language ability and attempted to demonstrate that the differences were in part due to a greater tendency towards impulsivity in lower-class subjects. He concluded that

the difference between children of the middle- and lower-classes in language usage seems to be attributed both to

language-speech competence and to impulsivity-reflection in response. (Schwebel, 1966, p. 20)

The results of a study by Wen (1972) in which an effort was made to modify the impulsivity of children, ages eight to eleven, led him to conclude that conceptual tempo apparently was related to a restricted language form. The conclusion was based on results of training, however, not upon a tested language performance level.

The third study was reported by Meichenbaum and Goodman (1971). They observed the private speech (children talking to themselves while playing) of cognitively impulsive and reflective nursery school children and found that the cognitively impulsive preschoolers differed significantly from the reflectives in both language style and content. The impulsive children manifested more ego-centric talk and more developmentally immature words and phrases. Reflective preschoolers were significantly more apt to use both outer-directed and self-regulatory, private speech. Analysis of the private language use led the researchers to the conclusion that among preschoolers, the impulsive children used private speech in a less mature, and a less self-guiding fashion than did their reflective age-mates.

The studies by Schwebel (1966), Gentile (1969), and Wen (1972) are covered in more detail in Chapter II, but each of them report results or conclusions that lend credence to the possibility that verbal language ability may be a more important factor in the differences between impulsive and reflective children than earlier researchers believed it to be. The Meichenbaum and Goodman (1971) report adds further evidence for at least the preschool child.

From the apparent conflicting reports between the above mentioned studies and Kagan's work, a need was perceived to clarify the relationship of response style to language performance. It was decided that the conflicting research could be clarified somewhat by investigating the language performance of the two groups, using standard testing procedures and an age group in which exposure to language experiences as a result of school attendance have been more similar than might be expected in a group of preschool children.

Furthermore, it was felt that if significant differences in language performance between impulsive and reflective children do exist, the classroom teacher would have added information to help in planning a more effective program of instruction for the impulsive responders.

#### Summary

The initial research on differences between impulsive and reflective children stated that the two groups do not differ significantly in verbal ability (Kagan, et al., 1964). Two years later Kagan, Pearson and Welch (1966) found that when verbal ability was statistically controlled, reflective children still performed inductive-reasoning tests more accurately than impulsive children.

In contrast to the findings of Kagan and associates, Schwebel (1966), Gentile (1969), Wen (1972), and Meichenbaum and Goodman (1971) all report some kinds of results or conclusions that link differences in language performance with the reflective-impulsive subjects.

The apparently conflicting reports in the literature prompted this investigation. It was felt that a study directly concerned with the language performance of nine to eleven year old reflective-impulsive children would supply needed information. The discrepancies reported have not directly addressed the question about possible differences in language performance between reflective and impulsive subjects. Neither has the effect on achievement test scores as related to the language performance of the reflective and impulsive subjects been investigated. In view of the conflicting evidence in previous studies about the kinds of relationships that have been found, it was felt an attempt to add clarity to the issue was worth pursuing.

### Definitions

To facilitate the communication process it is necessary to provide some operational definitions of terms as they were used in this report.

Adjusted Language Age was statistically derived so that the language-age equivalent reflected the influence of the chronological age of each subject. The formula used was Language-Age-Equivalent divided by chronological age, times 100 to eliminate decimals.

$$\frac{\text{Language-Age-Equivalent}}{\text{Chronological Age}} \times 100 = \text{Adjusted Language Age}$$

Assessed-Level of Language Development refers to the composite

language score derived from the following measures:

1. Utah Test of Language Development developed by Mecham, Jex, and Jones (1967)
2. Test for Recognition of Grammaticality developed by Susan Vogel (1975)
3. Sentence Repetition Test also developed by Susan Vogel (1975)

Cognitive style is a term that refers to stable individual preferences in the way an individual organizes his perceptions and categorizes his concepts of the external environment.

Cognitive style of responding refers to the tendency for individuals to respond either quickly, without considering all the alternatives that may be available, or the tendency to respond after taking time to consider several alternatives.

Impulsive refers to the tendency to display a quick response in problem solving situations and to fail to consider the worth of several alternative solutions before responding.

Impulsive subjects were operationally defined according to the scores obtained on the Matching Familiar Figures Test (MFF) by Jerome Kagan (1965). Those subjects called impulsives in this study had an average response delay time of 10.5 seconds or less, and an error score of

nine or more of the MFF.

Language Age-Equivalent was operationally defined as the age-equivalent obtained by the subject on the Utah Test of Language Development (Mecham, Jex, Jones, 1967). It was taken from the tables presented in the test manual accompanying that test.

Language Performance refers to the tested level of performance as derived from scores obtained on the three language measures used in the study.

Language Performance Index (LPI) was statistically derived by transforming all scores on each of the language measures to standard scores and combining them for a composite language score obtained by each subject.

Maze. A maze was counted as an error on the Sentence Repetition Test and consists of that event in which a subject becomes confused or tangled in words or sounds in trying to produce a repetition of the sentence. The result was an unmeaningful jumble of words or sounds that were inserted into the sentence by the subject. Loban (1966b) defined the maze in this manner and found it to be a reliable index of oral language proficiency.

Reflective refers to the tendency to delay a response in problem solving situations while considering the worth of several alternative solutions.

Reflective Subjects in this study consisted of those children in the sample whose average delay of response time was 16.0 seconds or more, and whose error score was six or less on the Matching Familiar Figures test.

Weighted Sentence Repetition Test Score. The Sentence Repetition Test was designed in an ascending order of difficulty controlled by the number of embedded sentences contained in each item. A weight of each of the three sections of the test was devised according to the following formula:

$$(Q_1)4 + (Q_2)3 + (Q_3)8 = \text{Weighted SRT Score}$$

$Q_1$  = Number of correct responses to items 1-5

$Q_2$  = Number of correct responses to items 6-15

$Q_3$  = Number of correct responses to items 16-20

### Limitations

The subjects included in this study were drawn from the fourth grade classes in an open-space school that serves all the fourth and fifth grade children in a town of approximately 12,000 inhabitants situated in southwestern Virginia. There were 304 fourth graders enrolled at the time of the study. Due to the requirement by the school division that all children used in the study must have prior consent of the parents, the subjects available were limited to those 118 children from whom parental consent was obtained.

The investigator was also limited in the amount of time that any one child could be released from regular classroom activities for the purposes of this study. As a result, three testing sessions were conducted with each subject. All the subjects were given the tests in the same sequence but they were not given contiguously. The MFF was administered first to all subjects before the language tests were administered. After language testing began, some subjects were tested on only one instrument in any given session while other subjects were administered two tests. In no case was any subject held for all three language measures in one testing session. Usually, the Utah Test of Language Development was given during the second session and the two tests by Vogel were administered in the third testing session. A maximum of 45 minutes was allowed for any one testing session.

The assessed level of language performance was restricted to the results derived from the instruments selected. While it is believed that the selected measures were adequate in discriminating between children with more or less language ability for their age, the assessed level was not intended to be a definitive measure of all possible language productions or competencies.

#### Summary

The significance of this investigation has been discussed in terms of the answers it might provide in determining the extent to which assessed language skills may be related to the reflective-impulsive responding styles of fourth grade children. In view of the

evidence that impulsive responders make more errors as a result of lessened ability to evaluate their responses, the study also sought to discover if the child's impulsive or reflective style of responding might be indicative of specific kinds of language deficiencies that might be remediable. The third area of investigation addressed by this study concerned whether or not impulsives still tended to score at a lower level on an achievement test when language performance and intelligence were statistically controlled.

The conflicting results of previous studies were discussed as they related to the questions posed by this investigation.

The terms used have been defined to add clarity to the report, and the limitations of the study have been discussed.

## Chapter II

### REVIEW OF THE LITERATURE

This study was undertaken to clarify the relationship between a child's level of language performance and his propensity to respond in a reflective or impulsive manner. It was also the intent of the study to discover whether or not differences between reflective-impulsive groups on a standardized achievement test were evident when intelligence and language performance were controlled.

This chapter contains a review of the literature pertinent to the study. The review has been organized into three sections with subsections as follows:

- I. Literature Related to the Reflective-Impulsive (R-I) Dimension
  - A. Characteristics of the R-I Groups
  - B. Training to Modify R-I Responding
  - C. Summary
- II. Literature Related to Language Performance of Children  
Categorized as Reflective or Impulsive
  - A. Direct Relationship Studies
  - B. Other Evidence
  - C. Summary
- III. Literature Related to Measurement of Language Performance
  - A. Characteristics
  - B. Instruments
  - C. Summary

The literature about the reflective-impulsive population tends to be concentrated in two main areas. First, a considerable amount of work has been done on trying to isolate characteristics of impulsive individuals that would provide information as to differences in age, sex, socioeconomic level, intellectual achievement or behavioral traits. Secondly, the research reports various methods of treatment to try to change the response styles of the impulsive and/or reflective subjects.

The first section in this review of the literature reports on work that has been done in these two main areas: 1) characteristics of reflective-impulsive subjects and, 2) treatments for changing response tempo or error rate. The second section of the literature review deals with work that has been done in relation to the study of language and reflective-impulsive responders. The third part addresses the processes used in language measurement and includes a brief description of the language tests that were found which could be used appropriately with a fourth grade sample of children.

## I. Literature Related to the Reflective-Impulsive (R-I) Dimension

### A. Characteristics of the R-I Groups.

Since the publication of the Matching Familiar Figures (MFF) test in 1965, the research conducted on the cognitively impulsive child has most frequently used the MFF as the basis for categorizing the impulsive vs. reflective groups. Much of this research was dedicated to finding distinguishing characteristics between the two groups.

There is evidence that the impulsive child characteristically concentrates attention on inappropriate cues. Nussle (1972) found that impulsive children do not attend to relevant features of stimuli, while reflectives analyze more of the important, relevant features. Odom, McIntyre and Neal (1971) found that impulsives were significantly more apt to neglect detailed feature analysis of stimuli than reflectives.

As early as 1963, Witkin was able to state:

There is now considerable evidence that children and adults with a relatively more analytical way of perceiving do better in intellectual tasks in which essential elements must be isolated from the context in which they are presented and recombined into new relationships. (Witkin, 1963, p. 27)

A study by Shine (1972) confirmed the above statement and tied the results to the R-I group. Her study involved 64 children in Grade Two and 69 in Grade Four and she was investigating the conceptual tempo characteristic of the reflection-impulsive dimension as it related to Piaget's theory of perceptual decentration. On the basis of test score analysis Shine concluded that perceptual decentration (that is, the ability to mentally manipulate perceptual stimuli by dissecting and transporting them over a distance) was related to the cognitive reflectivity-impulsivity continuum, although no causality could be inferred. She suggested that teaching the impulsive child to delay his responses may not increase his tendency to answer correctly unless he is also trained in how to use the increased time in an effective manner. Siegelman (1969) reported a similar conclusion when she indicated that her evidence on differences in

R-I scanning strategies inferred that " a long response time may be a necessary but not sufficient condition for reflective responding" (p. 1221).

Several studies were found that tend to support the conclusion that the reflective child seems not only to receive an increased quantity of information from his environment (Zelnicker, Jeffery, Ault & Parsons, 1972; Epstein, Hallahan & Kauffman, 1975) but also a different quality of input (Drake, 1969; Cohen, 1970; Shove, 1972). The conclusions hold even when intelligence is held constant (Butler, 1973; Cohen, 1970; Shine, 1972; Shove, 1972).

Study of problem-solving strategies of impulsive-reflective groups also has received attention from researchers. Generally, the research has centered around the idea that in problem-solving, when a child pauses to consider and assess the quality of this thinking, this process of evaluation influences the entire spectrum of mental work: his initial perception, his recall, and his hypothesis generation.

Some children accept and report the first hypothesis they produce and act upon it with only the barest consideration for its appropriateness or accuracy; these children are called impulsive. Other children devote a longer period of time to consider the merits of their hypotheses; they are called reflective. This difference among children is evident as early as 2 years of age and seems to be moderately consistent across problems and relatively stable over time. (Mussen, Conger, Kagan, 1968, p. 305)

In an attempt to assess the problem-solving strategies used by 80 reflective and impulsive six and eight year olds, Adams (1971) hypothesized that the older group would utilize more mature guessing

strategies than the six year olds. The impulsive first graders were consistent in their lower level of hypothesis generation and implementation when compared with their more reflective first grade counterparts. The guessing patterns of the third grade group, however, did not substantiate the predictions of the study. Adams felt that the reason for the lack of significant findings at the eight year level was due to the inappropriateness of the task. While not a major finding, the report lends empirical evidence to the consistency of findings concerning the impulsive child's inability to generate alternative and well-evaluated hypotheses.

A Twenty-Questions game was devised by Ault (1972) to allow her to classify problem-solving strategies of first, third, and fifth grade children categorized as reflective or impulsive according to the MFF. Impulsives asked questions indicative of less mature strategies than the reflectives at each grade level. The younger reflective subjects achieved scores on the game that were equivalent to those of the older impulsive subjects. Ault concluded that there was a strong cognitive development component underlying reflectivity-impulsivity.

McKinney (1973) found that not only do reflective children generate characteristically different and more efficient hypothesis-testing strategies than impulsive children but these differences are concerned with the relevance of conceptual categories rather than specific instances. The impulsive children in his study tended to seek and use information in a random, trial-and-error fashion.

Studies have been done to investigate the relationship between the reflective-impulsive dimension and various aspects of school achievement. Lesiak (1972) tested the relationship using ability in word recognition, ability in general reading comprehension, ability in critical reading and ability in rate of comprehension as the dependent variables.

In the first grade group containing the extreme reflective and the extreme impulsive children, the reflective first grade females scored higher than the impulsive females in word recognition ability, general reading comprehension, and ability in critical reading. For first grade males, the ability in critical reading was the only dependent variable reaching significance, with reflectives being more able than impulsives to display this skill. Critical reading requires inferences and judgements to be made from the content of the reading material. Lesiak concluded that the reflective-impulsive dimension may be an important variable in beginning reading instruction.

Butler (1973) investigated oral reading behavior as represented in frequency of miscues, semantic acceptability of miscues, hesitation and repetition frequencies, and self-corrections of 30 second grade males who scored between 2.2 and 3.3 on the Reading subtest of the Metropolitan Achievement Test. Administration of the MFF resulted in placing the boys in one of two groups--15 reflectives and 15 impulsives. Intelligence and reading comprehension ability were tested and controlled in the analysis of data. Goodman's Taxonomy of Reading Miscues was used to classify the dependent variables.

Reflective subjects made more repetitions and corrected more of their miscues. Since reading comprehension was controlled in this finding, an awareness of appropriateness of language may have contributed to the corrections, though no definitive statement can be made. Both sample size and placing the entire 30 boys along the impulsive-reflective continuum probably accounted for much of the wide variation that Butler observed from individual to individual within each group.

A study by Rebuhn (1973) at UCLA investigated the relationship between Kagan's reflective-impulsive dimension and three levels of performance on the 1970 Metropolitan Achievement Tests. The subtests of the Metropolitan Achievement Tests that were used were Mathematics Computation, Mathematics Concepts and Mathematics Problem-Solving tests. The reflective children did obtain significantly higher scores on the three mathematics tests than did the impulsive children.

#### B. Training to Modify R-I Responding.

Attempts to modify the behaviors of impulsive or reflective individuals have concentrated in two areas--modification of conceptual style and modification of conceptual tempo. Training to change the tempo has usually tried to train impulsive children to delay their responses. Brady (1971) used success-information feedback and failure-information feedback training on educationally handicapped children that were classified as conduct problems, personality problems, socialized delinquents. It was found that introverted personality-problem children did become more impulsive during the

failure-information feedback treatment where 75 percent of the time they were told that they had failed. Lower reaction times were noted during this portion of the experiment. No other significant relationships were found. The results of the experiment were most likely attributable to what is known about corrective feedback and task learning rather than to the reasons given by Brady. The design provided reinforcement indiscriminately for both success and failure so that reaction times were being controlled inconsistently. The reasons for failure suggested by Brady seem less significant in comparison. He named insufficient stress to elicit necessary arousal, habituation of the children to the stressor, and failure of a classification system to group the children adequately as possible causes of failure to modify response times.

Both delay of response and decrease in error rate due to verbal and nonverbal reward and punishment techniques were the goal of the research done by Henry (1970). Ninety impulsive and ninety reflective first grade boys were treated under various combinations of the dependent variables. Discrimination learning tasks were used to afford opportunities to administer verbal or non-verbal reward, verbal or non-verbal punishment or combinations of each. Only the combinations of reward and punishment proved to be significant in changing response style. Rewards consisted of the experimenter saying "Right" or a penny being dispensed for correct answers and punishments for incorrect responses were the vocalized word "Wrong" or a buzzer. Feedback for correct and incorrect responses seemed to be operating

here in a more definitive way than in the study by Brady (1971) discussed above. Using corrective feedback to inform the subjects of correct and incorrect answers improved their performance by lowering error rate and increasing delay of response time on the MFF. The effect of training on the discrimination tasks appeared to transfer to the R-I test.

Decision time and expectancy of success were used as dependent variables by Reali (1970) in research on 112 reflective-impulsive third grade boys. Results from this study indicated that both reflectives and impulsives reacted to success with an expectancy of success and to failure with a lowering expectancy of success. The treatment, not the conceptual tempo differentiated the groups, but such was not the case when decision-times were compared with expectancy of success. Reflectives took longer to make decisions than the impulsives did although the correlations were low. Changing conceptual tempo by knowledge of success or failure has not been found to be particularly effective. When Miller (1970) investigated the incapacity to delay in impulsive college students, he concluded that those subjects who took a long time to make responses evidently did so primarily due to difficulty in solving the problems rather than due to a capacity to delay.

Since visual discrimination had been shown to be related to conceptual tempo, Duckworth (1972) studied the effects of training in visual discriminations which incorporated a high response uncertainty. Using visual discrimination activities with groups of educable

mentally retarded children, Duckworth was able to show that the impulsives in all groups became more reflective when re-tested on the MFF than the group who had received no training. Social reinforcement in the treatment of one group was used in addition to other visual discrimination activities. Whether or not the training resulted in long-term gain was not known. Particularly for the EMR child, the possible effects of the social reinforcement portion of the treatment upon increased performance cannot be overlooked.

In an interesting study by King (1972) impulsive and reflective second graders were placed in classrooms with teachers who had been instructed in seminars concerning the reflection-impulsivity dimension of cognitive style. At the end of grade one students had been administered the MFF and Metropolitan Achievement Test, Primary I, Form B. The teachers were expected to modify teaching strategies to enhance learning for reflective or impulsive children although the materials used were the same for all groups. Children were grouped by cognitive style to facilitate treatment and planning demands for the different strategies. The post-testing consisted of a re-test on the MFF and the Primary II, Form C, Metropolitan Achievement Test, Reading Subsection. It was concluded that grouping children according to cognitive style had no effect on the reading progress of the experimental groups. It was suggested that longitudinal studies, teacher training and specific materials might all be significant considerations in future investigations.

In a similar study, Woker (1971) placed children in classes according to teachers who had been classified as Reflective or Impulsive on the adult MFF. He found no significant decrease in error score or increase in latency for the impulsive children placed in reflective teachers classrooms. The study was conducted with second grade boys and should be replicated at a higher grade level where cognitive processes place more demands upon the teachers to see if the same results are obtained. Dealing with second grade students and material may diminish the tendencies for the reflective and impulsive teachers to perform in ways that are characteristic of the two groups. Yando and Kagan (1968) in a similar study had found capacity to delay more malleable than the ability to perform perceptual discriminations, when teacher tempo was controlled.

Several studies were found where treatment was designed to change both error rate and response time of the impulsive subjects. Ayabe (1970) reasoned that, a change in strategy the children used to solve problems would produce a change in the cognitive products. He hypothesized that reflectives could be trained to become more impulsive in their problem-solving strategies, and that impulsives trained in reflective problem-solving strategies would become more reflective. He used the MFF to classify the training sample. During three training sessions, subjects were taught four rules appropriate to the treatment with liberal praise given for correct scanning strategies and correction given when subjects erred. The results indicated that one can train reflectives to respond more impulsively but training in

reflective strategy was not successful in inducing reflective behavior by the impulsive subjects. Furthermore, the training did not transfer to classroom tasks on the basis of the measures used to investigate this possibility. There seems to be more involved in the scanning strategy of reflectives than merely number of observations.

A similar study by Egeland (1973) involved the training of 72 impulsive children to improve their search and scanning strategies on match-to-sample visual discrimination exercises. A second group of 24 impulsive subjects were taught to delay their responses on the same set of exercises. Re-test results on the MFF administered immediately after training showed significant increases in response time and decrease in errors for both groups. Only the search and scanning group increased performance on the Gates-MacGinitie Comprehension subtest, while both groups showed improvement on the Vocabulary section of that test. A re-test two months later revealed that children who had received only delay in response training showed an increase in errors, while those who had been trained to improve their search strategies continued to maintain a low level of error responses.

Stein (1970) attempted to change cognitive style by cue discrimination training. One experimental group was trained to generate as many descriptive cues as they could about pictures containing many detailed objects. The goal was to train these children to attend to cues. The cue relevance training group was instructed in processes of comparing details for similarities and differences and of

evaluating several alternatives on all details in order to visually match figures that were similar on every detail. The MFF and the Haptic Visual Motor test were used to place children in a three group continuum and then they were randomly distributed to three groups. Subjects were 83 fourth grade children from lower-class schools with a higher proportion of Mexican-Americans. Two individual training sessions were conducted for each of the subjects in the two experimental groups. Error rate on the MFF post-test decreased significantly for all three groups but those children who had been trained to look for similarities and differences and to evaluate the possible alternatives decreased their error rate significantly more than those in the cue attendance group or the control group. The cue relevance group also significantly increased in response latency on the MFF. These findings are consistent with the suggestion from Shine (1972) and Ayabe (1970) that the quality of input is a factor in the impulsivity-reflectivity dimension. Whether or not the training received in the cue relevance group carried over time and transferred to classroom tasks was not investigated.

One hundred and fourteen kindergarten children were used in a study by Roettger (1972) to determine the effects of directed and non-directed training upon the visual discrimination performance of reflective and impulsive children. Mean response times on the MFF and Peabody Picture Vocabulary Test (PPVT) were used for purposes of classification and the twenty children whose response times clustered about the median for the group were eliminated. A word discrimination

task was used for training with one group being taught a scanning strategy involving match-to-sample, letter-by-letter. In the non-directed group, children matched responses without being taught the scanning strategy. The control group looked at books in the library and showed little change on the posttests. A word discrimination test was developed by Roettger and used for pre-post testing. In addition, twelve sets of words randomly selected from the twenty-five words on the test were used in the eight training sessions. All groups showed a decrease in mean error rate on the Word Discrimination posttest and mean response times increased significantly for both training groups. The impulsive children did respond to training, with both groups showing a decrease in error rate and an increase in response time on the Word Discrimination Test. Using words from the pre-post test for training purposes might account for this finding. On the MFF and PPVT posttests, reflective children in the two training groups showed a decrease in response time, while time increased for the impulsive children in these groups. Number of errors decreased for both reflectives and impulsives. Since the control group showed no such change, it appears that training may be effective in modifying the impulsive child's style of responding on visual discrimination tasks. As in other studies, the longevity effect of the training is not known, nor can it be assumed that there would be transfer to other discrimination tasks. Using part of the test words for training purposes weakened the design of the study.

### C. Summary.

As reported in Chapter I, an analytic style of responding was less frequently found among the impulsive subjects in the work done at the Fels Research Institute (Kagan et al., 1964). Impulsive children tend to be deficient in abilities to verbally categorize objects, to utilize similes and metaphors, to form generalizing statements and relationships between abstract and concrete ideas, to detect absurdities and incongruities in sentences, and to understand puns, proverbs, and parables (Gentile, 1969; Kirk and Kirk, 1971).

Impulsive subjects consistently display a lower level of hypothesis generation and implementation (Adams, 1971; Mussen, et al., 1968; Ault, 1972; Kagan, 1964; McKinney, 1973), and the quality of input they receive is qualitatively different from that of their reflective counterparts (Shine, 1972; Kilburg, 1974; McKinney, 1973). The reading ability of impulsive children is impaired when they are compared to their reflective classmates (Kagan, 1965; Lesiak, 1972; Butler, 1972). The scanning strategies and ability to attend to discriminative stimuli are less well developed in impulsives than reflectives (Epstein, et al., 1975; Siegelman, 1969; Weithorn, 1970). Low achievers are more apt to be impulsive than reflective in cognitive style (Cohen, 1970; Drake, 1969; Shove, 1972).

Training to modify conceptual tempo and error rate of impulsive responders has produced mixed results. Lack of control for possible interacting variables tended to cloud some of the reported differences. Knowledge of success or failure affects performance of the

impulsive child but has not been proven to be sufficient for change of conceptual style over time (Henry, 1969; Reali, 1969; Brady, 1970). Adjusting teaching style for the impulsive responder has not been shown to be particularly effective in studies where impulsive children were placed with reflective teachers in an attempt to change impulsive response styles (Woker, 1971; King, 1972). On the other hand, some success in training children to change their problem-solving strategies has been reported (Duckworth, 1972; Ayabe, 1970; Egeland, 1973; Stein, 1970; Roettger, 1972). The general consensus of the researchers has been that the quality of input is a factor in the impulsivity-reflectivity dimension. Not only do reflective children take more time to respond, but they appear to utilize inner language processes during that time. The impulsive child, on the other hand, seems to respond quickly without efficient utilization of information processing schemes.

## II. Literature Related to Language Performance of Children Categorized as Reflective or Impulsive

### A. Direct Relationship Studies.

Several studies were found which hypothesized that some kind of relationship existed between cognitive styles of responding and language abilities.

Educationally, the important question is whether children who do not spontaneously use inner speech to guide their actions can (and should) be trained to do so. Meichenbaum (1971) is one of several to report positive results, but how long the effect of the training lasts we do not yet know. (Cazden, 1972, p. 226)

A study by Schwebel (1966) supported the idea that language facility and the impulsive-reflective dimension may be related. As stated by the investigator, the purpose of his study was

to explore social-class differences in language ability in four standard verbal tasks and to demonstrate that in part these differences are due to the greater tendency towards impulsivity in lower-class (LC) subjects (p. 14).

The sample consisted of 30 Caucasian males whose mean age was 10.5 for the lower class group and 10.0 for the middle class group, with class distinctions made on the basis of the neighborhood in which the subjects lived. Four evaluation techniques were used.

- 1) Subjects were evaluated on number of items described and length of the descriptions on four pictures--two containing familiar objects and two abstracts using combinations of colors.
- 2) Subjects were asked to report their day's activities and responses were scored for length, quality, and proper sequence.
- 3) Subjects were given three words and asked to put them all in one sentence. The sentences were evaluated for complexity, number of errors, and time taken to plan the response.
- 4) Subjects were presented, in turn, two collections of 17 objects, and asked to put them into groups which were alike in some way. After grouping they were asked what the defining attribute of each grouping was. Quality and size of groups were evaluated and time spent in completing the

task was recorded.

In all but the events of the day task, subjects were evaluated in both a free response and a 15 second forced latency response situation. Significant differences between lower class and middle class subjects were found in the following areas:

- 1) Middle class subjects named more objects in the picture description task.
- 2) Lower class subjects increased performance in the forced latency situation compared to free response performance in the picture description task.
- 3) Middle class subjects gave fuller detail with fewer grammatical errors than lower class subjects.
- 4) Middle class subjects used longer sentences in the sentence construction test and took longer to respond.
- 5) When forced to wait before responding, lower class subjects reduced their sentences in length but improved them in quality.
- 6) On the grouping objects test, lower class subjects spent less time on the grouping task, used more groupings, and most of the groupings were functional rather than categorical.
- 7) Middle class subjects made fewer groupings but more of the groups were categorical than functional.

Schwebel concluded that "besides being hampered by inadequately developed vocabularies," the lower class subjects "sacrificed accuracy" by impulsively responding (p. 19).

In summary then, the difference between children of the middle- and lower-classes in language usage seems to be attributed both to language-speech competence and to impulsivity-reflection in response. (Schwebel, 1966, p. 20)

While the study by Schwebel offers evidence of a language-impulsivity-reflectivity relationship, consideration of the results should take into account the N of 30 for the total group. It should also be noted that the children were assumed to be impulsive based on latency measures for the tasks presented. A different set of verbal tasks might have shown different results. The lower class subjects appeared to have the ability to increase the quality of their sentences when forced to delay their responses, but their typical language performance did not utilize these underlying abilities under the free response conditions. Since the design allowed free response to precede delayed response on a given task, familiarity with the tasks may have interacted to produce the results.

In an effort to modify impulsivity of children, ages eight through eleven, Wen (1972) related language form to impulsive tempo and designed two variations of treatment. The first hypothesis stated that children trained in writing long sentences would show significant reduction in the impulsives' error scores on the MFF. Secondly, the hypothesis was made that training children in making multiple alternative choices would reduce the impulsive children's errors on the MFF. Only impulsive children were used in the treatment groups and graduate students were trained to conduct the ten training sessions which were finished in five weeks.

The results of Wen's study are summarized below:

- 1) Both of the impulsive training groups significantly decreased errors on the MFF when compared to the control group which received no training.
- 2) The long-sentences group showed more error reduction among higher IQ boys, and those from lower socioeconomic status.
- 3) The multiple-alternative choices group showed more error reduction among lower IQ boys, and those from higher socioeconomic status.
- 4) Both extremely and moderately impulsive boys were benefitted by the multiple alternatives choices task group.
- 5) Correlation between response time and error were significantly decreased for the long sentence group; that is, training increased delay of response time and decreased error rate.
- 6) After training, both impulsive experimental groups produced equal or fewer errors than the reflective group on three out of twelve items on the MFF. Before training no impulsive groups produced fewer errors than the reflective control group on any items on the MFF.

It seems possible that two kinds of factors may have been operating in these training sessions. The writing of long-sentences training seemed primarily to be a language training exercise while thinking of three alternative choices for each section of the ten tasks is more nearly representative of what Whimbey (1975) calls

raising the level of thinking of the children. Impulsive, higher mental ability, lower socioeconomic, boys were helped by the long-sentence training. Language training might have been the factor in this finding. On the other hand, impulsive, lower ability, higher socioeconomic, boys seemed to gain more from raising their level of thinking. Language proficiency could be expected to be less of a contributory factor for the boys from the higher socioeconomic status group, and measured lower intellectual ability could have been the result of an underdeveloped thinking style.

Wen (1972) ventured to state in his concluding remarks that conceptual tempo apparently was related to a restricted language form. It has been theorized that lower class children may respond impulsively because their language abilities are limited to a restricted code, that is, the responses available in their language repertoire lack the descriptive terms and more complicated sentence structures of their middle and upper class age-mates. As a result of the limited language sequences, the children may direct their attention to only the most obvious aspects of their environment, and solutions to problem-solving tasks become progressively more inappropriate as the problem becomes more abstract. (Bernstein, 1964)

In the study by Gentile (1969) the Illinois Test of Psycholinguistic Abilities (ITPA) was used to investigate the relationship between impulsive-reflective responding and specific strengths or weaknesses disclosed by results of the ITPA testing. Eighty, Caucasian, third grade boys were used in the study and the Matching

Familiar Figures test was used as the impulsivity-reflectivity measure. The age range was eight years, six months to nine years, zero months and the IQ range was 80 to 129. When the interaction between IQ, total response time and total error score on the MFF for all subjects and performance on the ITPA was examined, IQ accounted for the largest amount of the variance, error score on the MFF the next largest amount and response time the smallest amount. This analysis was based on all 80 subjects. Other data analysis was based on the subgroupings: 1) Reflective, 2) Impulsive, 3) Fast Accurate, and 4) Slow Inaccurate.

Gentile reported significant differences between the mean scores of the reflective and impulsive groups on two subtests of the ITPA--Auditory-Vocal Association and Auditory-Vocal Automatic. He also found that impulsive boys were less able to predict future linguistic events. Loban (1966a) found in his longitudinal study of language development in elementary school children, that children who are below their age-expected level of language development do not use predictive or future oriented terminology in their free speech. Words such as probably, maybe, and perhaps were not used by low language children, while high-language children frequently used such terms.

#### B. Other Evidence.

A compilation of studies concerning what Whimbey calls cognitive therapy is available in his book, Intelligence Can Be Taught (Whimbey, 1975). In each instance, an increased facility in the use

of language was an important part of the treatment, if we can accept the premise that cognitive growth is dependent in part upon language growth and development. Whimbey believes that such is indeed the case when he states

vocabulary knowledge accumulates, and is practiced, in the course of fully comprehending verbal ideas. And as such it is a good indicator of overall intelligence.

To be sure, some concepts do demand more thought--more comparative analysis--for their comprehension, and we sometimes refer to these concepts as more abstract. However, understanding such concepts requires not greater neural endowment expressed as a mythical abstraction ability, but rather a reflective pattern of thinking. (Whimbey, 1975, p. 113)

And in the same vein, he believes vocabulary knowledge is an end product of the processes that underlie "the second skill of reading--the skill of comprehension" (p. 113).

Kilburg (1974) found no difference between reflective and impulsive subjects when a correct response to a visual memory task could be made on the basis of a verbal label. When the task required concentrating upon distinctive or different visual stimuli, reflectives did much better, particularly in the condition in which the only basis for discriminating an old from a new item was distinctive perceptual features. The stimuli used for the study, however, were all line-drawings of familiar objects or animals so it can be assumed that labelling of them by the children was not dependent upon various levels of language skill.

Kaplan and Mandel (1969) used a series of object sorting tasks to study the level of conceptual functioning of middle versus lower class boys, ages six to twelve. The boys were presented a grouping

of familiar objects and asked why they belonged together, or they were given one object and asked to select other objects that belonged with it. Responses as to why the objects should be a part of the grouping were scored on a Leikert Scale for the degree of conceptualization that was communicated to the examiner. Verbal expression under these conditions significantly differentiated between the social classes. The lower class boys did not score as high as the middle class boys on the verbalization measures. The study had a forced delay of response time under one of the conditions of verbalization about the tasks. Contrary to the findings of Schwebel (1966) discussed above, the authors found that forcing subjects to delay their responses did not improve their verbalization scores over all ages. While the subjects in the Kaplan-Mandel study were divided by social class rather than the impulsive-reflective dimensions, the forced latency condition was tested because of the class differences that have been shown to exist where verbal behavior is required. The authors found that forcing lower class children to delay response did not improve verbalization for six, ten, or twelve year olds but did improve scores for eight year olds.

### C. Summary.

Bernstein (1964) theorized that restricted language form may evoke verbal sequences that inappropriately direct perception, so that, error rate increases with the degree of abstraction of a problem. The studies discussed above touched upon various aspects of language and language related skills among reflective and impulsive children.

While no study was found that attempted to analyze differences in overall language ability between reflective and impulsive subjects of the nine to twelve year old age group, work done by Schwebel (1966), Gentile (1969), and Wen (1972) tend to indicate that some language skills may be interacting with the reflective-impulsive styles of responding. Meichenbaum and Goodman (1971) report significant differences between reflective and impulsive pre-schoolers in an analysis of their private speech.

Whimbey (1975) stressed the importance of reflectivity in comprehension of abstract concepts and emphasized the importance of language growth in cognitive development. Kilburg (1974) found no difference between R-I groups when common verbal labels could be used by both groups to aid in visual memory tasks. When distinctive perceptual features without specific verbal labels were used as the basis for discrimination, reflectives did much better than impulsives in the discriminating tasks. On a design recall task, children who attached verbal descriptive labels to abstract forms, were better able to select the exact form from other similar forms (Kagan, et al., 1964). Verbalization differentiated Kaplan and Mandel's (1969) lower and middle class subjects, but forcing response delay did not improve verbalization over all ages, contrary to the findings of Schwebel (1966). The use of different measurement of verbalization techniques do not make the two studies directly comparable, however.

### III. Literature Related to Measurement of Language Performance

#### A. Characteristics.

The literature on language development is extensive both in amount and range of content. Because language is a basic ingredient of most of the learning that takes place in the life-time of an individual, references to its importance can be found in almost any book about education or human development. Some limits, therefore, were drawn in this review. Since the study was concerned primarily with levels of language development as they may relate to the reflective-impulsive cognitive styles, the review of the literature related to language development has been confined to the developmental characteristics that have been identified in children's use of language, particularly as it concerns the middle-elementary school child (ages 9-12).

McCarthy (1930) has done an extensive review of the literature on language development that covers the time before publication of her study in 1930. For an overview of the early work in the field of speech and language acquisition for the child of age six or younger, this is an excellent source of information. The McCarthy study added to the store of existing knowledge at the time and was an important step toward more objective analyses of language.

Between 1930 and the present time, the important aspects of language development that occur prior to age six have continued to be studied with ever-increasing refinements of testing methods. Landreth (1967) refers to a number of these studies and summarized their

content by stating:

In summary, young children learn all features of a language simulatenously. Their first word combinations are telegraphic [i.e. noun-verb, only] and concerned with the here and now. They understand more than they can express. They arrive at grammatical rules inductively and progressively use word order as a clue to the kinds of words they hear. They have difficulties in dealing with analytic processes and with discriminations based on more than one factor (Landreth, 1967, p. 188).

In the literature on language developmental levels, language acquisition and language deficits make up the two broad categories of concern as a result of the blending of psychology and linguistics (Allen and Cortazzo, 1973).

In a comparative study of the language of normal and mentally retarded children, Myklebust (1973) appraised the children on four language skills: their ability to receive auditory language, their ability to express language they hear, their ability to read and to write. While the results of the appraisals are reported primarily as they concern the retarded child and are beyond the interest of the present study, some of the findings concerning the normal children may be pertinent. Not only were developmental gains observed, they appeared to be uniform throughout the age range of nine to fifteen years for both normal children and retardates. Scores derived from the Picture Story Language Test showed that for normal children (IQ range 104-111) the length of the stories the children told about the pictures increased from 90 words at 9 years to 150 words at age 13. The number of sentences written was used as an indicator of facility in use of the written word. As normal children grew older, they

increased the number of words written but, as the sentences became longer, they decreased in number.

The work of Loban (1966) is one of the most important references available for gaining insight into language growth in the elementary school child. His longitudinal study covers a group of children from kindergarten through grade nine. Of the original 338 children tested in kindergarten, 220 remained for observation and testing at the end of the ninth grade. Loban's primary goal was to devise a "method of analysis for studying children's language and for locating features of language meriting further study (p. 87)."

While Loban contributed immeasurably to the study of language development in children, particular stages of development were not defined, but some developmental characteristics were delineated. The comparisons reported below are based on the two most extreme subgroups of all the children in the Loban study. The high subgroup were those judged to be most proficient in language usage, and the low subgroup those who displayed the least well-developed use of language in the day to day observations of teachers.

Since Loban was interested in developing methods of analysis which would make possible the scientific study of language in both its semantic and structural aspects, his methods and terminology must be understood in order to interpret his findings. Interviews with the child were recorded each year and then transcribed for analysis. The typed script was marked for phonological units, communication units, and mazes. Loban defined a phonological unit as a unit characterized

by a definite drop in pitch and then a definite pause. A communication unit was defined as a group of words that could not be further divided without loss of their essential meaning. The words comprising a communication unit were either independent grammatical predications or answers to questions which lacked only the repetition of the question elements to satisfy the criterion of independent predication. He described mazes as being language behavior consisting of many hesitations, false starts, and meaningless repetitions.

The communication units and mazes proved to be excellent measurements of language development. At a second level of analysis, Loban examined the component parts of the patterns revealed in the communication and phonological units. Analysis of the data revealed that the most useful and suitable categories proved to be 8 kinds of expressions.

- 1) Facts and unelaborated perceptions
- 2) Interpretations
- 3) Personal associations
- 4) Tentative statements or suppositions
- 5) Generalizations
- 6) Irrelevancies
- 7) Direct questions
- 8) Figurative language

(Loban, 1966, p. 11)

Of these, the tendency to use tentative statements or suppositions (I think, perhaps, it might be, maybe) was highly predictive of good language skills.

Those subjects who proved to have the greatest power over language--by every measure that could be applied, not just by the combined Teachers' Rating Scale and Vocabulary Test--were the subjects who most frequently used language to express tentativeness. Supposition, hypotheses, and conditional statements occur much less frequently in the language of subjects lacking skill in language.

The low group furnishes only a few examples of this use of language, whereas the high group uses language in this way from kindergarten through the sixth grade, employing such words as perhaps and maybe more often than subjects who had difficulty in expressing themselves. (Loban, 1966, p. 44)

In summarizing the findings of his study Loban states:

From one school year to another, the amount of meaningful language or communication units increases slowly and gradually throughout the primary school years and then spurts forward at the fifth grade level. In this respect the low subgroup moves forward much like the high subgroup and the total group, showing an appreciable jump in meaningful language at grade five. Children high in language ability maintain their initial superiority over those low in language ability. In respect to mazes, members of both groups continue to have trouble with expression from year to year, but those in the high group are more fluent and are gaining greater control over this fluency. (Loban, 1963, p. 34)

Extrapolating from Loban's work, the following differences between high ability and low ability language groups are pertinent:

- 1) Complicated constructions used as subjects of sentences, such as infinitives and clauses
- 2) Use of noun modifiers and compound nouns
- 3) Subject-predicate agreement with the third person singular verb a particular problem
- 4) Consistency in verb tense
- 5) Expressions of tentativeness (maybe, I think, perhaps, might)
- 6) Reading ability as interpreted from the Stanford and California Achievement Tests in Reading for grades 4, 5, and 6. The high group always reads more than two years above its chronological age. The low group starts off one and a half years below chronological age and falls further behind

with each successive year.

- 7) Number of words in a maze and the number of mazes in oral language
- 8) Written expression

In a study concerned with the acquisition of syntax in children between 5 and 10 years of age, Chomsky (1969) concluded:

Contrary to the commonly held view that a child has mastered the structures of his native language by the time he reaches the age of 6, we find that active syntactic acquisition is taking place up to the age of 9 and perhaps even beyond. Second, our observations regarding order and rate of acquisition for related structures in different children are in agreement with the findings of investigators who have worked with younger children...Quite simply, although we cannot say just when a child will acquire the structures in question, we can offer a reliable judgement about the relative order in which he will acquire them. (p. 12)

Her sample of 40 subjects in grades K through 4 were examined in depth on a few syntactical structures. The study is interesting in testing approach and important for establishing some specific analyses of deep structure in sentences. It does not, however, lend itself to defining an over-all language performance scale for large groups of subjects.

In an early study which tried to outline the principal stages of orderly sequence in development of language by children, A. F. Watts (1944) not only laid a sound theoretical foundation for his work but also contributed one of the few developmental language tests for older children. Since the work was done in England, some of the items must be changed for use in this country, but the tests were based on the principle of obtaining many small samples of a body of information. The normative population was composed of English school children and

the objective testing was done in school classrooms using groups of children. Children were most often required to write one word or short answer responses, although some of the tests were designed for individual administration. There are excellent tests for the 10-15 age group as well as for those children between the ages of 4 to 10. However, the limitations of the time that could be spent with the subjects of this study precluded the use of most of the instruments devised by Watts. For example, the vocabulary tests alone require more than four hours to administer.

Contributions of the Linguists. As mentioned earlier, language acquisition and language deficits make up the two broad areas of concern in the language development literature. As suggested by the paucity of longitudinal studies reported in this review, most of the work has been done on the pre-school or early primary child. The work on language deficits has been covered more extensively later in this review, but it would be a serious oversight not to mention the contribution to the study of language development that has been made by the linguists.

The field of linguistics evolved largely as a result of the need for anthropologists to understand the language of a culture in order to study that culture. The only method available to them was to study the native languages as they were spoken, describe them, and try to show their structure. The terms "structuralist" and "descriptive" grew out of these methods of study and have influenced the investigation of English grammar.

Thus, the structuralists began to explore language on three different levels: phonology, morphology, and syntax. They considered sentences to be the largest units of language capable of scientific analysis. Then, they systematically broke sentences into their smallest components--sounds. Phonology evolved from attempts to describe these minimal units of sound, or phonemes. Morphology is roughly analogous to the study of "words." It investigates the way sounds combine to form units of meaning, or morphemes. The way morphemes combine to form phrases and clauses--and the study of these formations--is called syntax. In the course of their investigations, linguists also attempted to separate meaning from structure. These efforts led to the creation of generative-transformational grammars. (Hodges, 1972, p. 3)

Studying language development by counting the different structures represented in children's speech and writing at different age levels did provide insights into developmental levels. It gave the investigator an objective measuring device that could identify certain common characteristics of language usage. The extensive work by Watts (1944) is an excellent representation of this approach to the study of the language of children below 15 years of age. It was when the linguists began to try to separate meaning from structure, that a new field of study emerged

As structuralism may be considered a reaction to traditional grammars, so may transformational grammar be considered an expansion of, if not a reaction to, structural grammars. It is Noam Chomsky whose name is generally associated with this "new" grammar. The publication in 1957 of his monograph Syntactic Structures is generally considered to be a turning point in contemporary linguistic study. (Hodges, 1972, p. 5)

Essentially, the transformational grammar movement is based on the idea that language is not synonymous with speech.

In transformational grammar, language is considered to be an underlying form that can be expressed through speech and through writing...underlying meaning is an integral part of

linguistic analysis; and language is the medium we use to convey meaning. (Hodges, 1972, p. 5)

The future for standardized tests of language development is much brighter as a result of the work of the linguists. Just as the structuralists made scientific study of language possible by operationalizing the testing procedures, the generative-grammar linguists are refining the process by taking meaning out of the realm of conjecture and into a more scientific approach.

There are still some problems with the samples of language that are drawn for study. If free speech of the subject for fifteen minutes in the presence of an interviewer is analyzed, the skill of the interviewer in getting the child to talk may influence the results. If the first 50 responses of a subject are recorded, there is control over amount of speech, but the situational context may influence the kinds of speech used. For example, the occasion may not be one in which a child would normally use supposition or certain morphological inflections.

As the linguists continue to join with the psychologists, however, it is likely that consistently more refined instruments will become available for analyzing and characterizing the language system by developmental levels (Lenneberg, 1964; Cicourel, Jennings K., Jennings S., Leiter, MacKay, Mehan & Roth, 1974). For now, such instruments are not yet available.

## B. Instruments.

A search for appropriate measures of the language performance for the nine to eleven year old age group disclosed a serious paucity of instruments. Most of the language tests that were available were designed for use with much younger children.

Truly reliable formal diagnostic procedures in language arts other than reading are few. An item analysis can be made from the language sections of most standardized achievement tests; they can give insights into a pupil's strengths such as grammar, punctuation, and spelling. But many such tests are merely survey tests and do not explore one skill with any depth. These tests may be used, nevertheless, as indicators of possible areas of concern for a child. If weakness in a skill is suspected, other diagnostic techniques should be used. (Knight, 1973, p. 323)

Knight proceeded to recommend the use of checklists, anecdotal records, tape recordings, responses to questions about pictures, and teacher-made tests as other diagnostic techniques that could be used. It was felt, however, that standardized instruments would be preferable for the purposes of this study.

Much of the work that has been done on language development, as far as determining levels of proficiency, has been concerned with the acquisition of speech sounds and language in the young child.

Research in the field of language development in young children has provided us with a good deal of information about the developmental or emergent stages leading from the birth cry to the first use of real words (or "true speech") about the twelfth or thirteenth month of life. There are several good charts and developmental scales available that review and summarize much of the developmental data gathered by several decades of researchers. (Molyneaux, 1972, p. 20)

Butler and Pratt (1972) mention some of the diagnostic tests that are available to help identify specific language disabilities.

The Denver Developmental Screening Test, which establishes a relative position for the subject with regard to a specific developmental schedule in several areas, is limited to children of age six or under. Pre-school children and infants can be evaluated by the Houston Test for Language Development. Both the Slingerland Screening Test for Identifying Children with Specific Language Disabilities and Myklebust's Picture Story Language Test were designed to examine various aspects of language function in young children across visual, auditory, or motor channels. (Jones, 1972)

While diagnostic tests give excellent information on possible areas of weakness involving the mechanisms of language reception or expression, they are designed to test such things as auditory or visual memory, auditory synthesis, grammatical closure, or auditory discrimination. Language Development, edited by Jones (1972), includes contributions by 28 language specialists and is especially intended to stress the importance of language in the learning process. While a number of language tests are reported as being useful to the language therapist, most of them are helpful in diagnosing specific deficits rather than in determining overall language proficiency. In addition, the emphasis for the book was placed on children at age seven or younger.

Carolyn Burke (1972) has reminded us that "the whole of language is not the sum of its parts" (p. 28). The truth of this statement has received emphasis by others.

The utterance of the child who uses language ably and purposefully tends to be fairly lengthy; his syntactic structure, complex; his vocabulary, sophisticated. He understands and responds to abstract thought. He is happy

with and interested in many types of experiences.  
(Ogilvie and DeVito, 1972, p. 213)

In spite of the demands placed upon any investigator by such ideas, Mecham (1971) reported how these general areas could be refined into more specific dimensions:

In addition to language demonstrating predictable developmental dimensions in time, linguists and psycholinguists are generally agreed that language can be classified mainly into four behavioral processes: (1) semantic encoding, (2) grammatical encoding, (3) semantic decoding and (4) grammatical decoding. (p. 81)

Using these processes as guidelines, standardized tests were reviewed for items representative of developmental schedules of language patterns. These items were then arranged

segmentally according to age progression and classified...in accordance with the four basic processes of language function, i.e., semantic decoding, semantic encoding, grammatical decoding, and grammatical encoding. (Mecham, 1971, pp. 83-84)

The Utah Test of Language Development was the result of this effort. It provides a measure of language proficiency that is reported in language-age equivalents and has the advantage of a normative base for each item that exceeds what is normally available in a new instrument.

Vogel (1975) constructed three experimental tests to help her assess the syntactical ability in the auditory language of normal versus dyslexic children. The Test of Recognition of Melody Pattern was constructed to assess the child's ability to recognize from inflection whether a sentence was declarative or interrogative. The theory behind the test construction was that internalization of the

intonation patterns of an individual's language is an important component for development of syntax. The test is composed of nonsense words in sentence groups which are to be read with the same inflection and intonation of the model sentence.

The second experimental instrument, the Sentence Repetition Test (Vogel, 1975), consists of 20 sentences arranged in increasing syntactic complexity. Both vocabulary and sentence length were controlled to restrict the influence of differences among subjects in the ability to recall the orally presented sentences.

The third instrument developed by Vogel (1975) was the Test for Recognition of Grammaticality. She hypothesized that the "greater the syntactic proficiency, the greater the ability to identify correct and incorrect usage in sentences of increasing complexity" (p. 18).

### C. Summary.

The problems associated with assessing the language ability of an individual are complex and have not been solved at this point in time. Most of the investigations into the assessment problem have been limited to very young children. The emphasis, generally, has been on trying to build a body of knowledge about how the infant learns to talk, about identifying patterns of language development that are more or less universal across or within cultures and about procedures that have proved useful in identifying speech/language abnormalities. Most of the authors recommend informal testing procedures for use with the school age child such as daily observations, anecdotal records, check lists, and teacher-made tests.

The problems involved in controlling for extraneous variables are recognized, and most of the assessment approaches try to control these variables as much as possible. Relying upon free speech samples for analysis is restricted by the fact that the speech sample is situation bound. The subject's language is guided by the situation in which he finds himself at the moment. Given that a variety of language samples, both formal and informal, both public and private, could be gathered, there remains the unsettled question of how best to interpret the findings.

Formal procedures of language assessment for the nine to twelve year old age group were found to be very limited.

### Chapter III

#### DESIGN AND PROCEDURE

Three areas of investigation were proposed in this study.

- 1) Is there a difference between the mean assessed language performance of reflective and impulsive fourth grade children?
- 2) If intelligence and language performance are controlled, do impulsives still tend to score at a lower level on a standardized achievement test?
- 3) Do the two groups tend to make different kinds of errors on the selected language measures?

The questions addressed in the study determined the procedures used in the collection and analysis of the data. From a preliminary sample of 118 fourth grade children, 30 subjects were identified as impulsive and 27 as reflective, using the Matching Familiar Figures test. Those 57 subjects were then administered three measures of language performance and the analyses of the language scores and errors were made to determine whether or not differences in language performance existed between the reflective and impulsive subjects. The achievement and intelligence tests administered in the school just prior to the beginning of the study were used to investigate differences between the reflective and impulsive children on achievement in reading, language arts, mathematics, science, and social studies.

This chapter contains information on the sample and its selection, the instruments that were used, the procedures used to collect the data, the hypotheses that were tested and the procedures used in data analysis.

### The Sample

The subjects for this study were drawn from the 304 fourth grade children enrolled in an open-space school located in southwestern Virginia. The school served all fourth and fifth grade children residing in the community, a town of approximately 12,000 population, and included, therefore, representation from the total community. Parental permission for a child to participate in the study was required. Letters requesting parental consent were sent home with all fourth grade children and 118 permissions were obtained. The testing performed to classify children as either reflective or impulsive was conducted on this sample of 118 children. Through the use of the Matching Familiar Figures test developed by Kagan (1965), 60 subjects were selected for purposes of this study.

An analysis of the socioeconomic levels represented in the subjects selected for further testing revealed that they were generally representative of the community at large. The percentage breakdown of the community and the reflective-impulsive sample has been presented in Table 1. Of the 60 children classified as reflective or impulsive, three left the community before complete sets of data were obtained and they were omitted from the study.

Table 1

## Percentages of Community and Sample Socioeconomic Levels

SES Levels (Annual Income of Parents)	Percentage of Population			
	Total Community	R-I Samples Combined	Reflective Group	Impulsive Group
Below \$4,000	16%	9%	7%	10%
\$4,000 - \$12,000	62%	72%	74%	70%
Above \$12,000	22%	19%	19%	20%

Classification of the remaining 57 subjects, as described below, resulted in a group of 27 reflectives and 30 impulsives. The sex and race distribution was comparable between groups as shown in Table 2. The age range of the sample was nine years, three months to eleven years, seven months. (Table 3)

### Instruments Used

Six instruments were used to gather data for this investigation:

1. Matching Familiar Figures
2. Utah Test of Language Development
3. Sentence Repetition Test
4. Test for the Recognition of Grammaticality
5. Science Research Associates Assessment Survey
6. Short Test of Educational Ability

The Matching Familiar Figures test (Kagan, 1965) was used to classify subjects as reflective or impulsive. The Utah Test of Language Development (Mecham, Jex, and Jones, 1967) was used in conjunction with two experimental tests developed by Susan Vogel (1975) to arrive at an assessed level of language performance. The Science Research Associates (1971) Assessment Survey, Achievement Series, Form E, and the Short Test of Educational Ability (Science Research Associates, 1969) were administered to all the fourth grade children in the school during the fall of 1975. The results of the Assessment Survey were used to obtain levels of school achievement for the subjects of this study and IQ scores were obtained from results of the Short Test of

Table 2  
Sex and Race Distribution of R-I Sample

	Reflectives (n = 27)	Impulsives (n = 30)
Boys	13	15
Girls	14	15
Race		
Caucasian	24	27
Negro	3	3

Table 3  
Chronological Ages of Reflective-Impulsive Subjects

Age in Years, Months	Reflective (n = 27)	Impulsive (n = 30)
9.2 - 9.11	18.5%	13.3%
10.0 - 10.10	77.7%	73.3%
10.11 - 11.8	3.7%	13.3%

Educational Ability.

Reliability and Validity of Scores on the Instruments Used

The instruments used in the study were examined for their merits as testing instruments. Both information about the tests that was reported by others and their reliability as found in the present study are reported below.

Matching Familiar Figures Test (MFF).

The MFF is an individually administered test designed and developed by Jerome Kagan (1965). The test format is presented in a spiral bound booklet that can be opened at a 90° angle in front of the subject. The subject is presented one picture of a familiar object (the standard) on the upright page and six similar pictures of that object on the table surface of the booklet. Only one of the six alternative pictures is identical to the standard. Objects pictured include houses, scissors, telephones, teddy bears, trees, leaves, cats, dresses, giraffes, lamps, boats, and cowboys. The subject is instructed to find the one picture from the six alternatives that is identical to the standard. The time required for the subject to make the first choice of the alternatives, called the delay-of-response time, was recorded. If the first choice was incorrect, the subject was asked to try again and incorrect choices were recorded to obtain the error rate.

Evidence for the construct validity of the MFF as a measure of impulsivity that relates to personality characteristics of impulsives,

in the psychological sense, is inconclusive and contradictory (Block, Block & Harrington, 1974; Bentler & McClain, 1976). However, there is empirical evidence that the MFF does display fairly consistent results across studies on time-error reliability (Siegelman, 1967; Fish, 1969; Freudman, 1974; O'Keefe, 1971; Ault, 1972; Adams, 1971).

The correlation between MFF latency and error scores is  $-.33$ . The internal consistency reliability of MFF latency is  $.89$ ; of MFF errors,  $.62$ . Based on 64 children tested one year earlier as well, the stability or across-time correlation for MFF latency is  $.19$ ; for MFF error, the stability of across-time correlation is  $.34$ .... These several figures are in reasonable accord with related figures in the literature. (Block, et al., 1974, p. 623)

For the 57 subjects in the sample in this study the Pearson correlation coefficient between MFF latency and error scores was  $-.71$ . The internal consistency reliability of the MFF latency scores was  $.88$  and of the MFF error scores was  $.64$ .

#### Utah Test of Language Development (UTLD).

The Utah Test of Language Development (Mecham, Jex, and Jones, 1967) was developed as a direct-test revision of the Verbal Language Development Scale. The UTLD is an instrument designed to measure expressive and receptive language skills. It contains 51 items and was normed for ages 1.5 - 14.5. The results are reported in Language-Age-Equivalent Scores.

The correlation coefficient between the UTLD and the Verbal Language Development Scale was  $.967$  for 117 children of the preliminary norm-sample. An odd-even, split-half correlation coefficient, corrected by the Spearman-Brown prophesy formula was reported

to be .937 and the authors concluded that these correlations were "sufficiently high to suggest that the scale is satisfactorily reliable as an objective testing instrument." (Mecham, et al., 1967, p. 5)

All items on the UTLD were selected from previously standardized sources, that is, items purporting to measure a language skill or ability from other tests were classified and combined to form the UTLD. Face validity, therefore, appeared to be good. In order to validate the test, the authors correlated the age-equivalents of the items as they appeared on the original sources with the test sample.

Product-moment correlation of ages of items in the present sample with their age levels in the original tests is .983.

Item validity was checked by correlating each item on the test with total test scores....Discrimination scores of all items except No. 1 were well over .40, and this indicates that they are acceptably valid items in terms of their discriminating power. (Mecham, et al., 1967, pp. 5-6)

The KR-20 correlation coefficient for the sample of 57 subjects in this study was .69. Standard error of measurement was 1.45.

Two experimental tests developed by Susan Vogel (1975) were chosen to bring a wider range of language performances into the assessment process. The first of these was designed to evaluate the child's ability to recognize appropriate and inappropriate grammatical usage and the second one utilized repetitions of sentences arranged in increasingly complex syntactic order.

#### The Test of Recognition of Grammaticality, (Vogel, 1975).

The notion of grammaticality is based on Chomsky's theory that native speakers can recognize that a sentence is

grammatically correct even if it is not meaningful. (Chomsky, 1957) Coleman (1965) and Hill (1961) tested this notion and found it to be true in 86 per cent of the responses. Thus this test is an extension of Chomsky's notion. It would seem that children should be able to recognize that a sentence is grammatical (especially when it is meaningful), provided the difficulty of the syntax does not exceed their level of development. It was hypothesized that the greater the syntactic proficiency, the greater the ability to identify correct and incorrect usage in sentences of increasing complexity. (Vogel, 1975, p. 18)

The elementary, intermediate, advanced, and high school levels of the Metropolitan Achievement Tests of language usage were used by Vogel as guidelines for the sentence types, ratio of correct to incorrect items, order of presentation, and instructions for administering the test. Six sentence types for each of the four levels were composed. Of the twenty-four test items, eight were grammatically correct and sentences were randomly ordered for level of difficulty.

Since this was an experimental test, the only reliability data available was that provided by its author. She found a reliability of only  $r = .49$  and felt that the low reliability was in part due to the fact that on some items all children failed. She concluded that the level of difficulty of the syntax was above their syntactic ability. It should be noted that the mean age for the 46 children in Vogel's sample group was 7.9 years, while some of the sentence types were composed of items similar in structure to the high school level achievement test on language usage. "Neither sentence length nor semantic difficulty were controlled" in the composition of the test items (Vogel, 1975, p. 67).

Since the sample in the present study was composed of older children, it was felt that perhaps the test would show a higher reliability correlation coefficient. Such was not the case. The reliability (KR-20) for the reflectives was  $r = .50$ , for impulsives  $r = .44$  and for the two groups combined  $r = .47$ . In no instance did all children fail an item, however, so further research and analysis is needed on this instrument, including particular attention to its content validity as a language ability measure.

In this study the Pearson-product-moment correlation of the Test of Recognition of Grammaticality with the Utah Test of Language Development language-age equivalent was  $.39$  ( $p \leq .001$ ) and with the Sentence Repetition Test (to be discussed below) was  $.59$  ( $p \leq .001$ ). In Vogel's work with the Grammaticality test, she found the ability to identify correct grammatical usage was independent of the ability to comprehend or use syntax in expressive language (Vogel, 1975), however, it is as yet unclear what components of language skill or acquisition may be contributing to this factor.

#### The Sentence Repetition Test (Vogel, 1975).

The second experimental instrument developed by Vogel (1975) that was chosen for use was a Sentence Repetition Test (SRT). It consisted of 20 sentences arranged in order of their increasing syntactic complexity. The task of repeating sentences is a complex one that involves memory factors and receptive language ability as well as ability to reproduce sentences that may be structurally unfamiliar to the elementary school child.

The process seems to be a complex one involving comprehension, memory, and expression of language and not imitation or memory span alone. (Vogel, 1975, p. 20)

In order to overcome some of the obvious drawbacks of the test, the sentence constructions were controlled for length as well as semantic difficulty. Syntactic complexity was introduced by increasing the underlying sentences from two to four--the first five items having two embedded sentences, the next ten having three embedded sentences and the last five containing four underlying sentences. In addition, the sentences were "developmentally sequenced" (Vogel, 1975, p. 20).

Vogel (1975, p. 55) reported an internal consistency reliability coefficient of .85 for this instrument. The test yielded a significant difference between Vogel's normal-dyslexic sample ( $p \leq .045$ ). For the purposes of the present study, the final scoring procedure used on the SRT differed from Vogel's simple right or wrong procedure and is discussed under the section on scoring below. The KR-20 reliability correlation coefficient computed on right or wrong sentence repetitions according to Vogel's (1975, p. 29) guidelines for scoring, however, yielded a comparable figure, with  $r = .82$ .

The analysis of covariance with receptive vocabulary as the covariate with the SRT yielded no significant regression effects caused by the semantic variable so Vogel's concern about vocabulary was well controlled in her test construction.

The SRT did significantly differentiate between normals and dyslexics when auditory memory was partialled out but there was a

significant correlation between the SRT and auditory memory tests, as would be expected. Validity of the SRT depends, in part, upon the child's auditory memory span. However, the work of Menyuk (1969) supports Vogel's construction of the Sentence Repetition Test as a valid measure of syntactic ability.

The most significant finding was that the structure of a particular sentence determined whether or not it was repeated, not its length. The correlation between sentence length and nonrepetition of sentences in their correct grammatical order is .03. For reverse word order utterances, on the other hand, the correlation is .87. The results of these studies indicated that repetition was dependent on structure rather than just imitation up to the limits of memory capacity. With sentences up to nine words in length, the length of the sentence was not the factor which determined successful repetition even for children as young as 3 years. The differences in the ability of children of varying ages to repeat sentence types was dependent on the particular rules used to generate these sentences, not length. When the structure was broken down completely, however (sentence in reverse word order), sentence length was a highly significant factor. Under this condition subjects imitate without comprehension, for the most part, and therefore repeat up to limits of their memory capacity. (Menyuk, 1969, pp. 113-114)

McNeill (1970) states that:

There is a strong tendency among children to include nothing in the surface structures of sentences that cannot be related to deep structures--i.e., nothing for which there is no transformational derivation known. The principle encompasses spontaneous speech as well as imitation....A child manipulates the grammatical system already at his disposal, often in fantastic ways, but he does not go beyond it [in imitation]. (McNeill, 1970, p. 106)

Science Research Associates Achievement Series, Assessment Survey.

The SRA Assessment Survey, published by Science Research Associates, Inc., was administered to all fourth grade subjects in the state of Virginia during the fall of the 1975-76 school year.

The test allows school personnel to monitor curriculum programs within the state. Student answer sheets were machine scored and results were made available for the purposes of this study. It was felt that administration of another achievement test would be an unnecessary consumption of classroom time.

The SRA Assessment Survey for the fourth grade, Form E, is a 400 item, multiple-choice test that measures achievement in the following areas: Reading (90 items), Language Arts (110 items), Mathematics (80 items), Social Studies (56 items), Science (56 items), and Use of Sources (53 items).

The test was standardized in 1971 with approximately 156,000 students from 6,500 classrooms in 220 school districts involved. The normative sample was drawn from nine geographical regions and eight classes of school districts.

The KR-20 reliabilities of the subtests from the Blue-Level, Form E were reported to be .88 or higher. The composite score reliability was reported to be .99 (Noggle, 1972). The technical manual published by Science Research Associates (1973) reports a composite reliability of .98 and a range of reliability coefficients from .85 to .95 on separate sections of each subtest.

#### The Short Test of Educational Ability (STEA).

The STEA (Science Research Associates, 1969) is a group intelligence test that was designed to provide an estimate of educational ability. Reading requirements are minimal for the levels above third grade but the factors of intelligence tapped by the test are

based on 30 items concerning verbal meaning that do require some reading ability. The test also includes 25 arithmetic reasoning and computation items. All items on the fourth grade level STEA were taken from editions of the SRA Primary Mental Abilities and the SRA Tests of Educational Ability. The results of the STEA are reported as intelligence quotients with a mean of 100 and a standard deviation of 16 for each age group above the first three grades. The STEA for grade four was equated to the Test of Educational Ability which was standardized on sample sizes ranging from 1,639 to 3,249 for grades 4 through 12 in 1962. (Science Research Associates, 1969)

The KR-20 and split-half internal consistency reliability for Level 4 of the STEA were reported to be .88 and .90, respectively. Standard error of measurement for the STEA IQ scores was found to be 5.06 when calculated on the total group of fourth graders in the sample. (Science Research Associates, 1969)

The choice of using the STEA for the IQ measure was made for two reasons. First, the time limitations put upon the researcher concerning total amount of time that a child could be released for testing purposes, forced the selection of time-saving procedures. It was decided, therefore, that the time allowed for testing should be spent gathering as much language data as possible. It was a decision that was not made lightly.

A second factor contributing to the choice of the STEA was the consideration that the STEA intelligence quotient was available on all subjects in the sample and had been administered to all of them

during the 1975-76 fall testing program. Not only was it advantageous for availability and recency, but it was decided that whatever IQ score was used, it should be from the same source for all subjects, as emphasized in the following quotation from Spradin:

Many of the writers in the field of language treat an intelligence quotient as a unitary construct independent of the test which yields the intelligence quotient. However, a closer look at the common intelligence tests suggests that mental ages or intelligence quotients on the various tests are not equivalent. The Peabody Picture Vocabulary Test is a vocabulary reception test. The Columbia Mental Maturity Scale is a visual concept evaluation test. It requires no auditory reception language for high performance. The Stanford Binet Scales use a variety of both verbal and nonverbal factors in testing. To obtain a high intelligence quotient, the child must both understand spoken language and express himself in spoken language. Each of these tests constitutes a definition of intelligence. The relationship between intelligence and the scores on any given language test depends on which intelligence test is used. (Spradin, 1974, p. 273)

#### Data Collection Procedure

After obtaining permission from the school administrative staff to conduct the research, a meeting was held with the fourth grade teachers to explain the purposes and procedures of the study. The teachers agreed to send the parental permission slips home with all of their students and to collect those that were returned. At this meeting the amount of time that each student could be absent from classroom activities was discussed. The investigator agreed to limit the time spent to no more than 45 minutes for any one session, and to keep the total time spent with each student to one and a half hours for administration of all instruments. It was also agreed that,

insofar as was possible, the students would be released during times when they were not involved in reading or math instruction, since teachers were reluctant to have children miss any of that work.

A letter to parents asking for permission to work with their child was distributed to all fourth grade children. A copy of the letter has been placed in Appendix A. Of the 304 letters that were sent home, 118 were returned with the permission granted.

Testing was started the last week in January and completed in May of the 1975-76 school year. The Learning Resources Area of the school was used for the testing sessions. The area was fairly well screened off from regular classroom activity and testing was scheduled in the area at times when it was not being used by groups of children. The librarians on duty were very cooperative in guiding potential individual spectators away from the testing session. In the opinion of the examiner, the tests were administered under nearly optimal conditions for field-based research.

The Matching Familiar Figures test was administered to each of the 118 children from whom permission slips from parents had been obtained. Procedures of administration followed the guidelines presented in the testing kit. Two trial items were presented to ensure that the subject understood what was to be done. The standard was presented and timing begun to determine delay of response time.

The examiner recorded to the nearest tenth of a second, the time between the moment which the subject first appeared to be looking at the test materials and his first response. If the response was

correct, the delay response time was recorded and the number of the response (1-6) was recorded before presentation of the next standard. If the response was incorrect the child was told that his response was incorrect and was asked to look again and find the one that was exactly like the standard. All errors were recorded but after the initial response of each set, the further responses were not timed.

The delay response times on each of the twelve items were averaged for each subject and total number of errors were recorded. The error and latency figures that were assigned to delineate the groups were chosen to provide as many subjects in each group as was possible without including those individuals for whom mixed results were obtained. Using these two criteria, a post hoc analysis of MFF results revealed a 10.5 second latency or less with nine or more errors and a 16.0 second latency or more with six or less errors allowed the largest possible number of subjects to be included without using children who fell outside the classic definitions of each of the two groups. Subjects were assigned to groups accordingly; that is, if a child had an average delay response time of 10.5 seconds or less and made nine or more errors on the MFF, the subject was classified as an impulsive child. The reflective group was composed of children whose average response delay time was 16.0 seconds or more and whose total error score was six or less. Children who did not fall within those guidelines were eliminated from the study at this point, resulting in a total of 60 subjects being retained. Before all data was collected three of the children classified as reflectives

moved out of the district, so the final groups included 27 reflectives and 30 impulsives.

The Utah Test of Language Development (Mecham, Jex, and Jones, 1967) was the second instrument administered to the 57 subjects. Testing time for each subject was approximately 30 minutes. Items on this test were scored either right or wrong on answer sheets provided in the testing kit.

Since the age range of the subjects in this investigation was from nine years, three months to eleven years, seven months, testing was begun at item number 35. If the child failed to achieve eight consecutive, correct responses above that level, testing proceeded downward until eight consecutive, correct responses were achieved. Items were scored plus or minus and all items below the eight consecutively correct responses were assumed to be passed. The basal score was the item number of the highest consecutive plus and items were then tested upward until at least eight consecutive minuses were scored. Testing stopped at that point. Scoring criteria presented in the test manual were followed. The total raw score on the test was obtained by counting the total items passed above the basal score and adding them to the basal score. The language-age-equivalent was obtained by reference to the table in the test manual. (Mecham, et al., 1967, p. 22)

The two experimental tests by Vogel (1975) were the last tests administered. The Sentence Repetition Test (Vogel, 1975) was the first of the two to be administered. Sentences were read only once

and the child was asked to say just what the examiner had said. Contrary to Vogel's scoring procedure of merely recording repetitions as being either right or wrong, it was felt that considerable knowledge might be gained from an analysis of the kinds of errors that were made in the repetition attempts. Therefore, a departure from Vogel's scoring procedure was taken and the child's response was recorded.

For each child the examiner had an individual sheet of the sentences, which could be used to modify the sentences in accordance with what the child actually said. A pilot test was administered to six children not included in the final sample, to give the examiner practice in altering the sentences so that they would represent the verbatim responses of each child. A tape recording was made to check on the examiner's method of coding the responses. No errors in coding verbatim responses were found; however, the recorder was not used on the sample subjects because it seemed to create some anxiety for the children in the practice sessions. Descriptive analyses of the errors made by the reflective-impulsive sample can be found in Chapter IV of this report.

In each instance the Sentence Repetition Test was the second language test administered to each child, sometimes alone and sometimes immediately prior to the Test for Recognition of Grammaticality. Administration time ranged from 15 to 25 minutes.

Children were informed that the Test for Recognition of Grammaticality was a listening test. They were told to listen for one

particular word in each sentence that was read to them and then tell the examiner if they thought the word was used correctly or incorrectly in that sentence. Each sentence was repeated twice and could be read again if the child requested it.

The test yielded two sub-scores and a total score. The first sub-score was the number of grammatically correct sentences that the child could identify. The second sub-score was the number of grammatically incorrect sentences the child could identify and the total score was the sum of the two sub-scores, i.e., total number correctly identified as being either grammatically correct or incorrect. It was the last test given to each subject, although, as mentioned previously, in some cases both the Sentence Repetition Test and the Grammaticality test were administered in one testing session.

The results of the Science Research Associates Assessment Survey and the Short Test of Educational Ability were obtained from school personnel. The tests were administered in October, 1975 and machine scored by the Science Research Associates testing services.

### Hypotheses

The hypotheses for this study and the questions posed were formulated to determine the extent of the relationship between reflectivity-impulsivity, assessed language performance, and achievement levels of a selected group of fourth grade children.

Stated in the null, the tested hypotheses were:

- I. Mean scores on the Language Performance Index obtained by reflective and impulsive fourth grade children will not differ. A  $p \leq .05$  was specified as the level of significance required to reject the hypothesis.
- II. There will be no differences between the mean scores of reflective-impulsive subjects on subtests of the SRA Assessment Survey, when intelligence and assessed language performance are controlled statistically. A  $p \leq .05$  was stated as the level of significance required to reject the hypothesis.

### Questions

1. On selected language performance tests, do impulsive children tend to make different kinds of errors than reflective children?
2. Will the results of an analysis of errors provide information about specific language deficits for which remedial instruction should be considered?

### Analytical Procedures

Several analytical procedures were used to test the hypotheses and answer the questions stated above. Both statistical and descriptive techniques were used.

### Constructing the Language Performance Index (LPI).

Before the differences between R-I groups on language performance could be assessed, several preliminary steps were taken. Because auditory memory was represented as a possible influential factor in all three of the language instruments, it was necessary to determine whether differences in auditory memory might have entered into the language scores obtained. Five items on the Utah Test of Language Development require the subject to repeat a series of numerals or words: (1) item 37 is a five number sequence; (2) item 42 is a four number sequence in which the subject repeats the series in reverse order; (3) item 44 is a six number forward digit span; (4) item 46 is a five number reverse digit span; and (5) item 48 asks the subjects to repeat a series of five words. Errors on these items included omissions, substitutions, additions or changes in the prescribed order. The items were scored either correct or incorrect. The auditory memory score was derived by adding incorrect responses on each of the five items for each subject. The resulting error scores were used to test differences between groups, using the Statistical Package for the Social Sciences (SPSS) (Nie, Hull, Jenkins, Steinbrenner & Bent, 1975) program for the  $t$  test. Since no significant difference between groups on auditory memory errors was found ( $p \leq .39$ ), adjustment for this factor was not considered necessary in the subsequent analyses.

The three language measures were then analyzed separately using raw scores that had been converted to standard scores with a mean of 50 and a standard deviation of 10. The Pearson Correlation program

available in the SPSS computer program was used to measure the strength of the relationship between the language measures (Nie, et al., 1975). Table 4 contains the results of this computation. By squaring the correlation coefficients it was possible to determine the extent to which variation on one language measure was linked to variation on another language measure. All correlations were positive and significantly different from zero at the .001 level. However, the coefficient of determination ( $r^2$ ) associated with these coefficients indicate that the Recognition of Grammaticality test shared only 15% of the variance of the UTLD and 19% of the variance of the SRT. The SRT and UTLD shared 35 % of the variance. It would appear that the Recognition of Grammaticality was testing some different attributes than the other two language measures. While the UTLD and SRT appeared to be measuring related attributes, there still remained approximately 65% of the variance between them unexplained. Therefore, since each test seemed to be measuring a somewhat distinct language component, standard scores from all three measures were summed to form one composite score to serve as an index of assessed language performance for further analysis. Several factors about the language scores used in the above analysis entered into the decision on how to form this composite score.

The first concern was that UTLD language-age-equivalent did not take into account differences in chronological age. For example, if only language-age-equivalents were used, both a nine year old and an eleven year old might have a language age of 11-3. For the eleven

Table 4

Intercorrelations Between Scores on the Utah Test of Language Development (UTLD), Recognition of Grammaticality (GRAMM), Sentence Repetition Test (SRT): Pearson Correlation Coefficients (r).\*

	UTLD	GRAMM	SRT
UTLD		.39	.59
GRAMM			.44
SRT			

\*All values significantly different from zero at  $p \leq .001$ .

year old this would be an average score for his age, but the nine year old would have been achieving at a level of two years beyond the average for his age. Using the language-age-equivalent would tend to mask the results. For that reason, each language-age-equivalent was divided by the chronological age of the subject and multiplied by 100 to yield an adjusted language age or language quotient.

Secondly, the Sentence Repetition Test was constructed in an increasingly complex sentence structure format. Once again, using simply number of sentences repeated correctly as a scoring criteria tended to mask results. A subject who missed the last five and most difficult items would receive a score of 15 on the SRT. A subject who missed two of the sentences in the middle section of the test and three of the last five would also receive a score of 15 but the two subjects would be displaying different capabilities in sentence repetition. Therefore, in order to improve the measurement of language performance capability of the test, the Sentence Repetition Test was divided into the three levels of difficulty, according to the description of the sentence structures provided by Vogel (1975), and weights were assigned to each section in the manner described below.

Sentences one through five on the SRT each had two embedded sentences so a weight of 4 was given to each correctly repeated sentence on that portion of the test. Sentences six through fifteen each contained three embedded sentences, so a weight of 6 was assigned. The number of correct sentences for items six through fifteen were multiplied by 6 and then divided by 2, since there were

twice as many items in this portion of the test. Sentences sixteen through twenty represented four embedded sentences in each item, so the number of correct responses was multiplied by 8. These three totals were summed to yield an adjusted sentence repetition score for each subject.

The Test for Recognition of Grammaticality yielded a raw score of correctly identified appropriate or inappropriate grammatical usage of a word in each of 24 sentences. The raw score of number of sentences correctly identified was used in computation of a composite language score.

As can be seen in Table 5, when the Pearson Correlation coefficients were computed on the adjusted language scores, the effect was to increase the relationship between the Utah Test of Language Development and the Sentence Repetition Test. The relationship between the Test for Recognition of Grammaticality and the other two measures, however, did not change. It appeared that some attribute was significantly interacting with the results obtained when the two sets of adjusted scores were used. Adjusting the language age for chronological age, and weighting the SRT sentences for difficulty level tended to make the UTL and the SRT less discrete as language measures. It increased the proportion of variation shared by the two measures from 35 to 50 percent.

The three adjusted language test scores were converted to standard score form using the z transformation subprogram of SPSS (Nie, et al., 1975) and were then added together to form an assessed

Table 5  
 Intercorrelation Coefficients Between Adjusted  
 Language Measures\*

	Adjusted UTLD	GRAMM	Adjusted SRT
Adjusted UTLD		.39	.71
GRAMM			.43
Adjusted SRT			

\*All values significantly different from zero at  $p \leq .001$ .

level of language performance for each subject. This computation resulted in composite language scores which were designated as the Language Performance Index (LPI). The standard scores for each language measurement and the resultant LPI have been included in Appendix B. LPI scores were rounded to the nearest whole number for subsequent statistical procedures.

#### Analysis Pertaining to Hypothesis I.

Once the LPI was derived, the hypothesis that reflective and impulsive subjects would not differ significantly from each other on their mean Language Performance Index scores was tested. Reflectives were assigned to group number one, and impulsives to group number two. A one-way analysis of variance between groups on the LPI was computed, using the SPSS (1975) ONEWAY computer program.

Since the findings of earlier research have shown a significant relationship between language ability and other factors, the data was analyzed further. A multivariate analysis of covariance between groups on the LPI was computed using the LPI scores as the dependent variable, R-I group membership as the independent variable and intelligence, socioeconomic status of parents, and sex of subjects as covariates. These results on the multivariate analysis were considered in the discussion of the univariate analysis mentioned above.

#### Analysis Pertaining to Hypothesis II.

The second hypothesis stated that no difference between the mean scores of the reflective and impulsive subjects on five subtests of the SRA Assessment Survey would be found when intelligence and

language performance were statistically controlled.

Univariate analyses of variance were used to test the differences between R-I group means on the reading, language arts, mathematics, science, and social studies standard scores before adjusting for intelligence and language performance.

Since it was known that language ability, measured intelligence and achievement are related factors, it was considered to be important to adjust the achievement test means for the influences of IQ and language upon them. In addition, as reported in Chapter II, both sex and socioeconomic class have been found to be related to differences between reflective and impulsive responders. The impulsives are more numerous in the lower socioeconomic classes than reflectives and more boys are found to be impulsive than girls in the elementary school age population. For these reasons, the second test that was applied to the achievement test data was a multivariate analysis of covariance, which adjusted the achievement scores as a function of performance on the covariates. The scaled scores of the achievement subtests of reading, language arts, mathematics, science, and social studies were used as the criteria, and the LPI scores, intelligence scores, sex, and socioeconomic status of parents were designated as covariates.

From the results of this multivariate analysis of covariance, it was determined that the slopes of the regression lines of sex of subjects and the socioeconomic status of the parents did not meet the statistical assumptions of homogeneous regression slopes across groups. Consequently, a second multivariate analysis of covariance

was done with the offending covariates deleted; thus, the achievement test scores were covaried with only intelligence scores and the LPI scores.

A descriptive analysis of the SRA Assessment Survey added information to the interpretation of the findings concerning the second hypothesis.

### Analysis Pertaining to Questions

#### Question 1

The question of whether or not there were differences in the kinds of errors made by the reflective or impulsive children on the language performance tests was handled descriptively. The errors on the SRT were recorded and categorized. Eight kinds of errors were found: 1) Omissions, 2) Substitutions, 3) Contraction changes, 4) Mazes, 5) Insertions, 6) Pronoun changes, 7) Change of word order, and 8) Meaning changes. Percentage of errors made by each of the groups were discussed.

#### Question 2

The question about the plausibility of remedial instruction indicated by examination of an error analysis of the language measures was handled subjectively.

Based upon an error analysis of the three language measures, the identified differences between reflective and impulsive subjects were discussed in terms of the implications for remedial instruction. Just knowing that impulsive children tend to make more errors than

their reflective age mates, is not particularly helpful to the teachers who have the responsibility of guiding these children through an educational program. By analyzing the kinds of errors that were made, however, information was gained that was deemed to be important for directing possible curriculum planning for the impulsive child as well as for future research efforts.

### Summary

This chapter has described the procedures used in selection of the sample and given information about the characteristics of it as to race, sex, and socioeconomic level. The instruments used in the study were described and procedures used in collecting the data for the study were defined. The hypotheses and questions were stated and the techniques that were used to analyze the data were presented.

Chapter IV  
FINDINGS AND INTERPRETATIONS

Hypothesis I

Stated in the null, it was hypothesized that no significant difference between reflective and impulsive subjects would be found on their assessed language performance as represented by the scores on the Language Performance Index (LPI). An alpha level of  $p \leq .05$  was specified as the necessary probability required to reject the null hypothesis. The LPI means, ranges and standard deviations for the two groups are presented in Table 6.

A univariate analysis of variance of the LPI scores as they differentiated between reflective and impulsive groups produced an F value of 3.69 with a corresponding probability of .057. The significance level stated in the hypothesis was  $p \leq .05$ . The results of the univariate analysis of variance did not support the rejection of the hypothesis that reflective and impulsive groups would differ from each other on their assessed language performance as represented by the Language Performance Index. Hypothesis I was retained. However, it may be that in retaining the null hypothesis, a Type II error was made in light of the observed p value (.057) associated with the F statistic.

Because of the known relationships between language performance, measured intelligence, socioeconomic status of parents and sex of the elementary school age child, a multivariate analysis of covariance was

Table 6  
Differences Between R-I Groups on the  
Language Performance Index (LPI).

LPI	Reflective	Impulsive
Range	115-195	103-206
Mean	156.44	144.23
Standard Deviation	22.67	25.20

used to further analyze the data. Reflective-impulsive group membership was designated the independent variable and language performance scores (LPI) as the dependent variable with intelligence, sex of subjects, and socioeconomic status of parents as covariates. Table 7 provides means and standard deviations of the variables in the analysis.

The test of equality of regression in all of the cells indicated that the slopes of the regression lines were not significantly different between the reflective and impulsive groups,  $F(3,49) = .26$ ;  $p \leq .86$ . Regression of intelligence, sex and socioeconomic status on group membership was significantly different from zero ( $F(3,52) = 6.54$ ;  $p \leq .001$ ). These preliminary findings suggested that an analysis of covariance was appropriate and worth doing in this setting.

However, when the LPI means were adjusted for IQ, SEX, and SES, no significant differences between LPI means resulted for the reflective and impulsive groups (Table 8). The adjustment of the means for the three covariates resulted in an  $F(1,55) = .925$  which yielded a probability of .34.

The findings suggest that after the effects of intelligence as measured by the STEA, the sex of the subjects, and the socioeconomic status of the parents were partialled out of the LPI variance, there was no significant mean difference between groups. It should be noted, however, that the use of covariance to adjust mean scores of non-equivalent groups is a poor substitute for beginning with groups which are not significantly different. The analysis of covariance in this

Table 7  
Means and Standard Deviations of Scores  
on LPI, IQ, Sex, SES by Groups.

		LPI	IQ	Sex*	SES
Reflective N = 27	M	156.45	105.19	.52	2.19
	SD	22.67	14.01	.51	.48
Impulsive N = 30	M	144.20	97.33	.50	2.10
	SD	25.20	14.62	.51	.55

\*Reflective = 14 girls, 13 boys; Impulsive = 15 girls, 15 boys.

Table 8  
 R-I Group Mean Scores on the LPI and After  
 Adjustment for IQ, Sex, SES.

	LPI Mean	LPI Adjusted Mean
Reflectives	156.445	152.938
Impulsives	144.200	147.356
	F = 3.687*	F = .925

\*F = 4.02  $p \leq .05$  with  $df = 1,55$ .

setting is only an attempt to account statistically for pre-existing differences between groups and should be interpreted very cautiously. Strictly speaking, it is inappropriate to assume that covariance can equate non-equivalent groups. If the reflective and impulsive children used in this study had been matched on the basis of the covariates, a far more adequate comparison of language ability as measured by the LPI process would have been possible and the results would perhaps suggest a different conclusion. However, even if such matching were possible, it would not avoid the potential problem of regression toward population means, which may be quite different for reflective and impulsive pupils. In summary, while it is recognized that covariance is not strictly applicable in this setting, there is no definitive analysis available when comparisons are to be made on non-equivalent groups.

### Hypothesis II

The second null hypothesis stated that differences between the reflective and impulsive categories and the SRA Assessment Survey sub-tests would not be found when intelligence (IQ) and language performance (LPI) were controlled statistically. The method of analysis used to test the hypothesis was a multivariate analyses of covariance using the MANOVA computer program (Clyde, 1969). Inspection of the intercorrelation coefficients (Table 9) shows that the scores on the sub-tests of the SRA Assessment Survey were highly correlated for the subjects in the sample, and for this reason a multivariate analysis was used. The zero-order correlations are simple correlations and do

Table 9  
Intercorrelation Coefficients Between SRA Subtests.\*

	Rdg	Lang Arts	Math	Science	Soc St
Reading		.73	.61	.81	.83
Language Arts			.59	.70	.74
Math				.68	.65
Science					.73
Social Studies					

\*All values significantly different from zero,  $p \leq .001$ .

not reflect control of any extraneous variables.

A univariate analysis of variance was used to test the differences between R-I group means on each of five subtests of the SRA Assessment Survey. Results are summarized in Table 10. No significant difference between groups was found on any of the subtests. Significance levels ranged from  $p \leq .12$  on language arts to  $p \leq .90$  on science.

The effect of differences in intellectual ability and language abilities upon achievement levels among elementary school children has been well documented. The expectation that there might still be a significant relationship between achievement test scores and the reflectivity-impulsivity dimension when IQ and language performance were controlled was tested through the use of a multivariate analysis of covariance.

Table 11 contains the R-I group means on each of the five SRA subtests both before and after adjustment for intelligence and language performance. When LPI scores and IQ scores were covaried with standard scores on reading, language arts, mathematics, science and social studies, no differences significant at the .05 level of probability between groups were found and the second hypothesis was retained. The results of the multivariate analysis of covariance are presented in Table 12. The  $F$  tests presented in Table 12 represent tests based on differences that were found between the reflective and impulsive groups on each of the five SRA subtests after the effects of language performance and intelligence were removed statistically. Again, the

Table 10  
Univariate Results for R-I Groups on the  
SRA Assessment Survey Subtests.

Subtests	Mean Square	F(1,55)	Probability Level
Reading	1633.669	.637	.43
Language Arts	7239.031	2.491	.12
Mathematics	1117.216	.696	.41
Science	43.984	.015	.90
Social Studies	885.177	.459	.50

Table 11  
SRA Subtests R-I Group Means Before and After  
Adjustment for IQ and LPI.

Subtests	Reflective	Impulsive
	<u>Means Before Adjustment</u>	
Reading	266.89	256.17
Language Arts	259.37	236.80
Mathematics	236.67	227.80
Science	255.93	254.17
Social Studies	257.59	249.70
	<u>Adjusted Means</u>	
Reading	254.52	267.30
Language Arts	248.60	246.49
Mathematics	229.53	234.22
Science	243.89	265.00
Social Studies	247.80	258.52

Table 12

Mean Squares, Univariate F Test Results Between R-I  
Groups After Means Adjusted for IQ and LPI.

Subtest	Mean Square	F(1,53)	Probability Level
Reading	2119.00	1.899	.17
Language Arts	58.19	.032	.86
Mathematics	285.84	.252	.62
Science	2780.00	3.56	.06
Social Studies	1490.48	1.50	.23

same caution must be exercised when interpreting the results of this analysis of covariance as was discussed earlier.

A comparison of the adjusted means between groups indicated that, when IQ and LPI were controlled, impulsives scored at a higher level than the reflectives on each of the subtests, except language arts. Since this was contrary evidence to most of the reported research, it was felt that the difficulty level of the SRA Assessment Survey might have been a confounding factor in the findings. Further analysis of the data tended to confirm this conjecture.

The research indicates that impulsives tend to make more errors in problem-solving tasks where several alternatives are available from which an answer must be chosen. The multiple choice format of the achievement test would appear to be this kind of a problem-solving task. Given these factors, one would expect to find differences between the groups on the achievement test scores.

The assumption was made that, if the achievement test proved to be a difficult test for a large proportion of the subjects in the sample, guessing of answers would likely have occurred frequently. Following this line of reasoning, an examination was made of the grade-level equivalents attained by the total fourth grade class from which the sample was drawn. The evidence tended to confirm that the SRA Assessment Survey was, in fact, too difficult for many of these students.

Table 13 presents the frequency distribution of all fourth grade children who scored below fourth grade level on the SRA

Table 13

Frequency Distribution and Percentage of Fourth Graders  
Scoring at Grade Levels at or Below 3.9.

	N =	Grade-Level Equivalents (N = Frequency of Cases)			Percent of Total Cases
		3.7 - 3.9	3.4 - 3.6	3.1 - 3.3 Below 3.0	
Reading	27	25	31	74	55%
Lang Arts	15	24	36	94	59%
Math	29	41	60	75	71%
Soc St	29	24	31	74	55%
Science	32	14	29	92	58%

Assessment Survey subtests. Only those fourth graders were included for whom complete data was available--288 cases. The importance of this examination of the data became even more evident when it was noted that, not only did more than half of the fourth graders score below fourth grade level, but about one-third of them attained scores equivalent to first and second grade children in the normative population.

It was felt that this finding may have contributed to the unexpected results of no significant differences between R-I groups on the SRA subtests. For these children the achievement test was difficult and probably encouraged guessing. Of the 57 children in the sample 42% scored below third grade level on one or more of the subtests (Table 14). Given this proportion of children in the sample scoring at first or second grade-level-equivalent, the finding of no difference between R-I groups on achievement may simply reflect measurement error associated with guessing. Of the subtest scores in the R-I groups that fell below third grade level, 47.5% were made by reflective subjects and 52.5% were made by impulsives. Both groups experienced considerable difficulty on the achievement test, as did the students from which the sample was drawn.

#### Question 1

The question was posed as to whether or not the reflective and impulsive children might differ in the kinds of errors made on the various language measures. An analysis of the errors made on the three language measures revealed a number of differences.

Table 14

Percentage of R-I Subjects Scoring at Grade-Levels  
Below 3.0 on the SRA Assessment Survey.

	% Below Third Grade Level
Reflectives	47.5
Impulsives	52.5
Total	42

As described in Chapter III, the errors made by the R-I groups on the Sentence Repetition Test were recorded verbatim and then categorized and counted. The percentage of total errors by group for each error category was calculated and are presented in Table 15.

The differences between groups ranged from twelve to fifty-eight percentage points. Three of the kinds of errors committed have special importance for the contention that impulsives may have lower levels of language development than reflectives.

In Loban's longitudinal study of the language development of the elementary school child, he found that the frequency of mazes present in oral language was a significant indicator of overall language development.

In the later years (grades four through nine) it becomes increasingly apparent that one must look not at raw figures alone but at percentage relationships. When these are studied, it becomes obvious that the high [language] group has a far lower proportion of mazes and words in mazes than does the low group. Thus, subjects rated as skillful in language are reducing their proportion of mazes and words in mazes as well as reducing their average number of words per maze. In other words, subjects in the low group say less than the high group and some of them have more difficulty in saying it. (Loban, 1966, p. 89)

In the present study, 28 instances of a maze were found in the sentence repetitions. A maze was recorded when the children became confused or tangled in words. Typically, the child would start a series of words or sounds that resulted in no meaningful communication. When the sentence repetition was completed by the child, the maze added nothing to the meaning of the sentence. The number of words per maze was not recorded but each incident of a maze was noted.

Table 15

Percentages of Errors on Sentence Repetition Test for R-I Groups.

Type of Error	Reflectives		Impulsives	
	No. of Errors	% of Total	No. of Errors	% of Total
Omissions	46	.34	88	.66
Substitutions	103	.42	143	.58
Contraction Changes	23	.39	36	.61
Mazes	6	.21	22	.79
Insertions	26	.36	46	.64
Pronoun Changes	47	.44	60	.56
Change of Word Order	7	.58	5	.41
Meaning Change	36	.38	59	.62
Total	295	.39	460	.61

Of the 28 mazes that were observed, the reflective children contributed only six or 21 percent of the total. Impulsive children, however, were responsible for 79 percent of the mazes. They were more than three times as likely to become confused or tangled in their repetition of sentences. When groups were matched for IQ, 16 instances of mazes in the sentence repetitions remained. Reflectives accounted for 3 of these 16 and impulsives for 13. While these numbers were based on a very small sample of 38 children, the percentages are impressive. The impulsives contributed 81 percent of the recorded mazes and the reflectives only 19 percent. Should further research validate this finding, a concentration upon training the impulsive responder in language fluency would be indicated.

A second finding that has implications for the educator was the difference between the groups on errors that changed the meaning of the sentence. If an omission, a substitution, a word order change or other error did not change the basic idea of a sentence, the child was not credited with an error in meaning. For example, the sentence, "Don't begin to serve until everyone who's coming arrives." was repeated as "Don't begin serving til everybody who is coming has arrived." The omission of the "un" in until, the substitution of "serving" for to serve, everybody for everyone, who is for who's and has arrived for arrives does not change the meaning of the sentence. While several substitutions were made, the basic idea of the sentence was retained. On the other hand, the same subject was credited with a meaning change error in the following example. The sentence that

was read to the subject was, "When can someone tell us why it stopped ringing?" The child responded, "When can someone tell us when it stopped ringing?"

There were 95 meaning change errors in the total sample on the Sentence Repetition Test. Reflectives had 36 instances of change in the meaning of the sentence, or 38 percent of the total and impulsives changed the meaning of the sentence upon repetition 59 times, for 62 percent of the total. The impulsive subjects were more likely to change the meaning of the sentence upon repetition than were the reflectives. Since development of meaningful communication skills is the basis for the language arts curriculum, this finding indicates that the impulsive responder may require an emphasis placed on sentence meaning in language-related subjects.

The errors that resulted in meaning change were not different kinds of errors between groups. Substitutions accounted for most of the changes in meaning, and omissions for the next most frequent error, but both groups had a similar proportion of the kinds of errors that contributed to changes in meaning. When the meaning changes of the 38 children who were matched in IQ were examined, the results were not as different as were found in the maze comparisons discussed above. Sixty-eight meaning changes were discovered in the 19 pairs of reflective-impulsive children with equivalent IQ's. Of the 68, impulsives contributed 56% and reflectives 44%. The difference between groups was not as startling as the fact that so many meaning changes occurred.

The third result that held promise for the curriculum planner was the difference between groups in the total errors observed. The impulsive subjects made more errors in each category and, therefore, in total number of errors. Impulsives made 61 percent of the total errors recorded on the repetition of sentences, while reflectives made 39 percent of the total errors. This finding was consistent with the finding of other studies on the impulsive child--that they make more errors. The importance of the finding, however, was that a lower level of language performance is a competency that is remediable, if educators can be made aware of the special needs of the impulsive child.

The Test for Recognition of Grammaticality did not serve to differentiate between groups in this sample. When the raw scores were converted to standard scores with a mean of 50 and a standard deviation of 10, the reflectives had a mean of 52.815 compared to 47.733 for impulsives. Standard error of measurements for the two groups were 2.868 and 2.711, respectively. The internal consistency reliability (KR-20) for the test was .467, which may have accounted for the test not differentiating between these groups, when it appears that there are some genuine differences in overall language performance, even when taking the intelligence difference into consideration.

In most instances the errors on the Test for Recognition of Grammaticality that were made did not differ very much between groups, although impulsives made more errors than reflectives over all. Three sentences, however, proved to be particularly difficult for

the impulsives when compared to the reflectives on those items.

Seventeen of the impulsives felt that the sentence, "Was you there last week?" was grammatically appropriate usage of the word was, while only seven of the reflectives made this error. Twice as many impulsives as reflectives said that "Be sure the bottle don't fall off the counter." was grammatically appropriate use of the word "don't." Only one reflective child missed the sentence, "Can't you see no difference between the two?" When asked to listen for the correct usage of the word no in that sentence, 11 impulsives indicated that was an example of "good English."

Correlations of  $r = .39$  and  $r = .44$  with the Utah Test of Language Development and the Sentence Repetition Test, respectively, suggested that the grammaticality measure had some of the aspects of performance that the other two language tests were tapping. Both of these correlations were significant at the .001 level but it was not ascertained what the matching components or performances might have been. In view of the low reliability of the items compared to total score on the test, however, any observation or interpretation could easily be in error.

The error differences between groups on the Utah Test of Language Development were primarily in the spread or range of item errors rather than in differences between reflectives and impulsives on specific items of the test. The impulsive subjects made twice as many errors on the items previous to and including item number 41. A raw score of 41 is equivalent to a language age of 9-0. It would,

of course, be unusual to find a subject who was able to earn credit for the first 41 items of the test and then miss all remaining items, but the increased error rate of the impulsives on the generally easier items is indicative of their propensity to make errors across a wide range of tasks.

On items consisting of repetition of a series of numerals (digit span), the reversed digit span caused the impulsives more trouble than forward digit span. When instructed to repeat four numerals in reverse of the order presented, 37 percent of the impulsives were unable to complete the task, while only 15 percent of the reflectives were unable to be credited for that item. On the six digit series to be repeated in the order presented, 70 percent of each group was unable to succeed on the task. For five digits reversed, 70 percent of the reflectives could not accomplish the task and 83 percent of the impulsives failed to complete the task successfully. The differences noted on the digit span items were not particularly revealing, except that, the impulsives seemed to encounter more difficulty than the reflectives when it was necessary to hold a set of figures in mind long enough to repeat them in a reverse order. It would seem that the process of mental manipulation of the symbols was difficult for them to handle. At some level, then, the information processing attribute seemed to be functioning with the impulsive subjects in this sample. Research on the information processing attributes of the impulsive child remains a potentially fruitful area of concentration.

The items of the Utah Test of Language Development that were included to test receptive vocabulary involved showing the subject a page containing five pictures and asking him to choose the one that was the best picture to show the meaning of given words. On these items, the differences between groups were most pronounced on items 43 and 50. The words used in item 43 were: respectful, assaulting, daring, and struggle. Thirty-seven percent of the impulsives were unable to identify the correct pictures for three of these four words. Only 18 percent of the reflectives were unable to succeed on this item. For item 50 the words were: anti-socialness, indulging, and combatant. For these words 52 percent of the reflectives were unable to complete the task successfully and 70 percent of the impulsives failed to do so.

In summary, the differences between reflective and impulsive error rates were more or less constant across all three language measures, with the impulsive subjects making more errors than reflectives. The kinds of errors made on the Sentence Repetition Test have particular importance for the educational planner. The higher incidence of mazes and meaning changes in the impulsive sample lend credence to the suggestion that an increased emphasis on communication skills might be an especially profitable undertaking for the impulsive responders in the elementary school. At least two areas for further research were suggested. First, a continued search should be made for research designs and instruments that could shed more light on the information-processing-ability differences that

appeared to be operating in the reverse digit span items on the Utah Test of Language Development. Secondly, a study is needed that would confirm or deny the feasibility of intensive language training for the impulsive responder. Would such training make a difference on their response style? If so, would it extend over time and would it transfer to tasks that are not overtly language-related such as problem-solving in mathematics or social situations?

### Question 2

The question was asked whether or not the errors that tended to differentiate between reflective and impulsive subjects would provide information about language deficits for which remedial instruction should be considered. Since change of meaning of the sentences on the Sentence Repetition Test was identified as a critical difference between groups in the error analysis, the meaning changes were analyzed to see what factors may have been contributing to these changes. In nearly all instances for both groups, the change in meaning was due to substitution of words for the words in the sentence read to the subjects. Four subjects in each group were credited with an error on meaning due to omission of parts of sentences and one in each group inserted words that changed the meaning of the sentence. The exception to this general statement involves the incidents of mazes which is discussed later.

When the sentences were analyzed, it was found that the kinds of substitution errors that were made were generally not different between groups. For example, in sentence number 12 (Nobody began

working until the bell rang loudly), the change in meaning in all cases was due to substitution for the word until. The word most commonly used for until was when. Sentence 19 (When can someone tell us why it stopped ringing?) proved to be the most difficult for both groups of children in terms of meaning change upon repetition. Most frequently the error resulted because the word why was changed to when or that. The importance of the meaning changes were not in the kinds of errors made but rather in the total number and in the tendency for the impulsives to experience more difficulty as sentence structure became more syntactically complex. As was discussed in Chapter III, the Sentence Repetition Test was divided into three portions according to the number of embedded sentences in the items on the test. When the errors were analyzed according to these respective parts of the SRT, it can be seen that the impulsive children tended to have more difficulty with the more complex items. Table 16 summarizes the errors in each section that were recorded as meaning change errors for each of the two groups. Syntactic complexity appeared to be a factor in the tendency for impulsives to make errors in meaning on the SRT. The results suggest that impulsive children particularly could benefit from instruction designed to give them practice in formulating and utilizing a wider variety of sentence structures.

Since the number of mazes found among the impulsive children was much greater than for the reflectives, the placement of mazes was studied to determine what factors might have been involved in this

Table 16  
 Meaning Changes of SRT Items 1-5, 6-15,  
 16-20, by R-I Subjects.

SRT Items	Meaning Changes	
	Reflectives	Impulsives
1-5 (2 embedded sentences)	0	1
6-15 (3 embedded sentences)	17	21
16-20 (4 embedded sentences)	19	37

finding.

In Table 17 it can be seen that the reflective children included a maze in the repetition of those sentences that were the most difficult syntactically. Impulsives, on the other hand, had a wider range of maze incidents. It was interesting to note that the inclusion of the maze did not change the meaning of the sentence in the reflective group. In the impulsive group, however, the maze contributed to meaning change eleven times, though substitution of words also resulted in change of meaning in those sentences. If mazes had been found in the first five sentences of the SRT, one would have to conclude that the tendency to tangle words was pervasive across all subjects. The incidents tend to cluster in the more difficult sentences, however, so it would seem that complexity of structure was the contributing factor for both groups. The reflectives could become entangled in their words, however, and still manage to repeat the sentence without loss of meaning. Such was not always the case for the impulsives. Rather, they exhibited the characteristics of the low language group in Loban's study. They tended to "say less" and "have more difficulty in saying it" (Loban, 1966, p. 25).

This analysis, then, tended to confirm a lower level of language performance of the impulsive subjects and to point to the need for more opportunities to practice fluency in oral language. Implicit in this need for increased fluency would be, not only practice in oral expression, but also increased awareness of a variety of ways to express ideas.

Table 17  
Incidents of Mazes on the SRT for R-I Groups.

SRT Items	Mazes	
	Reflectives	Impulsives
1-5 (2 embedded sentences)	0	0
6-15 (3 embedded sentences)	0	9
16-20 (4 embedded sentences)	6	13

The results of the analysis of errors on the Utah Test of Language Development gave evidence of a lesser ability on the part of the impulsive subjects in vocabulary development. Only two items on receptive vocabulary tended to differentiate between the groups. One observation appeared worth mentioning, however. The impulsives did as well as the reflectives on finding pictures to represent the words tackling (football players), refreshment (ice cream cone), cheerful (laughing boy), loser (racers at the finish line) and liquid (water). The concepts presented by these words were easier and more concrete than those presented in the items upon which impulsives experienced difficulty. The words respectful (boy saluting the flag), assaulting (hand with a stick hitting a man on the head), daring (tightrope walker), and struggle (weight lifter grimacing) seemed to represent more difficult concepts. The same was true of the items anti-socialness, indulging and combatant, and both of these questions were especially difficult for the impulsives in the sample.

Based on items of the UTLD that required knowledge of vocabulary, however, the reflectives were better able to identify correct pictures for the more difficult words presented than impulsives were. Vocabulary development of the two groups, based upon more words than were available in the UTLD would appear to be a fruitful area of study.

The Test for Recognition of Grammaticality did not contribute information about differences in the two groups that might be useful for planning special instruction in language for the impulsive child.

Both groups in the study tended to miss the same items.

To summarize the findings related to Question 2, when the errors on the language measures were analyzed to determine whether specific language deficits could be identified within the groups of reflective and impulsive subjects, several patterns were found.

1) The changes in meaning of repeated sentences was found generally for both groups to be due to substitution of words rather than to insertions, contraction changes, pronoun changes or omissions.

2) The exception to this finding concerned the impulsives, who also had meaning changes as a result of mazes inserted in the repetitions.

3) Both groups experienced more difficulty with the more syntactically complex sentences, but impulsives found them to be particularly difficult.

4) Impulsives tended more toward errors in oral language fluency when the presence of a maze was used as the index for this language ability.

5) Impulsives experienced more difficulty than the reflectives with the more difficult words on the receptive vocabulary items of the UTLD.

6) While impulsives made more errors than reflectives, on each category of errors, the omissions, pronoun changes, insertions, changes of word order and contraction changes did not contribute to the change in meaning of the sentences.

Summary

This chapter has reported the results of the analyses of the data about the relationships between language performance and the reflective-impulsive subjects in the sample. The questions addressed by the study were discussed descriptively. Chapter V summarizes the conclusions that were drawn from the results and the directions for further research that were indicated from the data analysis.

## Chapter V

### CONCLUSIONS AND COMMENTS

This investigation of the differences in assessed language performance between 27 reflective and 30 impulsive fourth grade subjects was undertaken to clarify apparently contradictory reports of earlier researchers.

In two early studies of reflective and impulsive subjects, it was concluded that verbal ability was not a significant characteristic differentiating the two groups (Kagan, et al., 1964; Kagan, Pearson and Welch, 1966). The work of later researchers tended to contradict these findings. Gentile (1968) found that impulsives did less well than reflectives on two subtests of the ITPA. Wen (1972) concluded that conceptual tempo was related to language form, though his study did not directly test differences in language performance between the two groups. Meichenbaum and Goodman (1971) reported that impulsive preschoolers used more egocentric talk and more developmentally immature words and phrases than reflectives, when they were talking to themselves.

The work with lower vs. middle class children reported by Schwebel (1966) and Kaplan and Mandel (1969) provided further evidence of a possible conceptual tempo and language-performance-relationship although results were mixed. Forcing a delayed response improved the quality of the response for some subjects, while for others it did not. Both age and socioeconomic status contributed to the differences

reported in these two studies, but in neither case were the subjects classified as impulsive or reflective.

The present study proposed to investigate the differences in assessed language performance of 57 reflective and impulsive fourth grade children. The underlying purpose was to determine whether true differences in language performance did exist and, if so, were they the kinds of differences that might indicate a need for special language training for the impulsive elementary school child.

The conclusions and comments are presented below as they pertain to each of the questions addressed by this study.

- 1) Do impulsive children exhibit lower levels of language performance than reflective children?

### Conclusion.

Mean scores on the LPI for reflective and impulsive fourth graders did not differ significantly at the pre-determined alpha level of .05. However, since the computed probability equalled .057, it is reasonable to suggest that there may be a meaningful difference in language performance between these types of children which might be revealed if a more sensitive language index were developed or if larger samples were to be used. The Language Performance Index seemed to give a reasonable indication of language ability and may be used with success until a more adequate index is developed.

Comment.

It is important to remember that the assessed level of language performances used in this study should not be equated to levels of language development. The differences found were differences on combined scores of the tests used. While the instruments used appeared to be tapping different aspects of the use of language, they did not separately or all together purport to test all language abilities.

When we speak of language ability we are addressing the phenomenon of that group of skills available to us that enables us to process verbal information, whether overtly or covertly, and in an infinite number of circumstances. The language ability that was available within the repertoire of each of the subjects in the sample was tapped only to the extent required by the items on each of the tests that were administered. Language performance as defined in this study, and language performance as it may exist under other circumstances should not be assumed to be identical.

However, a base referent which assesses representative language skills of the elementary school child is a much needed educational and research tool. Previous research efforts and the instruments produced by them have provided for both macro and micro measurements of language ability. The restrictions placed on the educator by the processes that have been developed at this point in time are numerous:

- 1) They are usually inappropriate for use with large numbers of children.

- 2) Individual analysis that covers a wide range of performances are time consuming.
- 3) Performance ability is often tied to reading ability.
- 4) Norms for the middle elementary school child have not been developed.
- 5) The study of language acquisition has not yet been widely applied to the school age child.

It was not a stated purpose of this investigation to develop a measuring instrument, but the approach used in the development of the Language Performance Index has merit and deserves to be improved and refined.

#### Conclusion.

The results of the study tended to support the conclusions drawn by Wen (1972) and Meichenbaum and Goodman (1971) that a relationship exists between the reflective-impulsive dimension and language performance.

#### Comments.

Meichenbaum and Goodman (1971) reported that, in their private speech, a group of impulsive pre-schoolers used more developmentally immature words and phrases, less outer-directed language and less self-regulatory language than their reflective peers. The present study cannot be directly compared with the work of Meichenbaum and Goodman because different kinds of language performances were sampled. On the other hand, the impulsive fourth graders in this study performed at lower levels than their reflective peers on the language measures

that were used. Wen (1972) concluded that the conceptual tempo of impulsives appeared to be related to a restricted language form. The present study supported Wen's conclusion. Impulsives in the current study experienced more difficulty with the syntactically more complex sentences on the Sentence Repetition Test. They made more errors on the easier items of the Utah Test of Language Development than reflectives did, and they displayed a receptive or listening vocabulary less highly developed than the reflectives. The nature of the tests and the confounding intelligence difference between groups in the current study made it impossible to confirm that impulsives have a restricted language code. However, it should be stated that the results of this study tended to confirm the possibility.

- 2) Do reflective and impulsive children tend to make different kinds of errors on selected language measures?

#### Conclusion.

The analysis of the errors that were made by the subjects did not disclose that reflectives and impulsives made different kinds of errors. It was concluded that the differences between the groups on language errors were a result of range of errors and number of errors rather than the kinds of errors made.

#### Comment.

The importance of the kinds of errors that were made by both groups are discussed below under question six. In no instance, however, did most of the impulsives make errors that were not also made

by at least some of the reflective subjects. Nor did reflectives make errors that were not made by impulsives.

- 3) Are there particular areas of language performance identified by the selected language measures that were especially difficult for either group?

### Conclusion.

The impulsives in the study displayed 3.8 times as many mazes in the task of repeating sentences as did their reflective classmates. This finding led to the conclusion that the impulsives had more trouble than the reflectives saying what they wanted to say. The impulsives were, therefore, judged to have less skill in using coherent and fluent spoken language.

### Comment.

The elementary school children who were classified as being members of the lower level of language development group, in the longitudinal study by Loban (1963) were found to have significantly more incidents of mazes in their speech.

The conclusion, above, was not derived from a replication of Loban's experimental procedure. However, the fact that most mazes in the repetitive task of the present study occurred in the syntactically more difficult sentences relates to Loban's line of inquiry. Both studies suggest that the difficulty represented by maze behavior is a function of using and controlling syntactic patterns.

Conclusion.

The impulsives were 1.64 times as likely as the reflectives to commit the kinds of errors that changed the meaning of the sentence, when repeating a sentence for the examiner. It was concluded that further research is needed to identify the full meaning of this finding.

Comment.

While it was true that impulsives were more apt to change the meaning of a sentence upon repetition than the reflectives, the reasons for this finding were unclear. It was not known, for example, whether or not the child could have chosen the appropriate meaning from a list of alternatives presented to him. Neither was it possible to tell from the data whether he had misunderstood the meaning upon hearing the sentence or merely had difficulty retaining the meaning long enough to reproduce it. Perhaps the struggle to deal with structures that were not a part of his normal speech patterns, interfered with his ability to retain the meaning. Until research is done to delineate the reasons for the changes in meaning that were observed, it is important for the educator to be cognizant of the problem and particularly, to be aware that there are children who may not understand certain language structures that seem quite clearly stated to an adult. Just as teachers are careful to explain new vocabulary, it may be necessary to explore different ways to combine words so that meaning is maintained for all individuals.

- 4) When intelligence and language performance are statistically controlled, do impulsives still tend to score at a lower

level on a standardized achievement test?

Conclusion.

The null hypothesis that reflective and impulsive mean scores on the SRA subtests would not differ after adjustments were made with respect to the specified covariates (IQ and LPI), was retained.

Comment.

The lack of statistical significance may reflect large measurement errors associated with the SRA test scores since the tests appeared to be overly difficult for the subjects tested.

- 5) Which one, or combination of, the language measures used in this study could teachers use to determine levels of language performance of their children?

Conclusion.

Of the three language measures used to obtain an assessed level of language performance, it was concluded that the Sentence Repetition Test was the best suited for use by the classroom teacher as an aid in identifying children who would particularly benefit from special language training.

Comment.

The Utah Test of Language Development takes longer to administer and the Test for Recognition of Grammaticality yielded little differentiating information among subjects. However, the conclusion that the SRT is the best of the three language measures for classroom use, presumes that the test would be administered in the same way as it

was in this study, with the child's responses recorded by the teacher-examiner. This procedure is recommended to insure that the resulting error analysis would provide concrete evidence to support planning for small group or large group instruction.

A well designed language development curriculum would extend over some time. Providing there were several months between testing sessions, and that instruction did not include specific test items, the SRT could be used both as a pretest and posttest to evaluate individual growth.

It should be noted that this conclusion was drawn from the results of the descriptive analysis of errors made on the tests rather than from inferential statistics.

- 6) What directions should be taken in future research on the language-reflectivity-impulsivity relationships?

#### Research Implications.

The analyses of the data suggest several areas of research that could bring significant information to the existing body of knowledge about reflective versus impulsive responders.

1. Because of the interrelationship between measured intelligence, socioeconomic level, sex, and language abilities, the study should be replicated on a group of nine to twelve year olds who are matched on the correlates. A post hoc analysis of pairs matched on intelligence in this study suggested that the differences found between the original R-I groups were maintained, but only 19 pairs were

available. The finding was tentative at best and was denied inferentially when intelligence, socioeconomic level and sex were statistically controlled for all 57 subjects.

2. As indicated earlier, the reasons for the meaning changes that occurred on the Sentence Repetition Test need further study. Particularly, it would be advantageous to know whether original meanings were misunderstood or were lost in the process of repeating syntactically complex sentence structures.

3. The predilection for the impulsives to experience more difficulty than the reflectives with the reverse digit span on the Utah Test of Language Development suggested that mental manipulation of symbols were more difficult for the impulsive responders in this sample. Research designed to investigate the differences in information processing between the two groups should be continued, with an emphasis placed upon how the information is processed.

4. Research designs should be implemented that integrate treatments for the specific language deficiencies that were identified-- problems with fluency and coherence, meaning change and syntactical complexity.

5. Psychologists and linguists should continue to work together toward the construction of a language development test for the older elementary school child. Validation studies of such tests should include comparisons with the many kinds of language that children use-- private language, the language of play, formal school language, and the language used in the home.

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## APPENDIX A

LETTER TO PARENTS

I would like permission to work with your child in connection with some research work I am doing at Virginia Polytechnic Institute and State University. Basically, this work involves selecting children at random in order to identify approximately 60 fourth grade children who respond to test questions in certain ways. Based on their answers, I hope to be able to develop more effective teaching strategies for these children.

The requirements needed by me would be approximately 45 minutes of individual time with each child. I plan to spread my contact with the children over a four month time span so that class disruption can be held at a minimum. As you may know, the fourth grade children at Critzer are presently finishing the testing program required by the state and I can use some of these responses in order to identify the children needed.

Any result that I find would be made available to your child's teacher and to you as parents. Otherwise, the children will not be identified in any way in my study.

I have discussed this research program with Dr. Johnston and the other school officials and I have permission from them to conduct this program if I have your permission. I would be happy to discuss this further if you like and can be contacted through Critzer School.

Thank you for your cooperation.

Beverly D. Braden

PERMISSION GRANTED FOR:

\_\_\_\_\_  
(Child's Name)

\_\_\_\_\_  
Parent's Signature

Please return this form to the homeroom teacher.

APPENDIX B  
STANDARD SCORES OF ADJUSTED AND WEIGHTED LANGUAGE MEASURES  
AND THE LANGUAGE PERFORMANCE INDEX

Standard Scores of Adjusted and Weighted Language Measures  
and the Language Performance Index.

Case	SUTLD	SGRAMM	SSRT	LPI	Case	SUTLD	SGRAMM	SSRT	LPI
1	60.96	65.84	58.37	185.17	30	33.57	41.15	27.78	102.50
2	42.70	44.68	36.12	123.50	31	50.69	44.68	64.49	159.86
3	36.43	55.26	38.35	130.03	32	39.85	37.63	36.12	113.60
4	45.56	51.73	43.91	141.20	33	38.71	48.21	47.25	134.16
5	51.83	44.68	61.15	157.67	34	34.71	44.68	36.68	116.07
6	54.11	51.73	52.25	158.10	35	38.71	37.63	38.35	114.68
7	50.69	58.79	52.25	161.73	36	50.12	55.26	61.71	167.09
8	71.23	58.79	64.49	194.51	37	64.96	51.73	55.59	172.28
9	62.10	69.37	63.94	195.41	38	49.55	55.26	43.35	148.16
10	63.81	44.68	55.04	163.53	39	47.27	37.63	45.58	130.47
11	47.84	48.21	41.69	137.73	40	63.24	62.31	64.49	190.05
12	61.53	48.21	59.49	169.22	41	37.57	55.26	30.00	122.83
13	50.12	58.79	48.92	157.82	42	41.56	44.68	48.36	134.60
14	46.13	55.26	48.36	149.75	43	54.68	34.10	46.69	135.48
15	66.10	58.79	61.71	186.59	44	34.14	34.10	40.02	108.26
16	48.41	37.63	46.14	132.17	45	58.11	37.63	42.24	137.98
17	59.82	69.37	53.92	183.11	46	40.42	58.79	52.81	152.02
18	56.40	65.84	62.27	184.50	47	44.41	58.79	51.70	154.90
19	50.69	34.10	56.70	141.49	48	59.25	51.73	56.15	167.13
20	50.69	34.10	57.82	142.61	49	48.98	55.26	57.26	161.50
21	47.27	55.26	37.79	104.32	50	48.41	62.31	63.94	174.66
22	47.84	58.79	61.71	168.33	51	49.55	30.57	38.90	119.03
23	43.84	51.73	43.91	139.49	52	37.00	51.73	30.56	119.29
24	43.27	44.68	55.04	142.99	53	51.26	44.68	53.92	149.86
25	39.28	37.63	38.35	115.25	54	74.09	65.84	66.16	206.09
26	46.70	48.21	45.02	139.92	55	58.11	62.31	53.92	174.34
27	73.51	48.21	59.49	181.21	56	45.56	55.26	42.24	143.06
28	51.83	41.15	47.80	140.79	57	48.98	51.73	47.25	147.96
29	35.85	37.63	54.48	127.96					

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LANGUAGE DIFFERENCES BETWEEN REFLECTIVE AND IMPULSIVE  
FOURTH GRADE CHILDREN

by

Beverly Arlene Dainton Braden

(ABSTRACT)

Contradictory reports of previous researchers concerning the relationship between language abilities and the reflective-impulsive dimension prompted this investigation. From a sample of 118 fourth grade children, 57 subjects were classified as reflective or impulsive using the Matching Familiar Figures test. Three measures of language performance were administered. Scoring procedures were defined to adjust for chronological age of the subjects and ascending level of difficulty of the items on one of the language measures. Scores on the three measures were combined to form a Language Performance Index (LPI). Analyses of the data were both statistical and descriptive and included testing of differences between reflective and impulsive groups as well as an analysis of the kinds of errors made by each group.

Results

1. The difference between reflective-impulsive groups on the LPI was significant at the  $p \leq .057$  level of probability.
2. Intelligence, sex and socioeconomic level contributed more to the difference found on the LPI than the reflective-

impulsive designation.

3. Impulsives made more errors on the language tests than reflectives, though not different kinds of errors.
4. Impulsives displayed more maze behavior and were more likely to change the meaning of sentences they orally replicated.
5. Impulsives experienced more difficulty on vocabulary items representing abstract concepts.
6. Differences between groups on five subtests of the SRA Assessment Survey were not significant either before or after statistical control of intelligence and language performance.

### Conclusions

1. Impulsive fourth graders in the study displayed a lower level of language performance than their reflective counterparts on repetition of syntactically more complex sentence structures.
2. Use of the LPI is a viable process for assessing different levels of language performance in the nine to twelve year old age group.
3. The finding of no significant differences between groups on the achievement subtests may have been due to the difficulty level of the test.
4. The results of the study tended to support conclusions of previous researchers that a relationship exists between the reflective-impulsive dimension and language performance.

## Research Implications

1. Because groups in the present study were non-equivalent, the study should be replicated on a group of nine to twelve year olds who are matched on known language correlates.
2. Reasons for the changes in meaning upon repetition of sentences need to be delineated to determine whether original meanings were misunderstood or were lost in the process of repeating syntactically complex sentences.
3. The predilection for impulsives to experience more difficulty with reverse digit span test items suggests a need for continued research on information processing differences between R-I groups.
4. Treatment research designs need to be applied to impulsive responders for the language deficiencies identified-- problems with fluency and coherence, meaning change, and syntactical complexity.
5. Psychologists and linguists should continue to work together toward construction of a language development test for the older elementary school child.