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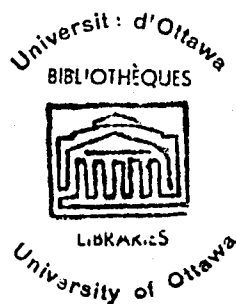
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A THEORETICAL AND EXPERIMENTAL
INVESTIGATION OF RUSSELL STAUFFER'S APPROACH
TO READING AT THE JUNIOR GRADE LEVEL

by Bayne Logan

Thesis presented to the School
Graduate Studies of the
University of Ottawa
as partial fulfillment of the
requirements for the degree of
Doctor of Philosophy



Ottawa, Ontario, 1977



B. Logan, Ottawa, Canada, 1977

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CURRICULUM STUDIORUM

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INTRODUCTION

Of all the competencies that are learned in the elementary and secondary schools, reading is probably that which has derived most attention. Throughout the formal school years, the curriculum is predicated on the assumption that a child either has or will have mastered the most rudimentary aspects of the reading act. In the years following this formal education, the individual's ability to read will be deemed essential if he is to be considered successful; if he is unable to read, he may well be restricted to the most unskilled of manual labor. Thus he may carry, throughout his life, the onus of illiteracy. And so it is that, from the time of first entering school, the child is confronted with the problem of either learning to read or of being prepared to learn to read.

For the educator, the teaching of reading has become one of the major preoccupations of the profession. Faced with a bewildering array of supposedly "fool-proof methods", the teacher of reading is frequently enticed into selecting that method which promises optimal success for the greatest number of children. Thus, in her efforts to ensure success for her children, the classroom teacher is frequently convinced that instructional methods and materials are of paramount importance in a child's learning to read.

Research has done little to discourage this practical emphasis on instructional methods and materials. Geared to the solution of classroom problems, much of the research has ignored strong theoretical positions which postulate that the child, and not the methods and materials, is the most important element in the reading encounter.

Major theorists have, for some time, believed that the most important element in the reading encounter is, indeed, the child and all that he brings to the printed page. In shifting their emphasis from methods and materials to the child, leading theorists have postulated that the emphasis should be placed on investigating those factors which influence a child's learning to read; the teaching of reading and the related materials should be considerably de-emphasized.

Foremost among those who have emphasized the role of the child in the reading encounter has been Russell Stauffer, Director of the Reading Centre at the University of Delaware. Stauffer has theorized that children bring three attributes to a reading encounter: evolving intellectual capacity, developing linguistic fluency, and ever-widening experiences and social interactions. These, he claims, have probably greater influence on a child's evolving reading competencies than the materials and methods used in the reading programme.

Stauffer's theory is centred on a well-known and time-honoured approach to the teaching of beginning reading; thus his theory appears, superficially at least, to be directed toward a consideration of reading in the primary grades; however, closer examination of his basic theory reveals fundamental principles which may find application at all grade levels. Extended to the more recent psycholinguistic theories of reading, Stauffer's theory may find as great, if not greater, applicability in the more senior grades, specifically the junior grade level, grades four to six.

That which follows, therefore, is an empirical investigation of Stauffer's theory as it might be extended to the junior grade level. In Chapter I is presented the theoretical rationale, an outline of Stauffer's main thesis. Included in this chapter is a consideration of Stauffer's concept of reading, his attitude toward contemporary reading materials, his views on the roles of intelligence, language and experienced social interactions, and his thoughts regarding the function of all-round maturation in the reading process. The chapter will conclude with an outline of the theoretical expectations.

Chapter II consists of a review of related literature. The chapter is composed of three parts: an overview of the learning theory which forms the foundation

for Stauffer's theory of reading, a summary of theories of reading which parallel and extend that proposed by Stauffer, and, finally, a critical review of research related to Stauffer's theory. The chapter will culminate in the statement of the problem and the research hypotheses.

In the third chapter, the experimental design will be presented. An outline of the research instruments, the research methods, the population sample and the organization of the data will compose the body of this chapter. The chapter will then be concluded by a brief summary.

The results of the investigation will be presented in Chapter IV. The chapter will begin with a brief review of the theoretical expectations, the problem and the research hypotheses. This review will then be followed by a description of the data and the inferential analysis. A summary will conclude the chapter.

Chapter V will include a discussion of the results. The chapter begins with a discussion of the increased variance among teachers during the investigation. This discussion is then followed by the decision to reject or fail to reject the null hypotheses. The chapter then will end with a summary of the discussion of the results.

To complete the study, a summary and statement of the conclusions will be presented.

CHAPTER I

THEORETICAL RATIONALE

In the introduction, mention was made of the importance of the child and all that the child brings with him to the reading encounter. Although many theorists have emphasized the role which the child plays in the reading act, Stauffer stands virtually alone in assuming the position that an effective reading programme must be predicated on the language and experience which a child already possesses. In this chapter, Stauffer's position will be outlined in some detail.

The chapter will begin with a brief outline of Stauffer's concept of reading. Out of this definition of reading and statement of position has grown Stauffer's approach to reading, an approach to which he refers as the Language-Experience Approach¹. Following the definition of reading, the statement of position and the advantages of the Language-Experience Approach, Stauffer's views on the role of maturation as reflected in intelligence, language and social interaction are presented. The chapter then concludes with an outline of the theoretical expectations.

¹ Russell G. Stauffer, The Language-Experience Approach To The Teaching Of Reading, New York, Harper and Row, 1970, p. 1-301.

In his book, Teaching Reading As A Thinking Process², Stauffer has presented a definition of reading to which he subscribes. Choosing Gate's definition, Stauffer has elected to offer a broad concept of the reading act. According to Gate's definition,

Reading is not a simple mechanical skill; nor is it a narrow scholastic tool. Properly cultivated, it is essentially a thoughtful process. However, to say that reading is a "thought-getting" process is to give it too restricted a description. It should be developed as a complex organization of patterns of higher mental processes. It can and should embrace all types of thinking, evaluating,³ judging, imagining, reasoning and problem-solving.

To Stauffer, reading is not a simple perceptual activity. Reading involves the entire conceptual apparatus which a child brings, including his ability to think, to evaluate, to judge, to imagine, to reason and to solve problems.

Within the context of this definition, Stauffer has presented his position with regard to published materials for reading programmes. In the Language-Experience Approach To The Teaching Of Reading, he has stated,

² Russell G. Stauffer, Teaching Reading As A Thinking Process, New York, Harper and Row, 1969, p. 9.

³ Arthur I. Gates, "Character And Purposes Of The Yearbook: Reading In The Elementary School", Forty-Eight Year-book Of The National Society For The Study of Education, Part II, Chicago Press, 1949, as quoted by Russell G. Stauffer, Teaching Reading As A Thinking Process, Op. Cit., p. 9.

As a senior author of a series of basic readers, I learned how difficult it was to construct material at a primer and preprimer level. A year of great effort plus the help of a well-known author of books for children, produced only substandard language usage that was no more palatable than any of the similar materials already available. Such materials do not take advantage of the children's facility, intellectual abilities and motivations.

The Language-Experience Approach...does take advantage of the wealth that children bring with them to school - linguistically, intellectually, socially, and culturally.⁴

Thus, according to Stauffer, prepared or published instructional materials do not capitalize on the children's intellectual abilities, on their language and wide range of experiences. An approach based on the language and experiences of children, the Language-Experience Approach to be specific, does, however, take advantage of the children's linguistic, social, intellectual and cultural backgrounds.

In taking a firm position in favour of the Language-Experience Approach, Stauffer has theorized that in an approach to reading "where the wealth of an individual is used as a base for intellectual growth through skill development"⁵, superior results should be evidenced. It is at this point that he has recommended basing reading programmes on materials written by the children themselves

4 Russell G. Stauffer, The Language-Experience Approach To The Teaching Of Reading, Op. Cit., p. vi.

5 Ibid., p. 258.

or, in the early primary grades, written by the teacher once the stories have been dictated by the children. Thus, the Language-Experience Approach becomes a "child-centred" approach to reading, an approach "where the wealth of an individual is used as a base for skill development"⁶.

Stauffer has defended his theoretical position by pointing out,

The Language-Experience Approach takes advantage of their (the children's) tastes, their insightfulness and intelligence, and, in general, their ability to do. The materials...are theirs. The vocabulary is not a substandard variety foisted on them but reflects their fluency and accuracy of usage. The words they recognize and remember are identified by them. The words they wish to learn in a deliberate attempt to add to their vocabulary are of their choosing. The word attack skills they learn are applied to their vocabulary. Everything that is done features their abilities and their choices.⁷

The Language-Experience Approach, then, capitalizes on a wide variety of backgrounds which a child brings to a reading encounter. The approach capitalizes on taste, intelligence, insightfulness. The materials are of the child's making; they are his creation; they are built on his personalized language and experience. In short, the materials are his.

Within the context of this reading material predicated on the unique language of the child, on his

6 Ibid., p. 258.

7 Ibid., p. 254.

individual wealth of experiences, tastes and insights, the child is then provided the wherewithal by which he can undertake the process of reading. It is here that Stauffer has advocated the use of what he has defined as Directed-Reading-Thinking-Activities^{8,9}.

A Directed-Reading-Thinking-Activity, which may be undertaken by an individual or by a reading group, consists of three distinct yet inter-related facets: predicting, reading, proving. In the first stage, predicting, the child formulates a question or series of questions based on what he already knows about the content of the passage to be read. To formulate his question, the child uses certain cues which are available to him, the title, accompanying pictures, the general context from which the passage is derived. Once the child has formulated his question or series of questions, he predicts potential answers to those questions. These speculated answers become, in effect, educated guesses since they are predicated on the knowledge which the child already possesses and on the cues that are available to him from the printed page. It would appear that the child utilizes that which he already

8 Ibid., p. 132-175.

9 Russell G. Stauffer, Teaching Reading As A Thinking Process, Op. Cit., p. 24-35.

knows in order to evaluate, to judge, to imagine and to reason his way through the cues that are available in the printed page.

In short, based on his prior knowledge and the available cues accompanying the passage, the child predicts possible answers, through the process of estimating, hypothesizing, guessing or conjecturing before reading the passage. It might be surmized that the greater the degree of prior knowledge and experience each child possesses and the greater his ability to relate this knowledge and experience to the available cues, the more accurate will be his estimates, hypotheses and guesses.

The second facet of the Directed-Reading-Thinking-Activity is that of the actual processing of information. When the child has formulated the question or series of questions and has arrived at a set of hypothetical solutions, reading becomes a process of information processing. The child learns to select, to attend to those pieces of information which are relevant to his questions and conjectured solutions. Reading becomes a selective, purposeful activity rather than a random, non-directed enterprise. In short, the question and tentative solution arrived at by an educated guess give direction to the reading so that the reading process becomes, in effect, an information processing enterprise.

Verification and validation of answers constitute the third phase of the Directed-Reading-Thinking-Activity. The child, in the initial stage of the Directed-Reading-Thinking-Activity, has formulated a question and has hypothesized an answer. Compared with the solution given in the story, the child must then decide to reject, accept or modify his hypothesized solution.

Basic to the entire concept of the Directed-Reading-Thinking-Activity is the role of anticipation. The child establishes directing questions and tentative hypothetical solutions based on what he anticipates. These questions and speculated solutions, derived from "the wealth of an individual"¹⁰ are the basis of hypotheses formulation, a direct consequence of the anticipatory process. Through the entire range of predicting, selecting and verifying at evolving levels of intellectual development, the child progresses toward a level of reading which "embraces all types of thinking, evaluating, judging, imagining, reasoning and problem-solving"¹¹.

In recognizing further the effect of the linguistic, social and cultural wealth which an individual brings to

¹⁰ Russell G. Stauffer, The Language-Experience Approach To The Teaching Of Reading, Op. Cit., p. 258.

¹¹ Arthur I. Gates, Op. Cit., p. 14.

a reading encounter, Stauffer's theory is based on the notion that reading is a developmental process strongly influenced by the process of intellectual development. It is here that Stauffer reveals the continuing influence of Jean Piaget^{12,13}. Extending Piaget's concept of maturation to the reading act, Stauffer has concluded that maturation in the form of intellectual development, greater linguistic fluency, and increased social interaction will have a profound influence on changes in reading.

According to Stauffer, intellectual development as a function of maturation, should be manifested in marked increments in reading ability. Regarding this consideration, he has written,

Intelligence, as it undergoes maturation and a gradual process of socialization, increasingly uses the bond established between thought, words and deeds. Directed thought is controlled more and more by the laws of language, experience and logic and it is influenced enormously by the need and desire to communicate thoughts to others.¹⁴

The explicit connection between maturation as revealed in intellectual development and observable increments in reading ability is found then, according to

12 Russell G. Stauffer, Personal Interview, Toronto, July, 1965.

13 Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. 8-12.

14 Ibid., p. 15.

Stauffer's theory, in the laws of language, logic and experience, and is strongly influenced by social interaction. Considering first the laws of language and logic, which appear to go hand-in-hand, he has written,

It seems, then, that language development, as a part of maturation or all-round mental capacity, influences much of the child's progress from thought that is predominantly perceptual and intuitive to thought that is conceptual and logical.¹⁵

Language development as part of maturation appears, then, to be an integral component of the reading process as the process was earlier defined. The influence of language in the evolving reading process is not simply one of increased vocabulary. According to Stauffer, it is language which enables the child to free himself from thought that is predominantly perceptual and intuitive to then progress to a level of thought that is conceptual and logical, a level of thought that "embraces all types of thinking, evaluating, judging, imagining, reasoning, and problem-solving"¹⁶.

In considering solely language development, however, only part of the link between maturation and reading is established. The increased social interaction and experiential background of the child is of extreme

¹⁵ Ibid., p. 14.

¹⁶ Arthur I. Gates, Op. Cit., p. 9.

importance in developing linguistic patterns and, ultimately, higher order linguistic and cognitive patterns in the reading process. According to Stauffer, facility with printed language should be acquired in a manner similar to that in which facility with spoken language is acquired. He has pointed out,

Oral language facility is acquired by children either spontaneously or by elicitation in a world of increasing intercommunications with adults, siblings and peers. Facility with printed language should be acquired in a similar way. Children can then adapt thought to others and to reality more effectively. This is why the Language-Experience Approach to learning to read provides a functional transition from oral language to printed language for all children, almost regardless of their abilities and backgrounds.¹⁷

Thus, to Stauffer, social interaction and experience enable the child to develop his oral language facility. In turn, the Language-Experience Approach helps the child to bridge the intellectual gap between spoken and printed language.

To summarize the total influence of maturation, in the form of intellectual development, greater linguistic fluency and increased social interaction, Stauffer has written,

¹⁷ Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. 198.

The all-round maturation, characteristic of the pre-operational and operational stages is cognitively a source of neuro-psychological affluence with tremendous implications for learning and reading instruction.¹⁸

All-round maturation, then, plays a vitally important role in a child's learning to read. According to Stauffer, all-round maturation is comprised of three inter-related components: evolving intellectual capabilities, increasing linguistic fluency, and developing social interactions and experiences. Intellectual development is governed by the laws of language, logic and experience, and is strongly influenced by social interaction. Language, in turn, enables the child to progress from "thought that is predominantly perceptual and intuitive to thought that is conceptual and logical"¹⁹. It is the social interaction and experiences which facilitate the acquisition of spoken and written language and permits the easiest transition from the spoken mode to the written.

Implicit in Stauffer's theory are three areas of consideration for both the educator and the researcher. These three areas of consideration may be presented as three theoretical expectations.

18 Ibid., p. 15.

19 Ibid., p. 14.

1. As a prime consideration, one would expect to find marked differences in reading ability between children exposed to a Basal Reader Approach and those exposed to a Language-Experience Approach. According to the theory, children should make significantly greater gains as a result of a Language-Experience Approach "almost regardless of their abilities and backgrounds"²⁰.

2. As a second consideration, one would expect "all-round maturation"²¹ to play a significant role in learning to read; that is, if comparisons were to be made between older and younger children, it would be expected that the older children would make greater gains in reading, as the process was defined earlier, than younger children during a comparable period of time. According to the theory, evolving intellectual capabilities, increasing linguistic fluency, and developing social interactions and experiences should enable children to move more readily from "thought that is predominantly perceptual and intuitive to thought that is conceptual and logical"²², to thought that "embraces all types of

20 Ibid., p. 198.

21 Ibid., p. 15.

22 Ibid., p. 14.

thinking, evaluating, judging, imagining, reasoning, and problem-solving"²³.

3. A third and final expectation is derived from the implications of the first and second expectations. Given that children demonstrate evolving intellectual capabilities and that the Language-Experience Approach is predicated on this evolving "wealth that children bring with them"²⁴, it would be surmized that an interaction would occur between evolving intellectual abilities and the approach used; that is, that the Language-Experience Approach would be more effective with older children.

23 Russell G. Stauffer, Teaching Reading As A Thinking Process, Op. Cit., p. 9.

24 Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. iv.

CHAPTER II

STATUS OF THE INVESTIGATION: A REVIEW OF RELATED LITERATURE

In the previous chapter, Stauffer's theory of reading was outlined. Three theoretical expectations, derived from that theory, and which form the nucleus of this study were presented as a summary of the chapter. In this chapter, a review of related literature will be presented in four sections.

Because Stauffer's theory is based on the cognitive and developmental theory of Jean Piaget, the first section of the chapter will deal exclusively with those aspects of Piaget's theory which pertain directly to this study. The second section will consist of an overview of other theories in reading which express points of view similar to those of Stauffer. In the third section, the results of empirical studies designed to investigate aspects of Stauffer's theory will be presented. The fourth and final section of the chapter will include a summary of material presented in the chapter and a statement of the problem and research hypotheses.

1. Piaget's Theory.

In this section, those aspects of Piaget's theory which deal directly with Stauffer's theory as it was outlined in the previous chapter will be presented. The section

will begin with a consideration of the role of experience as it is perceived by Piaget. Following this consideration of the role of experience, the maturational or developmental aspect of Piaget's theory will be outlined. A brief summary will conclude the section.

Piaget's cognitive theory deals with human adaptation¹, a process which implies the interaction of an individual with his environment. Interaction or adaptation occurs through the interplay of two complementary processes: accommodation and assimilation². According to Piaget's theory, both processes involve experience³.

Each experience, or encounter with one's environment becomes "internalized". It becomes part of an individual's thought processes; it becomes part of his cognitive structure⁴. In Piagetian terms, structure is the mental or intellectual counterpart of an experience. Once an activity has been experienced it becomes structure or schema;

1 Jean Piaget, The Psychology of Intelligence, (Trans. C.K. Ogden), London, Routledge and Kegan Paul, 1971, p. 7-8.

2 Jean Piaget and Barbel Inhelder, The Psychology of the Child, (Trans. H. Weaver), New York, Basic, 1969, p. 6.

3 Jean Piaget, Psychology and Epistemology, (Trans. Arnold Rosin), New York, Grossman, 1974, p. 70-73.

4 Jean Piaget, Structuralism, (Trans. Chaninah Maschler), New York, Basic, 1970, p. 68-71.

it becomes a part of an individual's cognitive apparatus. Without experience there can be no structure⁵.

Assimilation and accommodation are the processes by which experience becomes structure. A child either assimilates new experiences to his existing structure or accommodates existing structure to new experiences. Through assimilation, the child modifies, changes or adapts new experiences to fit existing structure; through accommodation the child modifies or adapts existing structure to meet new experiences. By means of the combined processes of assimilation and accommodation the child attempts to reach a state of homeostasis⁶ with his environment.

The evolution of cognitive structure, through the dual processes of assimilation and accommodation, is predicated on the grouping of operations and experiences which combine to form the cognitive structure. This grouping usually occurs in the sequence in which the experiences or operations have been encountered. Out of this sequential grouping of experiences into cognitive structure develops what Piaget has defined as anticipatory schemata.

⁵ Jean Piaget, Psychology and Epistemology, Op. Cit., p. 70-73.

⁶ Ibid., p. 47-49.

STATUS OF THE INVESTIGATION:
A REVIEW OF RELATED LITERATURE

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According to Piaget,

an anticipatory schema is simply a "grouping" of operations, the arrangement of a number of potential operations in direct or reverse order.⁷

These anticipatory schemata serve an important role in the child's adaptation to his environment. The arrangement and grouping of operations and potential operations permits the child to predict the incidence of future operations and experiences, to anticipate and thus to seek out regularities in his environment; the end result is the reduction of the degree of uncertainty which the child encounters in adapting to his environment.

In review, the processes of assimilation and accommodation in developing cognitive structure give rise to the evolution of anticipatory schemata⁸. It is the grouping, ordering and sequencing of operations and experiences which lead the child to anticipate new operations and events which should follow in the pre-established sequence. These anticipatory schemata, in turn, enable the child to

⁷ Jean Piaget and Barbel Inhelder, The Child's Conception of Space, (Trans. F.J. Langdon and J.L. Lunzer), London, Routledge and Kegan Paul, 1971, p. 134.

⁸ Barbel Inhelder and Jean Piaget, The Early Growth of Logic in the Child: Classification and Seriation, (Trans. E.A. Lunzer and D. Papert), London, Routledge and Kegan Paul, 1964, p. 55-288.

find regularities in his environment and to reduce the degree of uncertainty he experiences in adapting to his environment.

Although Stauffer has not made the point clear, it would appear that implicit in his theory is the notion that reading is a means of human adaptation; it is a process which permits the child to interact more fully with his environment. In reading, a child both assimilates and accommodates as he encounters new experiences through his reading. Without prior experience there can be no existing structure which enables both processes to become operative. Without structure, or internalized previous experiences, the child is unable to assimilate and to accommodate new experiences which he encounters through his reading.

In Stauffer's theory, experience is vital to reading. A reading programme which is based on a child's experiences, a reading programme to which a child brings his experiences is ultimately a reading programme which provides for maximal assimilation and accommodation. Conversely, if a child brings nothing to a reading encounter by way of experiences, hence cognitive structure or schemata, he can neither assimilate nor accommodate. It would appear, then, that to maximize the effects of both processes, the reading programme and materials should be based on

experiences which the child has already had. The initial or basic reading materials should, in effect, be a record of the child's experiences.

A reading programme, predicated on a child's experiences, should, theoretically, permit anticipatory schemata to become operative. Through the utilization of these schemata, the process of reading should become increasingly easier. The child is provided the wherewithal to anticipate, to predict, to hypothesize; hence, to use the context cues which are implicit in that which he brings to the reading encounter. The process of bringing into play the anticipatory schemata permits the child to predict events, to anticipate solutions, to decrease the degree of uncertainty which he encounters in his reading. In short, reading becomes a process of predicting, selecting and verifying that which has been anticipated.

To summarize to this point, Piaget's cognitive theory pertains to human adaptation, to the interaction between an individual and his environment. Human adaptation consists of two complementary processes: assimilation and accommodation. Through these processes, experience becomes a part of the individual's cognitive structure, part of his intellectual apparatus. To Stauffer, reading is a means of adaptation. Assimilation and accommodation are

as necessary to reading as to any other encounter with new experience. Because both processes are predicated on experience and because both processes are common to the reading act, a basic programme of reading should be based on the highly individualized experiences of the children.

The maturational aspect of Piaget's theory considered here encompasses, as in Stauffer's theory, intelligence, language and social interaction^{9,10}. The relationship among the components appears to be interactive and reciprocal rather than causal. According to Piagetian theory, intelligence, language and social interactions evolve simultaneously, and relatively independently, development in each reflecting the evolution of the other two. Because of this reciprocal or interactive relationship, it serves little purpose to investigate each component in isolation, for it is the relationship among components rather than the components themselves which indicate the development in a child's thought patterns.

Piaget's notion of intelligence differs markedly from that held by those who are concerned primarily with its measurement. Rejecting the idea that intelligence is

9 Jean Piaget, Structuralism, Op. Cit., p. 74-97.

10 Jean Piaget and Barbel Inhelder, The Psychology of the Child, Op. Cit., p. 84-92.

a fixed, rather nebulous quantity, Piaget has proposed the concept of intelligence as a mobile, though still nebulous quality¹¹. According to Piaget, intelligence is active; it is constantly evolving; as reflected in language and social interactions, it is "intelligence-in-action". Intelligence leads to and results from a child's interaction with his environment; intelligence modifies and is modified by the process of adaptation¹². It is this evolving, changing intelligence which is reflected in Piaget's stage theory, a brief summary of which will be presented here.

According to Piaget, this evolving mobile intelligence may be defined or characterized by four somewhat distinct stages of intellectual functioning¹³. From birth to approximately age 2 years, the child passes through the sensori-motor stage, a stage largely devoid of language, a stage where, as revealed in his paucity of language, the child cannot represent his world conceptually. His is the

11 Jean Piaget, The Psychology of Intelligence, (Trans. M. Piercy and D.E. Berlyne), London, Routledge and Kegan Paul, 1971, p. 3-18.

12 Ibid., p. 119-156.

13 Jean Piaget, The Psychology of the Child, Op. Cit., p. 1-159.

world of the perceptual; his is a world of isolated instances and objects; no classes or concepts reside in his intellectual functioning.

At approximately 2 years of age, the child enters the preoperational stage, a level consisting of two substages: the preconceptual and the intuitive. At the preconceptual level, ages 2 to 4, basic language patterns reveal that the child can internalize his experiences to the extent that he can form at least a basic understanding of classes. All men may be classified as "daddy", all women as "mommy". Because the child may not yet distinguish between apparently identical or even similar members of the same class, he is considered to be functioning at the pre-conceptual level.

The intuitive stage, age 4 to 7 years, is the stage in which a child attains a better grasp of concepts. Thought, however, continues to be influenced more by perception than by logic, an observation readily supported by the now-famous experiments on conservation. At this stage, thought and language still tend to be egocentric¹⁴; that is, all experiences are interpreted from the child's point of view and within the context of his very personalized

¹⁴ Ibid., p. 118-122.

language. As social interactions gain increasing importance, however, language and thought begin to be directed more toward the child's ever-expanding social interactions providing him the wherewithal to move in the direction of operational thought.

The level of concrete operations, which extends from about age 7 to 11 or 12 years, is a period when the child increasingly makes use of his ability to internalize activity in more or less conceptualized form. It is a process which is increasingly subjected to the laws of logic, the most important of which is reversibility. Although his thought is still tied to the world of the concrete, the child manifests three new abilities: the ability to deal with classes and to use classes to extend thought, the ability to seriate, and the ability to use seriation to extend his anticipatory schemata.

In classifying, the child must first have experiences with the world of the concrete. The world must be experienced, manipulated, explored. Through combining objects, segregating them, arranging them, the child gains an understanding of the criteria for class membership. As a result of operating with real objects, the child soon develops the ability to order them or to seriate them, from the largest to the smallest, from the shortest to the

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longest and so forth. Classifying and seriating lead naturally to the further evolution of anticipatory schemata which, in turn, permit the child to predict and to reduce the degree of uncertainty in adapting to his environment.

At about age 11 or 12 years, the child enters the formal operations stage, a stage which extends to approximately ages 14 or 15 years. This stage is marked primarily by the beginning of propositional thinking. While the thought structures of concrete operations are applied directly to concrete or real objects, the thought structures of the formal operations can apply to the realm of the purely hypothetical or propositional. Through his language, the child's reasoning can shift from the real to the potential, from the actual to the hypothetical. Thought is freed from its ties with the concrete.

To move from the level of concrete operations to that of formal operations represents a mental exercise of considerable import. Here, the role of language appears to be one of enabling the child to make the intellectual leap from the concrete to the advanced stages of the hypothetically abstract. Although Piaget has not made clear the role of language in enabling the child to make this intellectual leap, Furth has noted,

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Propositional operations...are manifestly more closely tied to the exercise of verbal communication. It is hard to conceive how they would develop or, rather, how they would reach an advanced stage of development without the use of language.¹⁵

Again, the relationship between language and thought does not appear to be causal; rather, it seems to be interactive and reciprocal. The language of the child accompanies and enhances; apparently, it does not cause. In Piaget's theory, as in Stauffer's, it is the language of the child which accompanies and enhances evolving intellectual abilities; it is a personalized language, developed by the individual, reflecting his thought patterns and his growing social interactions. To Stauffer, it is this language, the language of the child, the language which encompasses and projects his thoughts, that should form the basis of his reading programme.

Stauffer has extended the developmental aspect of Piaget's theory to the reading process. To Stauffer, reading is thinking^{16,17}; it involves intelligence as it is

¹⁵ Hans Furth, Piaget and Knowledge: Theoretical Foundations, Englewood Cliffs, N.J., Prentice-Hall, 1969, p. 127.

¹⁶ Russell G. Stauffer, Directing Reading Maturity as a Cognitive Process, New York, Harper and Row, 1969, p. 1-305.

¹⁷ Russell G. Stauffer, Teaching Reading as a Thinking Process, Op. Cit., p. 1-308.

conceived by Piaget. Thought in reading is developmental; it reflects the child's growing, evolving intelligence.

At the intuitive stage, the traditional stage of beginning reading, thought is influenced more by perception than by logic, in reading as in any other human enterprise. Thought and language tend to be egocentric; experiences are interpreted from the child's point of view and within the context of the child's language. Published reading materials which fail to take into account this egocentricity of thought and language, the wealth that children bring with them to school, make it virtually impossible for the child to utilize his thought processes to his best advantage in the reading process¹⁸. It is the child's recorded language, the record of his experiences which best reflects his egocentricity of thought. It is this record of experiences, within the framework of the child's language, which best provides a sound basis for the reading enterprise.

At the level of concrete operations, experiences with the real world are internalized to become part of the child's cognitive structure. Through these experiences and

18 John McInnes, Ontario Institute for Studies in Education, Class Notes, Ontario Curriculum Institute Reading Course, July, 1965.

structures the child is able to internalize that which he reads. In short, concrete experiences make reading possible. The child's new-found ability to deal with classes and to use classes to extend his thought is evidenced in his reading and through his reading. He can order and give order to that which he reads; seriation has become an integral part of his reading competencies. Although his thought is still tied to the world of the concrete, the child's reading, according to Stauffer, should reflect his increasing ability to internalize experience in more or less conceptualized form.

As the child moves into the stage of formal operations, his reading should reflect his new-found ability to move into the realm of propositional and abstract thinking. In his reading and through his reading, the child's thinking is freed from its ties with the concrete. His reasoning in reading can shift from the real to the potential, from the actual to the hypothetical. It is the child's evolving intelligence with its accompanying language and social interactions, which enables him to move from thought that is predominantly perceptual and intuitive to thought that is conceptual and logical¹⁹, to

¹⁹ Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. 14.

thought that "embraces all types of thinking, evaluating, judging, imagining, reasoning and problem-solving"²⁰.

To summarize, Stauffer has theorized that reading is thinking; reading involves intelligence as it is described by Piaget. Thought in reading is, therefore, strongly influenced by the child's cognitive development. In short, thought in reading reflects a child's growing, evolving intelligence.

Stauffer has recognized the influence of evolving cognitive development on the reading process. In recognizing this influence he has concluded that cognitive development in the form of intellectual development, greater linguistic fluency and increased social interaction will have a profound influence on changes in reading ability. It is this evolution in cognitive development which is reflected in the child's progression from "thought that is predominantly perceptual and intuitive to thought that is conceptual and logical"²¹, to reading which "embraces all types of thinking, evaluating, judging, imagining, reasoning, and problem-solving"²².

20 Russell G. Stauffer, Teaching Reading as a Thinking Process, Op. Cit., p. 9.

21 Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. 14.

22 Arthur I. Gates, Op. Cit., p. 9.

In summary, this section has been concerned with those aspects of Piaget's theory of cognitive development which pertain directly to Stauffer's theory of reading as it was outlined in Chapter I. The section began with a consideration of the role of experience as it is perceived by Piaget. Reference was then made to Stauffer's concept of the role of experience as it might be extended to the reading process. Following the consideration of the role of experience, the maturational or developmental aspect of Piaget's theory was outlined. The implications of this developmental aspect of Piaget's theory for the reading process then concluded the section.

2. Related Approaches to Reading

In the previous section, an outline was presented of those aspects of Piaget's theory which pertain most directly to that proposed by Stauffer. Three basic ideas were presented. First, through the dual processes of assimilation and accommodation, a child reads in terms of what he already knows; his prior experiences and knowledge make possible the assimilation of new ideas encountered in reading; these new ideas encountered in reading, in turn, cause changes to occur in existing mental structures; thus, accommodation.

The second idea consisted of the notion that what a child already knows permits him to predict, to select and to verify that which had been anticipated. The evolution of anticipatory schemata make it possible for the child to predict, to find in his encounter that which he has predicted and to verify his predictions. Through the existence of anticipatory schemata and when combined with assimilation and accommodation, the reader is able to find regularities, patterns and predictable sequences within his environment; thus, he is able to reduce the degree of uncertainty he encounters in not only his everyday encounters but also in his reading.

The notion that what the reader already knows is subject to developmental stages constituted the third idea developed in the previous section. In Stauffer's theory, reading is thinking; because thinking is developmental in nature, so too is reading. At the traditional stage of beginning reading, the child's reading represents intuitive thought or preconceptual operation. The child's thinking in his reading then evolves through the level of concrete operations to the stage of formal operations where his thought is freed from its ties to the concrete. In developmental terms, the child's reading should, theoretically, reflect evolution in form from that of preconceptual to that of formal thought.

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These three basic ideas are not peculiar only to Stauffer's theory. In this section, related approaches to reading, approaches which serve to exemplify and to extend that proposed by Stauffer will be presented. The section is divided into two parts. In the first part, the ideas of Jacobs, Bormuth, Huey and Kolers are presented. The second part consists of an overview of three theorists whose work parallels Stauffer's and thus serves to clarify further his theory: Dechant, Smith and Goodman.

As mentioned earlier, the three basic ideas developed in the previous section are not peculiar only to Stauffer's theory. Jacobs, Bormuth, Huey and Kolers have each elaborated on specific aspects of these three basic ideas, ideas which may well warrant repetition: a child reads in terms of what he already knows; that which a child already knows permits him to predict, to select and to verify; and, that which a child already knows is subject to developmental stages.

The notion that a child reads in terms of what he already knows is basic to Jacobs'²³ humanistic approach to reading. In discussing the role of that which the child

23 Leland Jacobs, "Humanism in Teaching Reading", in Phi Delta Kappan, Vol. 52, No. 8, April, 1971, p. 245.

brings to the reading encounter, he has advocated that reading is a two-way process. In this process, the reader both gives and takes; however, he takes from the printed page only in terms of what he can give to the passage²⁴. When the reader brings little he takes little. To Jacobs, reading is a function of that which an individual brings to the reading encounter.

The second basic idea presented consisted of the notion that what the child already knows permits him to predict, to select and to verify that which has been anticipated. Although prediction, selection and verification are closely integrated, Bormuth, Huey and Kolers have, in their analysis of the reading process, suggested ways in which each of these three elements is utilized in reading.

In considering the factors necessary for prediction Bormuth^{25,26} has proposed that the best measure of a reader's comprehension is to test his knowledge before he reads the

24 Ibid., p. 245.

25 John Bormuth, "An Operational Definition of Comprehension Instruction", in K. Goodman and J. Fleming, eds., Psycholinguistics and the Teaching of Reading, Newark International Reading Association, 1969, p. 48.

26 John Bormuth, "Readability: A New Approach", in Reading Research Quarterly, Vol. 1, 1966, p. 79.

passage. It is this prior comprehension, the knowledge which the reader brings with him, which permits the individual to anticipate and thus to predict. As with Jacobs, Bormuth has contended that the reader's background provides him with the basis for anticipation and prediction, an assumption not entirely dissimilar from that underlying Stauffer's concept of Directed-Reading-Thinking-Activities.

The process of selecting that which has been predicted has been further developed by Huey²⁷. In reviewing this second stage of the process, he has postulated that the reader "finds" in the printed page that which has been anticipated. If the reader is unable to find that which he has predicted, he will "back-track" to re-examine his prediction. In psychomotor terms, his attempt to re-examine his prediction will be manifested as an "eye-regression". The more closely the content of the reading material approximates the experiences of the reader and the more closely the language of the reading material approximates the verbal language of the reader, the more likely the reader is to find that which he has predicted and the less likely he is to "back-track" in his reading.

27 Edmund Burke Huey, The Psychology and Pedagogy of Reading, Cambridge, Mass., The MIT Press, 1968, p. XXV.

Verification of predictions has been discussed most clearly by Kolers who has advocated that "reading is only incidentally visual"²⁸. Reading is not simply a matter of decoding printed symbols to their sound equivalents. To Kolers, the reader confirms or verifies that which was predicted with that which was found. Reading is a matter of confirming and verifying the similarity between one's current knowledge and the information contained in the printed page. In this process of confirming and verifying, the reader requires and, therefore, utilizes minimal visual information. The reader need not attend to all the details or all visual cues contained in the printed page. The reader need attend only to those significant visual cues or details which verify his predictions. In turn, it is the child's prediction which lends significance to each visual cue.

In summarizing the importance of that which the individual brings to a reading encounter, Strang²⁹ and

28 Paul Kolers, "Reading is Only Incidentally Visual", in K. Goodman and J. Fleming, eds., Psycholinguistics and the Teaching of Reading, Op. Cit., p. 8.

29 Ruth Strang, Learning to Read, Insights for Educators, The Peter Stanford Memorial Lectures, The Ontario Institute for Studies in Education, 1970, p. 30.

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Shores³⁰ have proposed that the success one enjoys in reading is in direct proportion to that which one already knows. Success in predicting, selecting and verifying is determined by that which the individual already possesses. In turn, that which the individual already possesses is a function of the ability of the individual to organize and then to relate prior experience to new encounters through reading.

To summarize to this point, the notion that reading is a function of that which the reader brings to the printed page does not appear to be peculiar only to Stauffer. Jacobs, Bormuth, Huey and Kolers have each advanced similar proposals. A child predicts, selects and verifies in reading in proportion to that which he already knows. A child must be able to utilize his existing experiences; he must be able to assimilate, to accommodate and to utilize his anticipatory schemata; through assimilation and accommodation, he must be able to relate his prior experiences to that which he encounters in his reading.

This relating of prior experiences to new encounters in reading is fundamental to the theoretical

30 J. Harlan Shores, "The Nature and Scope of the Problem and the Attack on It", in William Gray, ed., Improving Reading in all Curriculum Areas, Proceedings at the Annual Conference on Reading held at the University of Chicago, 1952, Chicago, University of Chicago Press, Vol. XIV, 1952, p. 3.

positions taken by three major authors: Emerald Dechant, Frank Smith and Kenneth Goodman. In this part of the review, consideration will be given to those aspects of these three theories which are most relevant to that proposed by Stauffer.

The process of relating prior experiences to new encounters in reading is basic to Dechant's definition of reading. According to him,

Reading is a process of giving the significance intended by the writer to the graphic symbols by relating them to one's own fund of experience.³¹

Thus, in Dechant's definition the reader gives significance to the materials he encounters by relating new ideas to ideas already stored in his experience. It might be surmized that the child who experiences difficulties in reading either lacks the necessary background experience or cannot relate that experience to that which is being read. In Piagetian terms, the child may be unable to assimilate, to utilize existing structures to cope with newly encountered experiences.

Dechant has described that which the reader brings to the reading encounter in terms of concepts. These

³¹ Emerald Dechant, Reading Improvement in the Secondary Schools, New Jersey, Prentice-Hall, 1973, p. 19.

concepts or cognitive structures originate in one's experience. The nature and complexity of the concepts, therefore, tend to be a reflection of the nature and complexity of the experiences from which they are derived. According to Dechant,

Concepts develop from experience and their richness and scope are in direct proportion to the richness and scope of the individual's experience.³²

As the child's fund of experience increases in scope and complexity so increase the scope and complexity of the child's concepts. In turn, the increasing scope and complexity of concepts which the child brings to the reading encounter make reading possible. The more compatible the child's existing concepts are with those he encounters in his reading, the greater is the child's ability to relate these experiences and concepts to new experiences encountered in reading.

In supporting the third idea presented in the previous section, that what a child knows is subject to developmental stages, Dechant, like Stauffer, appears to have been influenced by the developmental theory of Piaget³³.

32 Emerald Dechant, Op. Cit., p. 41.

33 Emerald Dechant, Improving the Teaching of Reading, New Jersey, Prentice-Hall, 1970, p. 70.

While concepts derive their richness and scope from the child's experiences, they are also strongly influenced by the child's intellectual development³⁴. To Dechant, the evolution in a child's conceptual development is reflected in his reading. The child will comprehend only in terms of the level of conceptual development which he brings to the reading encounter. Thus, it would appear that in Dechant's approach to reading, as in Stauffer's, intellectual development plays an important role in the child's progression in reading to a level of thought that "embraces all types of thinking, evaluating, judging, imagining, reasoning and problem-solving"³⁵.

In discussing the evolution of concepts, Dechant has drawn a parallel between classes, categories and concepts. In his discussion, he has written that, basic to the child's learning to read,

...the child must learn to categorize. He must group his experiences into classes. Abstraction isolates the basic characteristics, and categorization applies it to more objects. The word or verbal symbol, in turn, is the verbal expression of a concept.³⁶

34 Ibid., p. 45-53.

35 Arthur I. Gates, Op. Cit., p. 9.

36 Emerald Dechant, Improving the Teaching of Reading, Op. Cit., p. 370.

To Dechant the process of categorizing or forming classes is fundamental to the reading process. It is this basic ability to categorize, to form classes and to use classes and categories to extend thought which the child brings to the reading encounter. In turn, these concepts, categories or classes reflect the experience, knowledge and level of intellectual development which the child already possesses.

Like Dechant, Smith³⁷ and Goodman³⁸ have advanced an approach to reading which serves to extend the position taken by Stauffer and to add support to the proposals offered by the authors reviewed earlier in this section. Although neither Smith nor Goodman have advanced recommendations concerning the teaching of reading per se, their analyses of the reading process among more mature or competent readers have provided greater insight into the competencies required for more efficient and effective reading.

Stauffer has theorized that children bring three attributes to the reading encounter: evolving intellectual

37 Frank Smith, Understanding Reading: A Psycholinguistic Analysis of Reading and Learning to Read, New York, Holt, Rinehart and Winston, 1971, p. 1-230.

38 Carolyn L. Burke and Kenneth Goodman, "When A Child Reads: A Psycholinguistic Analysis", in Elementary English, Vol. XLVII, No. 1, January, 1970, p. 121-129.

capacity, developing linguistic fluency and ever-widening social interactions. These, he claims, permit the child to predict, to select and to verify in his reading. Through predicting, selecting and verifying, a child relates previous experiences to new experiences and to ideas encountered in his reading. In Piagetian terms, predicting occurs as a result of anticipating, of developing anticipatory schemata. Anticipatory schemata, in turn, reduce the degree of uncertainty which a child encounters.

Smith has defined reading comprehension as "the reduction of uncertainty"³⁹. Through this definition, he has provided an important insight into the nature of the predicting, selecting and verifying process.

In a direction similar to that taken by several authors presented earlier, Smith has theorized that the reader predicts, selects and verifies in terms of what he already knows, in terms of his "non-visual information"⁴⁰. He has defined non-visual information as

39 Frank Smith, Op. Cit., p. 35.

40 Frank Smith, Psycholinguistics and Reading, New York, Holt, Rinehart and Winston, 1973, p. 6.

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...information that derives from behind the eyeball, from the brain. It is what the reader already knows about reading, about language and about the world in general. It is the prior knowledge which the reader brings to the visual task of reading.⁴¹

With this definition, Smith has provided additional insight into the nature of that which the individual brings to the reading encounter.

While Stauffer has theorized that the child brings three attributes, namely, evolving intellectual capacity, developing linguistic fluency and ever-widening social interactions to the reading process, Smith has postulated that the child brings with him that which he already knows about reading, about language and about the world in general. In his knowledge of reading, the child utilizes his understanding of the pattern and organization of the printed language; in his knowledge of language, he brings into play his understanding of syntax, or system of language, and of semantics, the meaning associated with words and with groups of words. His knowledge of the world is derived from his experience, that which he has internalized through exploring, manipulating, living. It is this non-visual information, the child's knowledge of reading, of language and of the world in general, which is brought into play in the reading encounter.

41 Ibid., p. 6.

To Smith, reading involves a process apparently not entirely dissimilar from that of Piaget's concept of assimilation and accommodation. He has proposed that reading is a "trade-off"⁴² between non-visual information and visual information⁴³, where visual information is defined as "information which comes from in front of the eye-ball, from the printed page"⁴⁴.

In this "trade-off", Smith has hypothesized that the more non-visual information the reader possesses, the more fluent will be his reading. In emphasizing the role of this non-visual information, he has written,

Prior knowledge of the world contributes more information to reading than the visual symbols on the printed page. That is, the skilled reader is one who possesses more non-visual information and the less fluent reader is one who relies on more visual information.⁴⁵

Implicit in Smith's statement is the concept that the more non-visual information the reader possesses, the less he must rely on visual information. Conversely, the less non-visual information the reader possesses, the more he must rely on visual information. In turn, the more

42 Ibid., p. 6.

43 Ibid., p. 7.

44 Ibid., p. 7.

45 Frank Smith, Understanding Reading, Op. Cit.,
p. 3.

visual information the reader requires, the more difficult the reading process becomes.

The nature of the "trade-off" between visual and non-visual information is best illustrated in Smith's concept of redundancy. Basic to this notion of redundancy is the idea of replication; certain pieces of information already stored in the reader's background are replicated in the passage being read. According to Smith,

Skilled reading utilizes redundancy - of information from a variety of sources - so that, for example, knowledge of the world and of language will reduce the need for visual information from the printed page.⁴⁶

Thus, it would appear that redundancy of information reduces the need for visual information from the printed page.

Redundancy, according to Smith's theory, serves a second purpose, a purpose which accompanies that of reducing the need for visual information. Redundancy appears to reduce the number of alternatives available to a reader and thus serves to reduce the degree of uncertainty.

This reduction of alternatives and uncertainty through the utilization of redundancy is best illustrated in the passage "The Lord is my shepherd; I shall not want". The fluent reader who utilizes his non-visual information

46 Ibid., p. 12.

and thus the redundancy of ideas contained in his visual and non-visual information, requires virtually no visual information to complete the last four words. Relying on what he already knows, relying on his non-visual information and thus, the redundancy of ideas, the reader has reduced the number of possible alternatives.

Non-visual information and redundancy lead to prediction. According to Smith, "the more skilled a reader is, the less visual information he needs from the printed page - the more he is able to predict what the unread material will be"⁴⁷.

In Stauffer's theory is the implication that the child predicts, selects and verifies at the level of ideas. Thus, the child is able to reduce the uncertainty regarding the number of possible ideas that are available to him. According to Smith, prediction, selection and verification occur at more than the ideational level; the child anticipates and predicts letters, words and phrases as well as ideas. According to Smith,

⁴⁷ Ibid., p. 71.

If we regard reading like any other process of acquiring information, namely the reduction of uncertainty, then we have discovered the first way in which the conventionally disparate areas of letter identification, word identification and "reading for comprehension" can be considered in the same light. In each of the three aspects of reading, information is acquired visually to reduce the number of alternative possibilities. The exact number of alternatives can be specified for letters, an approximate figure can perhaps be put to the number of words, but the number of alternatives for comprehension, if it can be estimated at all, must obviously be closely related both to the passage being read and the particular individual who is doing the reading. ...We may not know how much uncertainty an individual has about the identity of the sovereign of England in the year 1900, but we do know that this uncertainty must be reduced if he reads and comprehends a passage that the sovereign was a woman.⁴⁸

Thus, it may be surmized that a child anticipates, predicts, selects and verifies at several levels. According to Stauffer, the child can predict, select and verify at the ideational level. Smith, however, has extended this process of predicting, selecting and verifying to the level of letters, words, phrases and sentences, as well as ideas.

Smith's ideas are readily translated into practical terms. In the sentence, "The Lord is my shepherd; — — — —", the more skilled reader is able to predict the remaining four words. Relying on his non-visual information, on the redundancy of ideas, and on his knowledge

⁴⁸ Ibid., p. 19.

of language, the reader knows that for each of the last four words, and, indeed, for the entire sequence of the last four words, there exists only one possibility. There are no alternatives. Thus, the degree of uncertainty encountered by the reader is reduced theoretically to zero.

Prediction, through the recognition and utilization of redundancy, is predicated on prior experiences and knowledge. Through predicting, the reader can reduce the number of alternatives available to him and thus limit the degree of uncertainty.

Drawing heavily on the transformational-generative approach to grammar as developed by Chomsky^{49,50}, Smith has distinguished between two levels of language in reading: surface and deep structure. The term surface structure refers to the physical manifestations of language, the printed symbols on the page; deep structure refers to the meaning associated with the printed symbols of the surface structure. The physical aspects of the written sentence, the surface structure, are considered to be derived from the surface structure of spoken language by a set of grapho-phonetic rules. The information conveyed by a sentence, the

49 Noam Chomsky, Syntactic Structures, The Hague, Mouton, 1957, 286 p.

50 Noam Chomsky, Aspects of a Theory of Syntax, Cambridge, Mass., The MIT Press, 1969, 274 p.

meaning, is considered to emanate from the deep structure of language via a set of semantic rules. Deep and surface structure are both considered to be elements of syntax; they are linked by a set of transformational rules which are applied to deep structure to transfer ideas into surface structure. Because meaning resides in the deep structure of a sentence, there can be no understanding of the written sentence without reference to its deep structure or meaning.

The notion of deep and surface structure plays a significant role in Smith's theory. He has postulated that the reader intuitively attempts to identify directly the deep structure of a passage. It is with the deep structure that he relates his prior experiences and knowledge, his non-visual information. Deep structure, in turn, becomes the bases from which he formulates his predictions. Using this deep structure, then, the reader needs only minimal aspects of the surface structure to select and to verify his predictions, a theoretical position which serves to clarify and to extend Kolers' contention that "reading is only incidentally visual"⁵¹.

In the concept of deep and surface structure lies an important implication. The implication is that efficient

⁵¹ Paul Kolers, Op. Cit., p. 8.

reading begins with deep structure, with comprehension, with non-visual information. Using this deep structure as a basis for prediction, the reader samples only minimal aspects of the surface structure to select and to verify his predictions. Thus, Smith has postulated that comprehension precedes word identification⁵², a notion diametrically opposed to traditional views of reading where it was believed that all reading proceeded from word recognition to comprehension, that word attack and word recognition should be "taught" before comprehension could be expected.

It has been Smith's contention that this traditional approach to reading is detrimental to the learner's progress; reading is made more difficult. Reading competencies are acquired more readily when the reading process is made easier⁵³. By emphasizing word attack and word recognition, reading becomes a slow, laborious process. The end result of slowing the reading process is to overload the reader's sensory store and short-term memory⁵⁴. Reading at a word-by-word pace, the child is forced to remember words, of

⁵² Frank Smith, Psycholinguistics and Reading, Op. Cit., p. 70.

⁵³ Ibid., p. 183-196.

⁵⁴ Frank Smith, Understanding Reading, Op. Cit., p. 77-79.

which he can store seven at most in his short-term memory⁵⁵. Only when the reader arrives at the deep structure of a passage can he utilize his long-term memory; it is in his long-term memory that he stores meaning, the deep structure. It is in his long-term memory that his experiences and non-visual information are stored. It is in his long-term memory that the reader can relate his prior experiences to new encounters in reading. It is in his long-term memory that reading becomes

.....a process of giving the significance intended by the writer to the graphic symbols by relating them to one's own fund of knowledge.⁵⁶

Smith's theory might be encapsulated in emphasizing the role of deep structure and its relationship to non-visual information, that which the reader brings to and uses in the reading encounter. In emphasizing the importance of non-visual information, Smith has recognized the importance of experience, the reader's continuing adaptation to his environment.

Piaget⁵⁷ has proposed that a child's experience is first firmly established in the world of the concrete in

55 Ibid., p. 77-79.

56 Emerald Dechant, Reading Improvement in the Secondary Schools, Op. Cit., p. 19.

57 Jean Piaget, Structuralism, Op. Cit., p. 68-71.

experiencing, manipulating, exploring real objects. Through this interaction with the world of the concrete, the child learns to categorize and to classify as described by Dechant. Through the processes of combining, segregating, arranging, labelling, the child gains an understanding of the criteria for class membership. These classes and categories, in turn, lead to the further evolution of anticipatory schemata which permit the child to predict and to reduce the degree of uncertainty in adapting to his environment.

In extending Piaget's theory to the reading process, Dechant has described that which an individual brings to the reading encounter in terms of concepts, the nature and complexity of which reflects the nature and complexity of the experiences from which they are derived. Drawing heavily on Piaget's theory, Dechant noted that basic to the evolution of these concepts, "a child must learn to categorize. He must group his experiences into classes"⁵⁸.

Although apparently more influenced by Bruner^{59,60} than by Piaget, Smith, too, has proposed that the reader

⁵⁸ Emerald Dechant, Improving the Teaching of Reading, Op. Cit., p. 370.

⁵⁹ Frank Smith, Understanding Reading, Op. Cit., p. x.

⁶⁰ Ibid., p. 68-81.

brings to the reading encounter evolving expertise in the process of categorization. As with prediction, categorization occurs at many levels. According to Smith,

Every aspect of reading can be seen as a process of categorization. The identification of letters involves allocating the in-coming of visual information (from the marks on the page) into a set of 26 pre-established categories each associated with the name of a letter of the alphabet. The identification of words involves allocating the visual information to a much larger set of categories each of which has the sound of the word, has a name and also a number of related semantic connections or associations. Reading for comprehension or identification of meaning involves the allocation of visual information into category structures that represent meaning to the reader. In every case, the same visual information is utilized but it is allocated cognitively in a different way.⁶¹

Thus, in Smith's theory, categories play an important role. In reading, categories exist at many different levels, the level of letters, words, sentences, ideas. These categories are identified, in turn, by different orthographic, syntactic and semantic attributes; that is, they may be characterized by their letters, grammatical relationships or by their meaning. As the child acquires wider-ranging experiences, his categories increase in complexity, number and refinement. Thus, implicit in Smith's theory is the notion of evolving intellectual capacities, constantly

⁶¹ Ibid., p. 77.

developing categories, categories which increase in complexity, number and refinement with each new experience, encounter, and social interaction, newly developed categories which result from accommodation and which further facilitate assimilation at increasingly newer levels of sophistication.

Smith has recognized individual differences in terms of category organization which an individual brings to the reading encounter. Organization of categories appears to be closely related to individual interests and experiences. Regarding this individuality, Smith has written,

The way in which we organize our categories clearly reflects our personal interests and experience as well as the way in which the world is constructed. We are likely to have a complex network of categories and richness of category relations in those areas where fine differences are significant to us - postage stamps for philatelists, snow for skiers and Eskimos, word configurations for skilled readers.⁶²

Implicit in Smith's recognition of individual differences rests the notion of familiarity; one reads, with greatest ease, in the context of that which is most familiar. Translated into practical terms, it becomes increasingly more apparent why a psychologist may read the latest psychology text with relative ease, while experiencing difficulty in attempting to read a text on nuclear

62 Ibid., p. 73.

physics; and, why a nuclear physicist may read the same physics text with little or no difficulty. Each brings, to the task, different conceptual organizations and backgrounds; each brings different "non-visual information"; each brings a different degree of familiarity. Expertise in reading appears to lie in the context of that which is most familiar.

To summarize, Smith has defined reading comprehension as the reduction of uncertainty where non-visual information is utilized as a base from which the reader can predict, select, and verify in reading. To Smith, reading consists of a trade-off between non-visual and visual information, a process in which a parallel may be drawn with Piaget's notion of assimilation and accommodation. Within this trade-off, the reader utilizes redundancy, the replication within visual and non-visual information; thus, the more non-visual information the reader possesses, the less he must rely on visual information and the better equipped he is to predict, to select, and to verify in his reading. Extending Chomsky's transformational-generative grammar to the reading process, Smith has proposed that reading begins with deep structure, that comprehension precedes word identification. In this way, the reader can bring into play his long-term memory in which ideas, concepts, categories and classes are stored: ideas, concepts, categories and classes which are uniquely familiar to the individual.

Reference to Chomsky's transformational-generative grammar model is not peculiar only to Smith's theory of reading. Goodman⁶³ has proposed a theory of reading, also reflecting Chomsky's influence, in which he has challenged many traditional practices in the teaching of reading. In his theory, he has proposed that the reader uses the deep structure of a passage as a basis for making educated guesses regarding the surface structure, a practice traditionally frowned upon by teachers of reading. To Goodman, reading is a psycholinguistic guessing game⁶⁴.

Goodman, like Smith, has theorized that the reader relates his non-visual information to the deep structure of the text. Once he has grasped the meaning, or deep structure, he may reconstruct the message in a new and more familiar surface structure. Usually the reconstructed surface structure will be in a form which most closely approximates his own spoken language. If the original surface structure is quite dissimilar from that commonly used by the reader, the reconstructed surface structure

63 Kenneth Goodman, The Psycholinguistic Nature of the Reading Process, Detroit, Wayne State University Press, 1968, p. 1-347.

64 Kenneth Goodman, "Reading: A Psycholinguistic Guessing Game", Paper read at American Educational Research Association, 1967, mimeograph, 17 p.

may be quite different from the printed message as it existed in its original form⁶⁵.

The child who encounters the message, "If I were a rich man ...", may reconstruct it as, "If I was a rich man ...". In the process of anticipating, the child has predicted, and thus reconstructed the sequence, "If I was ...". What was reconstructed was not consistent with the original surface structure. In the reconstruction, only the surface structure changed; the deep structure remained constant. It has been Goodman's contention that nothing has been lost in the reconstruction. The child has simply changed the surface structure into a form more familiar to him. He has not lost the meaning; he has not altered the deep structure.

Although the child could grasp the deep structure, the surface structure which he encountered was unfamiliar to him. The structure was not part of his experiences, part of his cognitive structure, part of his non-visual information. Because the surface structure of the printed message was unfamiliar, the child intuitively sought to identify directly the deep structure. Then he reconstructed the

65 Kenneth Goodman, "Psycholinguistic Universals in the Reading Process", in Frank Smith, Psycholinguistics and Reading, Op. Cit., p. 21-27.

message in a more familiar linguistic form, a pattern in which he could predict, select and verify. As with Stauffer, Goodman has proposed that this process of predicting, selecting and verifying occurs most readily in linguistic forms with which the child is most intimately acquainted. According to Stauffer, these linguistic forms would be those which the child would normally use in his spoken language.

To many teachers and reading publishers, the child has made an error in his reading, an error based on the concept that reading is accurate word-by-word reproduction of the printed message. Goodman has contended that the child has simply "miscued"⁶⁶ because of his lack of familiarity with a newly-encountered linguistic structure. Ironically, by miscuing, the child has demonstrated that he has comprehended. He has visited the level of deep structure and has returned with a message couched in a linguistic form familiar to him. Where the child would normally be penalized for a reading error, the child has provided the only clue that he comprehended: he reconstructed. The unfamiliar linguistic structure of the passage prompted him to miscue.

66 Kenneth S. Goodman, "A Linguistic Study of Cues and Miscues in Reading", Elementary English Journal, October, 1965, p. 639-643.

Goodman has decried the use of reading materials in which there is little, if any, deep structure. Frequently, authors of children's reading materials become so engrossed in controlling the vocabulary of their books that they overlook the importance of comprehension, of providing a deep structure, considered by both Smith and Goodman to be so important in effective reading. Indeed, in their zeal, these authors may provide materials "that [are] no more palatable than any of the similar materials already available"⁶⁷.

Materials devoid of deep structure make it virtually impossible for the child to predict, to select and to verify. Reading becomes little more than "word-calling", a slow, laborious process which, as noted by Smith, overloads the sensory store and short-term memory. Without deep structure, consignment to long-term memory is impossible; without deep structure there can be no reference to past experiences, to non-visual information. Comprehension cannot precede word identification, since comprehension resides in the deep structure. Because reading becomes a purely visual task, it becomes an increasingly more difficult process, one which

⁶⁷ Russell G. Stauffer, The Language-Experience Approach to the Teaching of Reading, Op. Cit., p. vi.

places tremendous stress on the child's short-term memory. Reading is no longer a process which "embraces all types of thinking, imagining, reasoning and problem-solving"⁶⁸.

Common to the theories of Goodman and Smith rests the notion that reading competencies develop most readily in the context of that which is familiar, in materials which most closely approximate the non-visual information and linguistic style of the reader. While it can be accepted that the child will experience least difficulty using materials with which he is most intimately acquainted, it is implied that as the reader's competencies develop, he will become increasingly more capable of transferring these abilities to other reading contexts, new contexts in which he might be less acquainted with both the deep and surface structure. Of prime significance, however, remains the importance of the learner being provided materials which are rich in deep structure and which reflect linguistic structures familiar to him.

Providing reading materials which are not only rich in deep structure but also are expressed in a surface structure which reflects the spoken language of the reader is not an easy task. As suggested by Stauffer, Smith and

⁶⁸ Arthur I. Gates, Op. Cit., p. 9.

Dechant, each child brings a potentially different conceptual organization, different non-visual information, different linguistic style to the reading task. Yet, it is in providing for individual differences that reading is made easier. Reading materials based on deep structure to which each reader can relate his non-visual information and expressed in linguistic forms which reflect the unique language usage of each reader provide for maximal assimilation; they provide optimal opportunity for the predicting-selecting-verifying process to develop. Stauffer has suggested that only the reader can supply such reading materials.

The Language-Experience Approach, as envisioned by Stauffer, appears to be predicated on the notion that the child supplies his own deep structure. Because the reading material is derived from the child's own wealth of experiences, his reading is based on the assumption that he is already fully acquainted with its deep structure; thus, his reading begins with comprehension, with his non-visual information. As in Smith's theory, comprehension precedes word identification; reading moves from deep structure to surface structure. The child utilizes his knowledge of the deep structure as a basis for prediction and thus, as noted by Kolers, he samples the surface structure in order to test and to verify his predictions.

Because the reading materials are written in the child's own personalized language and represent his highly personalized experiences, maximal redundancy is present; the child can utilize, to the fullest, his non-visual information, his knowledge of reading, of language and of the world in general. In Piagetian terms, he can assimilate and accommodate to the fullest degree possible.

Although Goodman and Smith have not advocated the Language-Experience Approach per se, their emphasis on the conceptual and linguistic aspects of reading would suggest that there exists a strong psycholinguistic rationale for Stauffer's approach. They have summarized their attitude toward reading and reading materials in the following terms:

The value of psycholinguistics lies in the insights it can provide into the reading process and the process of learning to read. As such, a "psycholinguistic approach" to reading would be the very antithesis of a set of instructional materials. As we shall argue, psycholinguistic analysis formally confirms what we have all known intuitively for years - that the key factors of reading lie in the child and his interaction with information-providing adults, rather than in the particular materials used. Materials most compatible with such interaction are those that interfere the least with natural language functioning.⁶⁹

69 Frank Smith and Kenneth Goodman, "On the Psycholinguistic Method of Teaching Reading", in Frank Smith, Psycholinguistics and Reading, Op. Cit., p. 178.

None of this can, to our mind, be formalized in a prescribed sequence of behaviorally stated objectives embalmed in a set of instructional materials, programmed or otherwise. The child is already programmed to learn to read. He needs written language that is both interesting and comprehensible, and teachers who understand language-learning and who appreciate his competence as a language-learner.⁷⁰

The contribution of the psycholinguists, as they themselves have encapsulated their contribution, lies in the insights they have provided for the teachers of reading, insights into the nature of the reading process. In suggesting the importance of the teachers' insights, they have introduced an important variable seldom considered in the research: the reading teacher.

Although no specific materials have been suggested, Smith and Goodman have recommended materials which interfere the least with natural language functioning, with the predicting-selecting-verifying sequence. In the final analysis, it would appear that these materials lie within the child and all that he brings to the reading encounter. It is the child who is already programmed to predict, select, and verify. It is the child who appears to constitute the common denominator in the theories of reading presented.

⁷⁰ Ibid., p. 180.

In review, this section began with a review of three basic ideas: a child reads in terms of what he already knows; that which a child already knows permits him to predict, to select and to verify; and, that which a child already knows is subject to developmental stages. It was suggested that these three ideas are not peculiar only to Stauffer's theory. In the section, related approaches to reading, approaches which served to extend and to exemplify that proposed by Stauffer were presented. The section was divided into two parts; in the first, the ideas of Jacobs, Bormuth, Huey and Kolers were presented. The second part consisted of an overview of three theorists whose work parallels Stauffer's and thus serves to clarify further his theory: Dechant, Smith and Goodman.

To summarize, common to all theories presented rests the notion that higher order reading abilities are acquired more readily when the process is made easier. Stauffer has proposed that the reading process is made easier through the Language-Experience Approach, an approach which takes "advantage of the wealth that children bring with them to school - linguistically, intellectually, socially"⁷¹. Interpreted from a Piagetian perspective,

⁷¹ Russell G. Stauffer, The Language-Experience Approach to the Teaching of Reading, Op. Cit., p. 258.

children utilize this wealth as a basis for the combined processes of assimilation and accommodation in reading as they do in any other encounter with their environment. Again from a Piagetian perspective, these reciprocal processes are evolutionary in nature, developing in accord with the child's evolving linguistic and intellectual abilities and social interactions.

Smith and Goodman, in apparent agreement with Stauffer, have suggested that the reading process is made easier when materials are used which "interfere the least with natural language functioning"⁷², materials rich in deep structure, a richness determined by the individualized experiences of the reader and expressed in linguistic forms which reflect the unique language usage of each reader. From Stauffer's vantage point, these reading materials would appear to be those supplied by each child, the language-experience of the child. It is in these materials that the child's evolving intellectual abilities, his developing concepts and category organization, should be reflected and facilitated. When compared with children using prepared instructional materials, Stauffer has maintained that superior results should be evidenced among children using

⁷² Frank Smith and Kenneth Goodman, "On The Psycholinguistic Method", Op. Cit., p. 178.

this language-experience, "almost regardless of their abilities and backgrounds"⁷³; moreover, older children should make greater gains than younger children in the acquisition of higher order reading abilities due to greater development in evolving intellectual abilities, concepts and category organization.

These claims would suggest that, given the same reading tests or common base, children of two different age groups, exposed to two distinct approaches, should demonstrate measurably different reading abilities. Older children should more readily acquire higher order reading abilities than younger children, given a comparable period of time. Children exposed to a Language-Experience Approach should also more readily acquire higher order reading abilities than their counterparts exposed to an approach based on prepared instructional materials. Given these two theoretical predictions, it would be expected that an interaction would occur between approach and age; that is, it is anticipated that the Language-Experience Approach would exert a greater effect on older children than with younger children.

73 Russell G. Stauffer, The Language-Experience Approach to the Teaching of Reading, Op. Cit., p. 198.

3. Empirical Investigations

In this section, an overview is presented of studies which have been undertaken to investigate aspects of Stauffer's theory. The overview is presented in three parts. A review of studies dealing specifically with the Language-Experience Approach will constitute the first part. In the second part, a review of investigations more pertinent to psycholinguistics but having direct implications for the Language-Experience Approach is presented. The third part consists of a review of empirical investigations related to the Directed-Reading-Thinking-Activities.

An overview of the empirical studies designed to investigate Stauffer's theory has revealed five major features. First, while there appears to be an endless number of articles and papers extolling the benefits to be derived from the Language-Experience Approach, there seem to be surprisingly few actual empirical investigations of Stauffer's theory. Second, despite the position that the Language-Experience Approach may find equally valid application with older as well as with younger children, the majority of studies appears to have been undertaken at the primary level, specifically in the area of beginning reading. Third, research conducted beyond the primary level appears to have been directed largely toward those

who are considered to be linguistically handicapped. Fourth, empirical investigations of Stauffer's theory appear to have failed to consider the effect of the teacher, thereby failing to take into account variance which may be attributable to differences among teachers; and fifth, there appears to be difficulty in finding a common denominator or common base on which to compare the language-experience and basal reader approaches. It is probably for this reason that few studies have been extended beyond the primary grade level. In summary, investigations of Stauffer's theory have revealed five major trends: a limited number of studies, a major emphasis on the primary level, investigations directed toward the linguistically handicapped, an absence of a common base or foundation on which to compare approaches, and a failure to account for differences among teachers.

Although not reporting the results of empirical investigations, Balasa⁷⁴, Downing⁷⁵, Kretschner⁷⁶ and

74 Michael Balasa, "Vocabulary Conceptualization and Reading", Reading World, Vol. 13, May, 1974, p. 272-275.

75 John Downing, Thinking About Reading, paper presented at the Annual Meeting of the International Reading Association, New York, May, 1975, 12 p.

76 Joseph C. Kretschner, "Toward a Piagetian Theory of Reading Comprehension", Reading World, Vol. 14, March, 1975, p. 180-187.

Thorndike⁷⁷ have defined reading in much the same terms as that advocated by Stauffer. According to their definitions, reading is not a simple perceptual activity; rather, it represents higher order conceptualizations, conceptualizations which reflect the reader's evolving intellectual capabilities. It is this continuing concept of reading which is represented in the studies presented in this section.

In one of the more recent publications, Goldbecker⁷⁸ has reviewed many of the studies undertaken to 1975. Although written primarily for classroom teachers, she has provided a major overview of the more salient features of this research and has attempted to interpret these studies for the classroom teacher. Goldbecker's major contribution appears to be one of situating the Language-Experience Approach in the context of a range of approaches designed to promote and to enhance reading abilities in children.

Hoyt⁷⁹, in reviewing four approaches to beginning reading - the basal reader approach, the Language-Experience

77 Robert L. Thorndike, "Reading as Reasoning", Reading Research Quarterly, Vol. 9, 1973-1974, p. 135-147.

78 Sheralyn S. Goldbecker, Reading: Instructional Approaches; What Research Says to the Teacher, National Education Association, Washington, D.C., 1975, 34 p.

79 Homer Hoyt, Four Paths to Teaching Reading, San Luis Obispo County, California, Superintendent of Schools, 1969, p. 1-88.

Approach, self-selection of books and programmed instruction, failed to find superior results with any one of the four approaches. As noted earlier, Hoyt's work was confined to beginning reading at the primary grade level; thus, his investigation has been limited in its scope by failing to take into account evolving intellectual expertise on the part of his subjects. His work, moreover, was further limited by his failure to account for differences among teachers.

Although not investigating Stauffer's theory specifically, Morgan⁸⁰ found little support for the contention that a Language-Experience Approach should produce results consistently superior to the basal reader approach. Again, limiting her study to beginning reading, thus failing to take into consideration evolving intellectual abilities, and failing to account for variance attributable to differences among teachers, Morgan's study was weakened considerably by these major deficits. Given that evolving intellectual factors and teachers exert an impact on the reading process, these factors should have been considered.

80 Lorraine Lee Morgan, Effects of an Integrated Language-Experience Approach and a Basal Language Arts Approach on Language Learning Outcomes in First Grade, Ed.D. dissertation, Pittsburgh, University of Pittsburgh, 1967, 101 p.

The major proportion of investigations pertaining to Stauffer's theory appears to have been undertaken primarily by Stauffer^{81,82} himself. Again, Stauffer's investigations have been carried out at the primary level, although extended to the second grade level. In extending his investigations of the effectiveness of the Language-Experience Approach to the second grade level, Stauffer was interested in the relative effects of two approaches, the Language-Experience Approach and the Basal Reader Approach. His interests centred on the common base, or the criterion measures, of performance of boys and girls, writing mechanics, originality, oral reading performance, word recognition, hand writing skills and spelling. Although failing to account for the variance attributable to teachers, his findings indicated that the Language-Experience Approach produced, in general, significantly superior results when compared with the Basal Reader Approach.

81 Russell G. Stauffer, and Hammond W. Dorsey, "The Effectiveness of Language Arts and Basic Reader Approaches to First Grade Reading Instruction - Extended Into Second Grade", The Reading Teacher, Vol. 20, May, 1967, p. 740-746.

82 Russell G. Stauffer, The First Grade Reading Studies: Findings of Individual Investigations, Newark, I.R.A., 1967, p. 1-165.

Stauffer's summary⁸³ of twenty-seven investigations undertaken at the University of Delaware, again at the primary grade level, indicated that, in beginning reading, the Language-Experience Approach produced superior results, "almost regardless of (the children's) abilities and backgrounds"⁸⁴. The investigations undertaken at the University of Delaware have been limited in areas other than being undertaken only at the primary level. As noted in the introductory paragraphs of this section, the effect of differences among reading teachers has not been taken into consideration; thus, while the internal validity of these studies may have been maximized, the external validity of these investigations may have been seriously hampered.

Although not pertaining specifically to Stauffer's theory, Strickland⁸⁵, in summarizing a series of studies of the relationship between children's language and the language used in basal reading materials, provided considerable insight into the nature of the Language-Experience

83 Ibid., p. 1-165.

84 Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. 198.

85 Ruth Strickland, "The Language of Elementary School Children: Its Relationship to the Language of Reading Textbooks and the Quality of Reading of Selected Children", Bulletin of the School of Education, Indiana University, Vol. 38, 1961, p. 1-131.

Approach. In a series of studies undertaken by herself and her students, she found that the relationship between children's language and the language of the reading materials is a reliable indicator of the success children will enjoy in their reading.

Her studies tended to support the contention that the more children's language approximated the language of the reading materials, the less difficulty the children experienced in their reading; conversely, the greater the dissimilarity between the children's spoken language and the language of the reading materials, the greater was the degree of difficulty experienced by the children in their reading.

In a very practical sense, Stauffer⁸⁶, Thorn⁸⁷ and Van Allen^{88,89}, have advocated building reading materials

86 Russell G. Stauffer, Theoretical Rationale of the Language-Experience Approach, paper presented at the meeting of the International Reading Association, Atlantic City, April, 1971, 17 p.

87 Elizabeth A. Thorn, "Language-Experience Approach to Reading", Reading Teacher, Vol. 23, No. 8, 1969, p. 3-8.

88 Roach Van Allen, Updating the Language-Experience Approach, paper presented at the International Reading Association Conference, California, May, 1970, 5 p.

89 Roach Van Allen, Language Experiences Which Promote Reading, paper presented at the Early Childhood Lecture Series, Eastern Michigan University, Michigan, September, 1969, 16 p.

on the spoken language of the child. As indicated in the previous section, it is within the context of the child's very personalized language that he is provided the wherewithal to predict, select and verify; it is within the context of his very personalized language that he is able to maximize the dual processes of assimilation and accommodation.

Because each child can predict, select and verify best within the context of his own language, particular attention appears to have been given to the effectiveness of the Language-Experience Approach with linguistically handicapped children, those identified by Bernstein⁹⁰ as being limited to a "restricted code"⁹¹. Criscuolo⁹² questioned the effectiveness of prepared instructional materials with linguistically handicapped children. Assuming that culturally disadvantaged children are doubly handicapped due to their lack of familiarity with both the language and experiences utilized in the prepared basal readers, he attempted to compare two approaches using basal

90 Basil Bernstein, "Social Structure, Language and Learning", Educational Research, Vol. 3, 1961, p. 163-176.

91 Ibid., p. 163-176.

92 Nicholas P. Criscuolo, "How Effective are Basal Readers with Culturally Disadvantaged Children?", Elementary English, Vol. XLX, March, 1968, p. 364-365.

readers. The two approaches were distinguished essentially by the degree of enrichment utilized with each, rather than by the type of material used. By providing enrichment in terms of supplying the required background information and linguistic abilities in the form of enrichment, it was found that the youngsters became more capable readers. While the results supported the researcher's predictions, the study, as in the case of other investigations reviewed in this section, was limited in terms of taking into account the role played by the reading teachers and the differences which occur among teachers in supplying the required language and experiences.

In a direction similar to that taken by Criscuolo⁹³ and Strickland⁹⁴, Adkins⁹⁵ investigated the relationship between the spoken language of third grade children whose native tongue was Spanish in an English school in El Paso with the language of the reading materials they were required to read. As with Strickland and Criscuolo, she

93 Ibid., p. 364-365.

94 Ruth Strickland, "The Language of Elementary School Children: Its Relationship to the Language of Reading Textbooks and the Quality of Reading of Selected Children", Op. Cit., p. 1-131.

95 Patricia G. Adkins, "Relevancy in Children's Language", The Reading Teacher, Vol. 24, No. 1, October, 1970, p. 7-11.

found that these children were limited in their reading abilities and attributed the difficulties to their lack of linguistic expertise and relevant experiences, a position supported in the research of Miller and Johnson⁹⁶ who found similar results with young Navajo Indians. As a result of her investigation, she concluded that these children's difficulties could be overcome by utilizing books that the children had written based on their own experiences. Although the study was undertaken at the primary level and was limited to one school, the results support Stauffer's theory that an approach to reading based on the "wealth that children bring with them - linguistically, intellectually, socially and culturally"⁹⁷, will produce superior results, "almost regardless of their abilities and backgrounds"⁹⁸.

Goodman and Buck⁹⁹ have suggested that dialects which may be peculiar to linguistically handicapped readers

96 D.D. Miller and G. Johnson, "What We've Learned About Teaching Reading to Navajo Indians", Reading Teacher, Vol. 27, March, 1974, p. 550-554.

97 Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. vi.

98 Ibid., p. 198.

99 Kenneth S. Goodman, and Catherine Buck, "Dialect Barriers to Reading Comprehension Revisited", Reading Teacher, Vol. 27, October, 1973, p. 6-12.

must be taken into account when selecting or utilizing prepared reading materials. Although they do not specifically recommend the Language-Experience Approach per se, it would appear that, implicit in their suggestions, rests the basic idea that the reading materials best suited to the wide range of dialects among children who are linguistically handicapped are those which are predicated on and derived from the children's spoken language.

The recommendations of Goodman and Buck¹⁰⁰ and the research findings of Criscuolo¹⁰¹, Strickland¹⁰² and Adkins¹⁰³ have found parallel in the conclusions reached by Lamb¹⁰⁴. In her study, she used ten inner-school teachers to investigate the relative effects of a Basal Reader and Language-Experience Approach, again with beginning readers. Two criterion variables, reading achievement

100 Ibid., p. 6-12.

101 Nicholas P. Criscuolo, "How Effective are Basal Readers with Culturally Disadvantaged Children?", Op. Cit., p. 364-365.

102 Ruth Strickland, "The Language of Elementary School Children: Its Relationship to the Language of Reading Textbooks and the Quality of Reading of Selected Children", Op. Cit., p. 364-365.

103 Patricia G. Adkins, "Relevancy in Children's Language", Op. Cit., p. 7-11.

104 Rose Lamb, The Language-Experience Approach for Teaching Beginning Reading to Culturally Disadvantaged Pupils, paper presented to the American Educational Research Association, Chicago, April, 1972, 18 p.

and attitude, and seven independent variables, sex, intelligence, reading approach, teacher experience and professional background, teaching style and time in class, were utilized in the study.

In this study, the researcher utilized two different experimental units: the child and the class. Although significant differences were found between groups when the child was used as the experimental unit, no differences could be found between groups when the class was used as the experimental unit. Using the class as the experimental unit appears to have considerable merit. First, the scores used are mean scores for the class; thus, the scores should reflect increased stability. Second, the within variance is variance among teachers rather than among children. In this respect, the teacher variable is taken into consideration and greater control is provided for classroom interactions among the children, a point which is discussed in greater detail in the following chapter.

To use the class as the experimental unit, it would appear that the researcher must increase considerably the number of classes used in the study. In Lamb's¹⁰⁵ study, using the class as the experimental unit, the cell size

105 Ibid., 18 p.

was reduced to five scores per cell. Reduction of the cell size produces problems in controlling the power of the analysis, a point discussed in considerable detail by Logan¹⁰⁶. In this latter study, it was found that utilizing the class as experimental unit was an effective measure in taking into account differences among teachers; however, as in Lamb's study, the beta error became so inflated that there existed little chance of finding true differences.

In a paper presented to the International Reading Association, Hall¹⁰⁷ reviewed research which had been undertaken in utilizing the Language-Experience Approach with culturally disadvantaged and, hence, linguistically handicapped children. Her assessment of current and past research into the efficacy of the Language-Experience Approach with linguistically handicapped children has served to corroborate the evaluation of research which introduced this section.

106 Bayne Logan, A Study of the Possible Distinction Between Developmental and Acquisitional Processes in the Attainment of Higher Order Reading Skills - A Univariate Analysis, unpublished Masters thesis, University of Ottawa, Ottawa, 1972, p. 74-97.

107 Mary Anne Hall, The Language-Experience Approach for the Culturally Disadvantaged, International Reading Association, Newark, 1972, 40 p.

To review that evaluation and to suggest avenues by which the research might be improved, it would appear, first, that any extension of Stauffer's theory might well take place at a grade level other than the primary level. Because of the sequence of grade levels, it would seem appropriate that an investigation of Stauffer's theory might take place most profitably at the junior grade level, grades four to six. Second, it would seem reasonable that, since many of the studies which do extend beyond the primary grade level pertain to linguistically handicapped children, any extension to the junior grade level might best be undertaken with children who are not generally designated as linguistically handicapped. As a final consideration, it would appear appropriate to utilize the class as the experimental unit thereby controlling for interactions among children and taking into account that variance which may be attributable to individual differences among teachers.

Investigations into the effectiveness of the Language-Experience Approach with linguistically handicapped children appear to find their origins in two aspects of psycholinguistic theory: familiarity with semantic features and syntactic complexity of the printed and spoken language. In the previous section of this chapter, it was indicated that a close relationship may exist between psycholinguistic

theory and Stauffer's rationale for the Language-Experience Approach. In this part of the review, an overview is presented of those investigations into the nature of psycholinguistics which are concerned most directly with the Language-Experience Approach.

Prominent among those who have commented on the value of psycholinguistic research in the teaching of reading has been Lutz¹⁰⁸. He has maintained that a reading programme should be predicated on the linguistic structures both semantic and syntactic, with which the child is already familiar. Although he has not advocated the Language-Experience Approach per se, he has contended that the research into the nature of psycholinguistic theory has supported the belief that lack of familiarity with newly-encountered linguistic structures may constitute a major impediment in a child's learning to read.

Velluntino, Pruzet and Stager¹⁰⁹ have demonstrated that familiarity with linguistic structures bears considerably more effect on reading ability than does visual

108 John Lutz, "Some Comments on Psycholinguistic Research in Education", The Reading Teacher, Vol. 28, October, 1974, p. 36-39.

109 Frank R. Velluntino, Robert W. Pruzet, and Joseph Stager, "Immediate Visual Recall in Poor and Normal Readers as a Function of Orthographic-Linguistic Familiarity", Cortex, Vol. 9, December, 1973, p. 370-386.

perception. Svedman¹¹⁰ has defined one aspect of this familiarity as "semantic sensitivity"¹¹¹. Using only four heterogeneous classes of sixth grade children, she has developed the Semantic Sensitivity Test¹¹², an inventory to diagnose children's understanding of the effect of context on the changing meaning of a word. Although, as noted earlier, her sample was limited to four classes, she has found that children are most sensitive to those semantic contexts which most closely parallel their own personalized spoken language.

Relating the semantic element of reading to memory, Dapolito, Barker and Wiant¹¹³ found that long-term memory was utilized much more readily when the reader could relate the contextual structure of the reading materials with structures most familiar to him. In other words, the reader, if he is able to relate the semantic elements of his reading materials to semantic forms most familiar to him, specifically his spoken language, will experience fewest difficulties in reading.

110 Shirley Svedman, "Semantic Sensitivity and Reading Achievement", Reading Teacher, Vol. 23, 1970, p. 640-646.

111 Ibid., p. 640-646.

112 Ibid., p. 640-646.

113 Frank Dapolito, Douglas Barker, and Joseph Wiant, "Context in Semantic Information Retrieval", Psychonomic Science, Vol. 24, No. 4, 1971, p. 180-182.

Investigations dealing with familiarity with surface structure of language, or with syntax, have been undertaken which appear to bear considerable relationship to language-experiences. Clark and Begun¹¹⁴ demonstrated the hierarchy of complexity which usually occurs in a child's understanding of the printed language. This hierarchy of complexity has been found by Chomsky¹¹⁵ to parallel the evolving complexity of the child's spoken language. In this latter study, conducted with thirty-six children, it was found that while the written language may influence the evolution of a child's spoken language, there must be an optimal degree of comparison between the spoken and printed language in order for effective reading to occur. As the child matures, and as his social interactions increase in complexity and scope, his awareness and knowledge of syntactic patterns increase.

Explicit in Chomsky's study is the notion that a child's knowledge of syntax is developmental in nature, developing in relation to the individual's experiences,

114 Herbert H. Clark, and Jeffrey S. Begun, "The Use of Syntax in Understanding Sentences", in British Journal of Psychology, Vol. LIX, No. 3, 1968, p. 219-229.

115 Carol Chomsky, "Stages in Language Development and Reading Exposure", in Harvard Educational Review, Vol. 42, No. 1, February, 1972, p. 1-33.

social interactions and evolving cognitive structures. Implicit is the notion that older children have more highly sophisticated schema, hence greater facility in accommodating and assimilating, greater facility in the predicting-selecting-verifying process.

Salzinger, et al¹¹⁶, studying children three through six years of age, found evidence to support Chomsky's contention of the importance of the role played by developing cognitive structures in a child's facility with increasingly more complex syntactic structures. Translated into the context of Smith's¹¹⁷ theory, the reader's "non-visual information"¹¹⁸, specifically his evolving knowledge of language and of reading, appears to play an extremely important role in acquiring facility in the predicting-selecting-verifying sequence.

Incompatibility of a child's existing syntactic-semantic structures and the syntactic-semantic complexity of the reading materials frequently gives rise to what

116 Suzanne Salzinger, Kurt Salzinger, and Sally Hobson, "Memory for Verbal Sequences as a Function of Their Syntactical Structure and the Age of the Recalling Child", Journal of Psychology, Vol. LXIV, September, 1966, p. 79-90.

117 Frank Smith, Psycholinguistics and Reading, Op. Cit., p. 6.

118 Ibid., p. 6.

Goodman^{119,120} has defined as "miscues"¹²¹. Compatibility between syntactic-semantic structures of the reader and syntactic-semantic complexity of reading materials, on the other hand, leads to reading becoming what Goodman has defined as "a psycholinguistic guessing game"¹²².

Using the Reading Miscue Inventory¹²³ as developed by Goodman¹²⁴, Vorhaus¹²⁵ investigated the nature of miscue responses of twenty first grade children. Although her study was limited to the primary grades and was limited to a very small sample of twenty children, she found that miscues are not of significant importance when they occur in a syntactic and semantic context which is

119 Kenneth S. Goodman, "Analysis of Oral Reading Miscues: Applied Psycholinguistics", Reading Research Quarterly, Vol. 1, 1969, p. 9-30.

120 Kenneth S. Goodman, "A Linguistic Study of Cues and Miscues in Reading", Elementary English, Vol. 42, 1965, p. 639-643.

121 Ibid., p. 639-643.

122 Kenneth S. Goodman, "Reading: A Psycholinguistic Guessing Game", Op. Cit., 17 p.

123 Yeta Goodman, and Carolyn Burke, Reading Miscue Inventory, New York, MacMillan, 1973, p.1-124.

124 Ibid., p.1-124.

125 Renee Pool Vorhaus, Analysis and Comparison of Oral Miscues Generated by First Grade Students on Four Different Reading Tasks, Ed.D. dissertation, University of Pennsylvania, 1976, 144 p.

familiar to the child. Expressed in terms of Chomsky¹²⁶, only the surface structure was altered; the deep structure remained intact. In short, the meaning of the passage remained unaltered by the miscues made by the children.

Burke and Goodman¹²⁷, in an analysis of one boy's reading miscues, concluded that miscues did not alter the deep structure of the passage being read; rather, the substitutions which accounted for sixty to one hundred percent of the miscues represented the child's attempts to reconstruct the surface structure in a form more familiar to him.

These conclusions have been supported by Beebe¹²⁸ who extended the theoretical position of Carroll¹²⁹ in an effort to examine the relationship of Carroll's work to

126 Noam Chomsky, Syntactic Structures, The Hague, Mouton, 1957, 286 p.

127 Carolyn Burke, and Kenneth S. Goodman, "When A Child Reads: A Psycholinguistic Analysis", Elementary English, Vol. 47, No. 1, January, 1970, p. 121-219.

128 Mona J. Beebe, "Case Studies of Grade-Level Effects on Children's Miscues and Reading Comprehension", Canadian Journal of Education, Vol. 1, No. 2, 1976, p. 51-62.

129 J.B. Carroll, "The Nature of the Reading Process", in Harry S. Slinger and Robert B. Ruddell, eds., Theoretical Models and Processes of Reading, Newark, International Reading Association, 1970, 162 p.

that of Goodman¹³⁰. Although the study was limited to only four children and failed to take into account the effect of individual teachers, Beebe found evidence to support her conclusion that,

The material that children read must be meaningful or understandable to them within the language and the concrete and vicarious experiences that they bring to the reading situation.¹³¹

Shapiro¹³² et al, have found evidence to support the contention that once children are provided materials which are "meaningful or understandable to them within the language and the concrete and vicarious experiences that they bring to the reading situation"¹³³, they become what Goodman has defined as "educated guessers"¹³⁴. Although the study was conducted with only twenty-three fourth grade children and therefore failed to take into account individual differences among teachers and the effects of

130 Kenneth S. Goodman, "Reading: A Psycholinguistic Guessing Game", Op. Cit., 17 p.

131 Mona Beebe, "Case Studies of Grade-Level Effects on Children's Miscues and Reading Comprehension", Op. Cit., p. 60.

132 Lewis Shapiro, Nicholas Anastasiow, and Denis Hoban, "The Mature Reader as an Educated Guesser", Elementary English, Vol. 49, No. 3, 1972, p. 418-421.

133 Ibid., p. 418-421.

134 Kenneth S. Goodman, "Reading: A Psycholinguistic Guessing Game", Op. Cit., 17 p.

evolving intellectual abilities, evidence persisted that familiarity with syntactic and semantic elements plays a significant role in the degree to which an individual is able to enter into the predicting-selecting-verifying process.

To summarize the contribution made by the studies related to psycholinguistics, it would appear that familiarity with syntactic and semantic elements of the reading materials is a key factor in a child's evolving expertise in the predicting-selecting-verifying sequence. If a child is unfamiliar with these elements, miscuing is likely to occur; if, on the other hand, he is familiar with these elements, he is more likely to become an educated guesser, a reader proficient in the predicting-selecting-verifying sequence.

From the vantage point of research design, the investigations pertaining to psycholinguistics, as in the case of the studies investigating the nature of the Language-Experience Approach, have suggested avenues by which the research might be improved. First, since the majority of investigations relating to psycholinguistics have been undertaken at the primary level, it would seem reasonable to conclude that any extension of these studies might be profitably undertaken at the junior grade level. Second, it would appear reasonable that an extension of

these studies might be undertaken with children who are not considered to be linguistically handicapped. Third, it would appear appropriate that, to account for variance attributable to differences among teachers and to control for personological interactions among the children in each classroom, the class be considered as the experimental unit.

Comparisons of the Language-Experience and Prepared Instructional Materials Approaches, particularly where evolving intellectual abilities are involved, necessitate careful consideration of at least two forms of common foundation or base on which to predicate such comparison. The first has to do with the selection of an appropriate research instrument, a procedure which is described in some detail in the following chapter. The second has to do with arriving at common procedures where differential effects occur, effects which may be created by the questions developed by the publishers and authors of prepared instructional materials.

In the studies reviewed in this section of the chapter, the researchers carefully avoided any contaminating procedural effects which might have resulted from accompanying questions used in prepared instructional materials, since such questions usually reflect adult expectations of what a child should do, or should be able to do, at

different grade levels. Stauffer, in his Directed-Reading-Thinking-Activities¹³⁵ appears to have provided a common procedural basis from which comparisons might be drawn between the Language-Experience and Prepared Instructional Materials Approaches.

As outlined in the first chapter of this study, Directed-Reading-Thinking-Activities involve components which parallel closely the predicting-selecting-verifying process. That which distinguishes between Directed-Reading-Thinking-Activities and questions prepared by the authors of prepared instructional materials is that the Directed-Reading-Thinking-Activities are derived from the child's personalized experiences. It is on his personalized experiences that the child predicates his predictions, that he selects from the reading materials evidence to support his predictions and that he verifies that which was predicted with that which was found. In this segment of the study, a review of the empirical investigations of the Directed-Reading-Thinking-Activities is presented.

135 Russell G. Stauffer, Teaching Reading As A Thinking Process, Op. Cit., p. 24-35.

Anderson¹³⁶, investigating the effect upon quantity, quality and variety of responses among children in the primary level using Directed-Reading-Thinking-Activities, found that differential increments were evident in all aspects of quality, quantity and variety of responses when compared to a more traditional approach to the teaching of reading. It was proposed by the researcher that such Directed-Reading-Thinking-Activities could be easily adapted to older children and that it could be likely that gains could be expected in all three areas with older children, due to their more sophisticated reasoning processes.

The results of this investigation tended to corroborate and to extend the findings of Petre's¹³⁷ study. In this latter study, where two groups of fourth graders constituted the sample, it was found that Directed-Reading-Thinking Activities assisted children in the predicting-

136 William W. Anderson, Study of the Effects of Self-Directed Activity Upon Quantity, Quality and Variety of Responses in a Group Directed Reading Thinking Activity, unpublished doctoral dissertation, University of Virginia, 1971, 204 p.

137 Richard M. Petre, Quantity, Quality and Variety of Pupil Responses During an Open-Communication Structured Group Directed Reading Thinking Activity and a Closed-Communication Structured Group Directed Reading Activity, unpublished doctoral dissertation, University of Delaware, 1970, 131 p.

selecting-verifying process. As in the Anderson study¹³⁸, Petre's interest centered on the differences between a Directed-Reading-Activity and a Directed-Reading-Thinking-Activity, the latter ostensibly involving the predicting-selecting-verifying process which, in turn, encompasses the processes of examining, hypothesizing, proving, judging, and making decisions about the materials being read.

In both the Anderson¹³⁹ and Petre¹⁴⁰ studies, it was shown that Directed-Reading-Thinking-Activities can be utilized with both language experiences and prepared instructional materials, thereby providing a valid basis for comparison of the two approaches. Utilization of these Directed-Reading-Thinking-Activities would indicate that the comparisons being made would be in terms of the nature of the materials being read rather than the type of questions being asked. Evident in these two studies, however, are two important implications for extending investigations of the Language-Experience Approach to the junior grade level, particularly where Directed-Reading-Thinking-Activities are used. The first implication is

138 William W. Anderson, Op. Cit., p. 204 p.

139 Ibid., p. 204 p.

140 Richard M. Petre, Op. Cit., 131 p.

that Directed-Reading-Thinking-Activities lead naturally to increased intercommunications or personalized interactions. The second implication is that, where Directed-Reading-Thinking-Activities are used, individual differences become increasingly more pronounced, especially among older children.

The first implication, that of increased personalized interactions, poses a problem when the child is regarded as the experimental unit in that scores may no longer represent discrete entities; rather, differential effects may be due to not only the treatment but also the interpersonal interactions. To control for such interactions, shifting the experimental unit to the class, as in the study undertaken by Lamb¹⁴¹, has proven to be a successful technique.

The second implication, that of increasingly more pronounced individual differences, particularly among older children, poses a particular problem when extending an investigation of the Language-Experience Approach to the junior grade level. In spite of the fact that the class is used as the experimental unit, it is still necessary to ensure that groups, characterized by their age, be mutually exclusive. Since only three grade levels exist at the

141 Rose Lamb, Op. Cit., 18 p.

junior grade level, this implication suggests that selection of subjects from this grade level be done so from the extremes of grades, specifically from grades four and six. Selection of subjects from these extremes of grade levels serves a second purpose, that of providing an optimal age differentiation which should permit the finding of differences attributable to age should true differences exist.

As an extension of the Petre¹⁴² study, Davidson¹⁴³ investigated the effects upon teachers' questioning techniques and upon the nature of responses of fourth grade children which might be attributable to Directed-Reading-Thinking-Activities. Although she found significant differences in these two variables to exist between Directed-Reading-Activities and Directed-Reading-Thinking-Activities, her study appears to have been weakened by her research procedures. Using only nine teachers and ninety children where only two lessons were taught, her study appears to have been weakened, first, by a very small

142 Richard M. Petre, Op. Cit., 131 p.

143 Jane L. Davidson, The Quantity, Quality and Variety of Teachers' Questions and Pupils' Responses During an Open-Communication Structured Group Directed Reading Thinking Activity and a Closed-Communication Structured Group Directed Reading Activity, unpublished doctoral dissertation, University of Michigan, 1970, 121 p.

sample size and, second, by a very short period of time in which to make comparisons. One would have expected that, where teacher effects were being taken into consideration, more teachers would have been utilized in the study. Second, it would have been expected that a greater period of time would have been required to determine whether or not the differences found would have been sustained. On the basis of two lessons only, one would question the role of novelty in producing significant differences, particularly when no effort was made to determine the effect of individual differences among the teachers.

Henderson¹⁴⁴, in an earlier study designed to investigate the nature of Directed-Reading-Thinking-Activities, found that the predicting aspect of the predicting-selecting-verifying process is a valid indicator of reading comprehension, thereby supporting the notion that reading comprehension is predicated on that which the reader brings to the reading encounter. In this study, support was found for the claim that the predicting-selecting-verifying process can be taught and, therefore, warrants increased attention in the teaching of reading.

144 Edmund H. Henderson, A Study of Individually Formulated Purposes for Reading in Relation to Reading Achievement Comprehension and Purpose Attainment, unpublished doctoral dissertation, University of Delaware, 1963, 155 p.

Of fundamental importance in this particular study was the selection of the Sequential Tests of Educational Progress: Reading¹⁴⁵ as an appropriate instrument in determining levels of reading comprehension. In selecting this particular instrument, it was indicated that this reading test was most compatible with the abilities being developed through the Directed-Reading-Thinking-Activities. Thus, in the Henderson¹⁴⁶ study is found the second aspect of the common base for comparison between the Language-Experience and Prepared Instructional Materials Approaches: the research instrument, in this case, the Sequential Tests of Educational Progress¹⁴⁷. In the subsequent chapter, a more detailed description of the appropriateness of this instrument is presented.

To summarize the studies pertaining to the Directed-Reading-Thinking-Activities, it was noted at the outset of this part of the review that comparisons between the Language-Experience and Prepared Instructional Materials Approaches, particularly where evolving intellectual

145 Scarvia B. Anderson, Sequential Tests of Educational Progress, Co-operative Test Division, Educational Testing Service, Princeton, N.J., 1959, p. 1-86.

146 Edmund H. Henderson, Op. Cit., 155 p.

147 Scarvia B. Anderson, Op. Cit., p. 1-86.

abilities are concerned, necessitate careful consideration of at least two forms of common foundation or base on which to predicate such comparison: the selection of an appropriate research instrument and the utilization of common procedures with both groups.

Providing for common procedures was directed mainly at controlling for the possible contaminating effects of using the questions provided by the authors and publishers of the prepared instructional materials. It was suggested that Stauffer's Directed-Reading-Thinking-Activities might provide this common procedural base or foundation on which comparisons might be based. This suggestion, in turn, was predicated on the awareness that these activities are derived from the child's personalized experiences and awareness.

A review of the research pertaining to these activities suggested that, not only do these activities exert considerable impact on the quantity, quality and variety of both teachers' and children's questions and responses, but also they may be utilized with either language experiences or prepared instructional materials. Directed-Reading-Thinking-Activities, therefore, would appear to constitute a valid procedural basis, if the class is considered as the experimental unit, for comparing

the Language-Experience and Prepared Instructional Materials Approaches with both younger and older children. Because Directed-Reading-Thinking-Activities tend to amplify individual differences, it was suggested that younger and older children be designated specifically as fourth and sixth grade children at the junior grade level. As a direct outgrowth of the examination of Directed-Reading-Thinking-Activities, it was found that the Sequential Tests of Educational Progress: Reading might well constitute the most appropriate research instrument because of its apparent compatibility with Stauffer's concept of reading and with the Directed-Reading-Thinking-Activities.

4. Summary, Problem and Research Hypotheses

This chapter has consisted of four sections. In the first section of the chapter, those aspects of Piaget's cognitive and developmental theory which pertain most closely to Stauffer's theory were presented. The second section consisted of an overview of other theories in reading which express points of view similar to those of Stauffer. The results of empirical studies designed to investigate aspects of Stauffer's theory were presented in the third section. In this, the fourth and final section of the chapter, a summary and statement of the problem and research hypotheses are presented.

In the first section of the chapter, those aspects of Piaget's theory which deal most directly with Stauffer's theory, as it was outlined in the first chapter, were presented. The section began with a consideration of the role of experience in the learning process as it is perceived by Piaget. Following this consideration of the role of experience, the maturational or developmental aspects of Piaget's theory was outlined.

The review of Piaget's work indicated that his cognitive theory pertains to human adaptation, to the interaction between an individual and his environment. Human interaction, it was found, consists of two complementary processes: assimilation and accommodation. Through these processes, experience becomes a part of the individual's cognitive structure, part of his intellectual apparatus. To Stauffer, reading appears to be a means of adaptation. Assimilation and accommodation are as necessary to reading as they are to any other encounter with new experience. Because both processes are predicated on experience and because both processes are common to the reading act, it would appear that the most effective approach to reading would be one based on the highly individualized experiences of the children.

Piaget's stage theory, his concept of an evolving "intelligence-in-action", has been reflected by Stauffer

who has recognized the influence of evolving cognitive development on the reading process. In recognizing this developmental influence, he has concluded that cognitive development in the form of intellectual development, greater linguistic fluency and increased social interaction will have a profound influence on changes in reading ability. It is this evolution in cognitive development which is reflected in the child's progression from "thought that is predominantly perceptual and intuitive to thought that is conceptual and logical"¹⁴⁸, to reading which "embraces all types of thinking, evaluating, judging, imagining, reasoning and problem-solving"¹⁴⁹.

The second section began with a review of three basic ideas: a child reads in terms of what he already knows; that which a child already knows permits him to predict, to select and to verify; and, that which a child already knows is subject to developmental stages. It was found that these ideas are not peculiar only to Stauffer's theory. In the section, related theories of reading, approaches which served to extend and to exemplify that proposed by Stauffer, were presented. Divided into two

¹⁴⁸ Russell G. Stauffer, Teaching Reading As A Thinking Process, Op. Cit., p. 9.

¹⁴⁹ Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. 14.

parts, the first part of the section consisted of the ideas of Jacobs, Bormuth, Huey and Kolers; in the second part, an overview of the theories of Dechant, Smith and Goodman, three theorists whose work parallels Stauffer's was presented.

Common to the theories presented in the second half of the section, lies the notion that higher order reading abilities are acquired more readily when the process is made easier. Stauffer has proposed that the reading process is made easier through the Language-Experience Approach, an approach which takes "advantage of the wealth that children bring with them to school - linguistically, intellectually, socially"¹⁵⁰. Translated into Piagetian terms, children make use of this wealth as a foundation for the combined processes of assimilation and accommodation. Again, in Piagetian terms, these reciprocal processes are evolutionary in nature, developing in accord with the child's evolving intelligence, linguistic abilities and social interactions.

The psycholinguists, specifically Smith and Goodman, in apparent agreement with Stauffer, have suggested that the reading process is made easier when materials are

¹⁵⁰ Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. vi.

used which "interfere the least with natural language functioning"¹⁵¹, materials rich in deep structure, materials to which each reader can relate his non-visual information and expressed in linguistic forms which reflect the unique language usage of each reader. Theoretically, these reading materials would appear to be those supplied by each child, the language experiences of the child. It is within the context of these materials that the child's evolving intellectual abilities, his developing concepts and category organization, should be reflected and facilitated.

These theoretical positions would suggest that, given the same reading test or common base, children of two different age groups, exposed to two distinct approaches, should demonstrate measurably different reading abilities. Older children should more readily acquire higher order reading abilities than younger children, given a comparable period of time, since evolving intellectual abilities are largely responsible for a child's progression from "thought that is predominantly perceptual and intuitive to thought that is conceptual and logical"¹⁵², to reading which

151 Frank Smith and Kenneth Goodman, "On the Psycholinguistic Method", Op. Cit., p. 178.

152 Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. 14.

"embraces all types of thinking, evaluating, judging, imagining, reasoning and problem solving"¹⁵³. Children exposed to a Language-Experience Approach should also more readily acquire higher order reading abilities than their counterparts exposed to an approach based on prepared instructional materials, "almost regardless of their abilities and backgrounds"¹⁵⁴. Given these two theoretical positions, it would be expected that, because of evolving intellectual abilities and because the Language-Experience Approach is predicated on these evolving intellectual abilities, an interaction would occur between approach and age; that is, it is anticipated that the Language-Experience Approach would exert a greater effect on older children than on younger children.

In the third section, an overview was presented of studies which have been undertaken to investigate aspects of Stauffer's theory. The overview was presented in three parts. A review of studies dealing specifically with the Language-Experience Approach constituted the first part. In the second part, a review of investigations more pertinent to psycholinguistics but having direct implications

153 Arthur Gates, Op. Cit., p. 9.

154 Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. vi.

for the Language-Experience Approach was presented. The third part consisted of a review of empirical investigations related to the Directed-Reading-Thinking-Activities.

The overview of the empirical studies designed to investigate Stauffer's theory revealed five major features. First, while there appeared to be an endless number of articles pertaining to the practical classroom virtues of the Language-Experience Approach, there were surprisingly few actual empirical investigations of Stauffer's theory. Second, the majority of studies was undertaken at the primary level, specifically in the area of beginning reading, despite the position that the Language-Experience Approach may be more effective with older children than with younger children. Third, the research conducted beyond the primary level was directed largely toward those children considered to be linguistically handicapped. Fourth, empirical investigations of Stauffer's theory were found to have not taken into account the effect of the teacher, an important variable introduced by the psycholinguists¹⁵⁵. Fifth and last, it was found that common to the research undertaken to investigate the Language-Experience Approach, there appeared to be difficulty in

155 Frank Smith and Kenneth Goodman, "On the Psycholinguistic Method", Op. Cit., p. 80.

finding a common base or denominator on which to compare approaches to reading.

The review of studies pertaining to psycholinguistics supported the contention that familiarity with syntactic and semantic elements of the reading materials is a key factor in a child's evolving expertise in the predicting-selecting-verifying process. It was found that, if a child is unfamiliar with these elements, miscuing is likely to occur; conversely, if the child is familiar with these elements, the more likely he is to become an educated guesser, a reader proficient in the predicting-selecting-verifying process.

From the vantage point of research design, the investigations pertaining to the nature of the language experiences and those directed toward an investigation of the psycholinguistic process indicated several means by which the research might be improved. First, it was suggested that any extension of Stauffer's theory might occur at the junior grade level, since all studies appear to have been undertaken at the primary level. Theoretically, the children's evolving intellectual abilities should make the Language-Experience Approach increasingly more operative, particularly in view of the fact that the approach is predicated on these evolving intellectual abilities. Second, it was suggested that, because the

studies which have been extended to the junior grade level pertain to linguistically handicapped children, any extension to the junior grade level should be undertaken with children who are not generally designated as being linguistically handicapped. Finally, it was suggested that the class be considered as the experimental unit thereby controlling for interactions among children, which appear to become particularly pronounced when Directed-Reading-Thinking-Activities are involved, and taking into account that variance which may be attributable to individual differences among teachers.

A review of the research pertaining to Directed-Reading-Thinking-Activities suggested that not only do these activities exert considerable impact on the quantity, quality and variety of both teachers' and children's responses and questions, but also they may be utilized with either language experiences or prepared instructional materials. It was found, therefore, that these activities would appear to constitute a valid procedural basis, if the class is regarded as the experimental unit, for comparing the Language-Experience and Prepared Instructional Materials Approaches where both younger and older children are included; moreover, it was suggested that the Sequential Tests of Educational Progress: Reading would

constitute a research instrument most compatible with Stauffer's concept of reading and with the Directed-Reading-Thinking-Activities.

In view of the theoretical predictions presented in the first chapter and in the light of the review of related literature presented in this chapter, the following research problem is presented: If one controls for personological interactions and accounts for variance attributable to individual differences among teachers, what are the relative effects of evolving intellectual abilities, as determined by the grade level of the subjects, and approaches to reading used by the teacher on the acquisition of higher order reading abilities at the junior grade level?

In the light of the stated research problem, the following hypotheses will be investigated:

1. There is a significant difference in the acquisition of higher order reading abilities between older (grade 6) and younger (grade 4) subjects at the junior grade level.
2. There is a significant difference in the acquisition of higher order reading abilities between two different approaches to the teaching of reading at the junior grade level.
3. There is a significant interaction between age or evolving intellectual abilities of subjects and instructional approaches to reading at the junior grade level in the acquisition of higher order reading abilities.

CHAPTER III

EXPERIMENTAL DESIGN

In this chapter, the procedures involved in conducting the experiment are presented. The development of the theoretical rationale and subsequent review of related literature posed three problems, the solutions of which are outlined in this chapter. In the first section, the research instruments, The Sequential Tests of Educational Progress Series I¹, are described, including the problem of selecting an instrument most compatible with the definition of reading presented at the outset of the experiment while not detracting from the concept of reading held by each of the theorists presented. The second problem, presented in the second section, had to do with the selection of an appropriate design. It would seem that, because teachers are seldom, if ever, randomly assigned, in practice, to a particular approach, a quasi-experimental design would have provided for optimal external validity. In this experiment, however, it was decided that, to maximize the internal validity, teachers would be randomly assigned to each approach, thereby attempting to control for teacher effect. The third problem encountered was concerned with that of controlling for interactions within the classroom, since

1 Scarvia B. Anderson, Op. Cit., p. 1-86.

classes remained intact throughout the duration of the study. To overcome this latter problem, it was decided to alter the experimental unit, a procedure which is described in greater detail later in the chapter. To conclude the chapter, a brief explanation of the resulting organization of the data and an outline of the statistical operations are presented.

1. The Research Instruments

To test the hypotheses, presented in the previous chapter, two research instruments were selected, The Sequential Tests of Educational Progress (STEP) Series I: Reading, Levels 4A and 4B². In this section, the test is reviewed. The review includes an investigation of the appropriateness of the instrument relative to the selected definition of reading, the nature of the instrument itself, a consideration of the validity of the test, and, finally, an outline of the reviews describing the reliability of the instrument including both alternate form reliability and the measures of internal consistency.

a) The Sequential Tests of Educational Progress Series I (STEP): Reading, Levels 4A and 4B:

In chapter I, reading was defined as

² Ibid., p. 1-86.

...not a simple mechanical skill; nor is it a narrow scholastic tool. Properly cultivated, it is essentially a thoughtful process. However, to say that reading is a "thought-getting" process is to give it too restricted a description. It should be developed as a complex organization of patterns of higher mental processes. It can and should embrace all types of thinking, evaluating, judging, imagining, reasoning and problem-solving.³

Recognizing that the instruments might not totally reflect the concept of reading espoused by the psycholinguists, it was determined, nonetheless, that, of the available standardized measures, these instruments were most in keeping with Gates' definition, particularly in view of the precedent established by Henderson⁴. Thus, it was decided to use these particular instruments as the criterion measure.

STEP Reading, Level 4, is purported, by the test publishers, to measure five major categories of comprehension, basic abilities and attitudes: a) ability to recall ideas b) ability to translate ideas and make inferences (reason) c) ability to analyze motivation d) ability to analyze presentation (evaluate) and e) ability to criticize constructively (judge), abilities which parallel closely those cognitive operations outlined in the definition of reading.

3 Arthur Gates, Op. Cit., p. 9.

4 Edmund H. Henderson, Op. Cit., 155 p.

Though not always sequentially grouped, the seventy items in each of the alternate forms are designed to investigate the reader's ability to cope with mood, intent and tone. Apparently rejecting the concept of reading as being accurate word-by-word reproduction of printed symbols, the test publishers appear to have been more interested in assessing the reader's ability to relate prior experiences to the deep structure of the materials being read; thus, the items are designed to measure the reader's ability to visualize, to recognize the sequence and relevance of ideas, to draw conclusions and to interpret idiomatic and figurative expressions, again abilities which represent those cognitive operations which are of a higher order.

Although the seventy items in each of the alternate forms yield both a raw score and a converted score, a decision was made to use only the raw scores. This decision was based on three considerations. First, while the converted scores make it possible to refer to standardized percentile bands for each grade level, no such reference was required in this study; the study centered only on an analysis of differential increments in reading ability. Second, all subjects were administered the same tests, thereby negating the need for converted scores or percentile bands. Third, since the latest available

statistical data⁵ concerning the alternate forms of the test were based on the raw scores, it appeared appropriate to use only these latter scores. Thus, based on three distinct considerations, it was decided to use only the available raw scores.

In reviewing earlier reports of the statistical data compiled on the STEP Reading test, it was found that Lohnes⁶ had criticized the content validity of the instrument by pointing out the lack of evidence regarding the factorial composition of the test. Anastasi, conversely, has written,

The development of STEP represents content validation at its best. Committees of outstanding educators, representing all levels from the elementary school to college and chosen in consultation with national professional organizations, participated with ETS test construction specialists both in drawing up the test specifications and in preparing and reviewing items. Statistical analyses of preliminary forms included the usual determination of difficulty, discriminative power and grade progress for individual items.⁷

Based on the rating of a group of authorities in the area of reading and test construction, it may be

5 Bayne Logan, On Children's Mathematics, Ottawa, University of Ottawa, 1975, p. 52.

6 Paul R. Lohnes, "STEP: Reading: A Review", in O.K. Buros, ed., The Sixth Mental Measurements Yearbook, Highland Park, N.J., Gryphon Press, 1961, p. 810-811.

7 Anne Anastasi, Psychological Testing, 3rd edition, London, Macmillan, 1968, p. 400.

assumed then that the tests do, in fact, measure that which they have been purported to measure.

Although the Centre For The Study of Evaluation⁸ has, on a ten-point scale, rated the content and construct validity of the STEP Reading test at 8 and has gone to considerable length to compliment the factorial composition of the test, neither the Centre⁹ nor the test publishers has provided specific reliability coefficients for Level 4 of the reading test. In his review of the tests, Lohnes¹⁰, however, has indicated that, "the correlations between tests average about .80"; Logan has provided even more specific correlations between tests in reporting a coefficient of .84 between the alternate forms for Level 4¹¹. Anastasi has reported the internal consistency of tests in the following manner, "Kuder-Richardson reliabilities of each of the six tests within single-grade groups cluster in the upper .80's and low .90's"¹².

8 Ralph Hoepfner, ed., CSE Elementary School Test Evaluations, Centre For The Study of Evaluation, UCLA Graduate School of Education, Los Angeles, California, 1970, p. 69.

9 Ibid., p. 69, 98.

10 Paul R. Lohnes, Op. Cit., p. 810-811.

11 Bayne Logan, Op. Cit., p. 52.

12 Anne Anastasi, Psychological Testing, 3rd edition, London, Macmillan, 1968, p. 400.

To summarize, two research instruments were selected to test the hypotheses stated in the previous chapter: The Sequential Tests of Educational Progress (STEP), Reading, Series I, Levels 4A and 4B. The tests were selected to provide a criterion measure of gains made in reading ability, particularly the higher order cognitive skills of reading. It was found that, despite the criticisms levelled by Lohnes¹³, both Anastasi¹⁴ and The Centre For The Study Of Evaluation had rated the tests higher in terms of validation; moreover, it was determined that interform reliability coefficients ranged in the mid .80's and that the reliability coefficients of internal consistency for each of the six subtests, based on the Kuder-Richardson Formula 20, cluster in the upper .80's and low .90's.

2. Research Methods

In this section is included a discussion of the procedures by which the subjects were selected, a brief description of the treatment used with the subjects, and an explanation of the experimental unit employed in the study.

a) Selection Procedures: Forty grades 4 and 6 teachers, representing both male and female teachers, and their classes were randomly selected by sex from a total

13 Paul R. Lohnes, Op. Cit., p. 810-811.

14 Anne Anastasi, Op. Cit., p. 400.

possible population of 276 grades 4 and 6 teachers employed on a full time basis in a large educational system encompassing schools serving both urban and suburban populations.

b) Treatment: During the late winter of 1971-1972, the teachers, accompanied by colleagues participating in two related studies, including colleagues from a neighbouring educational system, took part in an in-service programme in reading. As part of the programme, the teachers were introduced to novel approaches and techniques in the teaching/learning process in reading, and were exposed to an intensive study of higher order reading competencies, particularly those associated with inferential, creative, evaluative, and critical thinking. As an integral part of the programme, all participants were given extensive preparation in undertaking both individual and group Directed-Reading-Thinking Activities as described by Stauffer^{15,16}.

At the beginning of February, the 40 teachers were randomly assigned to one of two approaches. In the first approach, using published instructional materials (PIM), teachers used both group and individual Directed-Reading-Thinking-Activities rather than the questions provided by the publishers and authors.

15 Russell G. Stauffer, The Language-Experience Approach to the Teaching of Reading, Op. Cit., p. 132-175.

16 Russell G. Stauffer, Teaching Reading As A Thinking Process, Op. Cit., p. 24-35.

TABLE I

Sample of Teachers Teaching Grades 4 and 6

		Sex	Number selected	Possible population (each sex)	Total population (male and female)
Grade 4	Male		10	50	144
	Female		10	94	
Grade 6	Male		10	62	132
	Female		<u>10</u>	70	
TOTAL:			40		276

To avoid using materials published by one particular publisher or author, no "class sets" of materials were used. Each teacher made use of partial sets, usually numbering five at most, of a wide range of published reading materials. This range of materials included basal readers, novels, and short stories. In each class, only those instructional materials approved by the Ontario Ministry of Education were utilized. From these approved materials, principals were afforded the freedom to select instructional materials most likely to be compatible with the reading needs of the children. Thus the materials selected tended to represent instructional materials in vogue at the time of the data collection. Since each of the forty classes contained a wide spectrum of reading abilities, as evidenced in the individual scores of the children, the range of printed materials provided was considered by each teacher to be appropriate to the needs of each child. Thus, in summary, each class involved in the first approach was provided with a wide range of reading materials, a wide range in terms of publishers, authors, and grade levels; the common denominator consisted of prepared instructional materials, materials other than the recorded language of the children.

In the first approach, all creative writing was discontinued in the language or reading programme for the duration of the experiment, that is, during the months of

February to May inclusive. Time normally allocated to creative writing was assigned to the reading programme, again where only prepared, published instructional materials were used.

In the second approach, the Language-Experience Approach (L.Exp.), the teachers used Directed-Reading-Thinking-Activities where only the creative writing of the children was utilized as the basic reading materials. While the children continued their recreational reading, that is, their library books and independent reading of other published materials, the time normally allocated to directed reading of prepared reading materials was assigned to the creative writing part of the programme.

As an integral aspect of the second approach (L.Exp.), children were asked to write prose and poetry. As with the children using prepared instructional materials, these children utilized Directed-Reading-Thinking-Activities in conjunction with the material they had prepared and shared with their colleagues. This material, written by the children and predicated on their experiences and accustomed language, including vocabulary and syntax, formed the basis for their reading material for the duration of the experimental period.

To control for learning which had occurred prior to the experimental period, the STEP Reading: Level 4A test was

administered to all children in the forty classes at the outset of the experiment. At the conclusion of four school months, February-May, or sixty-five days of class instruction, subjects were administered the STEP Reading: Level 4B test. All testing of subjects was conducted between the hours of 9:00 and 10:15 a.m. by three research assistants who operated on a rotational basis, each testing three classes in each experimental group, the author testing the remainder of the classes.

c) Experimental Unit¹⁷: In the review of related studies, it was noted that many researchers had failed to take into account variance which may occur among classes and to control for interaction among children within each class. By failing to take into account variance which may occur among classes, researchers appear to have overlooked the importance of the role played by the reading teacher; and, by failing to control for interactions among children within each class, the researchers may have overlooked increments in reading which could be attributable to learning exchanges among children rather than to the variables being investigated.

To overcome these apparent weaknesses in design and because each class remained intact prior to, during, and

17 Gene V. Glass and Julian C. Stanley, Statistical Methods in Education and Psychology, Englewood Cliffs, N.J., Prentice-Hall, 1970, p. 506.

following the experimental period, it was considered necessary to regard the class as the experimental unit. Since such was the case, mean post-test scores were used as measures of reading ability at the termination of the experimental period and mean pre-test scores were used as measures of ability at the outset. Although the number of units was reduced from 1256 to 40 by shifting the experimental unit from "child" to "class", support was found in Glass and Stanley¹⁸ who suggested that this procedure provides for a more valid analysis, not only by allowing for personological interactions which almost invariably occur among children and the variance among teachers but also by providing greater stability for scores used either as measures of reading ability at the beginning or at the end of the experimental period.

To summarize, then, forty grades 4 and 6 teachers, representing both male and female teachers, and their classes were randomly selected from a total possible population of 276 grades 4 and 6 teachers employed on a full time basis by a large educational system, encompassing schools which serve urban and suburban populations. As part of the experiment, teachers took part in an in-service programme in reading. At the beginning of February, teachers were randomly selected and

18 Ibid., p. 507.

assigned to one of two approaches, either that in which prepared instructional material was used as a basis for the reading instruction, or that in which the children's own "personal wealth", their own written materials, were used as a basis for reading instruction.

STEP Reading: Level 4A¹⁹ was given to subjects at the outset of the experiment and STEP Reading: Level 4B²⁰ was given at the conclusion of sixty-five days or one hundred and thirty hours of instruction, with each test period being between the hours of 9:00 a.m. and 10:15 a.m. To provide a more appropriate basis for the statistical analysis, the experimental unit was shifted from that of "child" to that of "class"; thus, mean class scores were used for both measures of reading ability at the outset and the conclusion of the experimental period. While it was found that the sample was reduced from a potential 1256 experimental units to 40 actual units, it has been suggested that greater stability of scores can be obtained as well as controlling for personological interactions and variance attributable to differences among teachers.

19 Scarvia B. Anderson, Op. Cit., p. 1-86.

20 Ibid., p. 1-86.

3. The Population Sample

In this section, the description of the sample used in the study is considered. The section begins with a description of the 40 teachers involved in the experiment, since the teachers played an integral role in the study. Included in this discussion will be a description of the teachers' academic backgrounds, the male-female ratio among the teachers, their ages and years of teaching experience. The discussion of the children will centre around a description of the male-female ratio of the sample and their ages.

Of the forty teachers selected to take part in the experiment, twenty were female and twenty were male. Although the total population of teachers operating at the grade six level was fairly evenly divided between males and females (62 male - 70 female), the same proportion did not exist at the grade 4 level (50 male - 94 female). Thus, the sample was not stratified according to the male-female ratio in the total population. The male-female ratio in the sample did, however, represent an attempt to control for possible differential effects in the results which might be attributable to the sex of the teacher, or to sex differences among teachers.

Academically, all teachers shared one characteristic: all were busily engaged in working toward their first bachelor's degree. None of the teachers had taken part in a

TABLE II

Teachers Involved in the Experiment:
Age, Sex, Years of Experience, and Approach Used:
Grade 4

Grade	Teacher	Approach	Sex	Age (Yrs.)	Experience (Yrs.)
4	1	P.I.M.*	M	24.8	3.5
	2	P.I.M.	F	38.3	4.5
	3	P.I.M.	M	29.2	8.5
	4	P.I.M.	F	34.2	10.5
	5	P.I.M.	M	28.6	8.5
	6	P.I.M.	F	45.4	19.0
	7	P.I.M.	M	27.2	2.5
	8	P.I.M.	F	56.4	24.5
	9	P.I.M.	M	31.2	10.5
	10	P.I.M.	F	47.4	26.5
4	11	L.Exp.**	M	26.3	5.5
	12	L.Exp.	F	48.4	23.5
	13	L.Exp.	M	26.8	5.5
	14	L.Exp.	F	57.4	27.0
	15	L.Exp.	M	31.2	10.5
	16	L.Exp.	F	27.3	6.5
	17	L.Exp.	M	28.2	8.5
	18	L.Exp.	F	34.5	10.5
	19	L.Exp.	M	26.3	6.5
	20	L.Exp.	F	38.4	15.5

* P.I.M. - Prepared Instructional Materials

** L.Exp. - Language-Experience Approach

TABLE III

Teachers Involved in the Experiment:
Age, Sex, Years of Experience, and Approach Used:

Grade 6

Grade	Teacher	Approach	Sex	Age (Yrs.)	Experience (Yrs.)
6	21	P.I.M.*	M	24.8	4.5
	22	P.I.M.	F	26.2	6.5
	23	P.I.M.	M	24.6	2.5
	24	P.I.M.	F	34.7	12.5
	25	P.I.M.	M	28.2	7.5
	26	P.I.M.	F	26.2	7.5
	27	P.I.M.	M	31.0	10.5
	28	P.I.M.	F	33.4	12.5
	29	P.I.M.	M	26.2	5.5
	30	P.I.M.	F	43.2	22.5
6	31	L.Exp.**	M	26.7	6.5
	32	L.Exp.	F	42.3	23.5
	33	L.Exp.	M	32.2	11.5
	34	L.Exp.	F	37.2	17.5
	35	L.Exp.	M	24.3	2.5
	36	L.Exp.	F	22.2	2.5
	37	L.Exp.	M	26.4	5.5
	38	L.Exp.	F	32.3	11.5
	39	L.Exp.	M	27.3	6.5
	40	L.Exp.	F	28.9	8.5

* P.I.M. - Prepared Instructional Materials

** L.Exp. - Language-Experience Approach

reading course, other than that provided in their one-year teacher education programme. None of the teachers had taken any basic university psychology courses; all of the teachers were enrolled in Liberal Arts programmes. Of the forty teachers, thirty had reached the mid-point of their undergraduate programmes. The other ten were within four courses of reaching mid-point. Thus, the teachers included in the study shared the common characteristic of all being enrolled as part time students at about the mid-point of their undergraduate studies.

The male teachers in the sample tended to be younger and to have fewer years teaching experience than their female counterparts. The mean age of the men was 27.58 years while that of the women was 39.72 years. In terms of experience, the men had an average of 6.65 years of experience while the female teachers had an average of 14.65 years of experience. The difference in age and experience between the male and female elements of the sample might be explicable in terms of the greater professional upward mobility of the men via promotion to positions as vice principals, principals and, in many cases, to teaching positions in intermediate and senior grade levels upon completion of their degrees.

Comparing age and years of teaching experience between grade levels, it was found that the mean age of the grade 6 teachers was 34.84 years while that of the grade 4

teachers was 35.42 years. The mean number of years of teaching experience for the grade 6 teachers was 12.4 years; for the grade 4 teachers, it was 11.9 years. In terms of age and years of teaching experience, the grade 6 teachers in the sample had more years of teaching experience although they were slightly younger. This discrepancy in age and experience was more evident among the female teachers than among the males. Interviews with those females whose age would have suggested more years of teaching experience revealed that many of the teachers had taken time from their professional careers to raise families. No other reasons were given.

Comparisons between teachers using the Language-Experience Approach and those using prepared instructional materials revealed that the teachers in the Language-Experience group had 10.78 years of experience; those using prepared instructional materials had 10.52 years. The mean age of the teachers in the Language-Experience group was 32.23 years while for those using prepared instructional materials, the mean age was 33.06 years. Based on comparisons predicated on years of experience and age, it would appear that the two groups of teachers were comparable.

Among the children whose teachers were selected, girls outnumbered boys from grade four, while the converse was true at the grade six level. At the grade four level

360 girls and 277 boys were involved while the grade six sample included 263 girls and 356 boys.

The mean age of the grade four children was 9.2 years; the mean age of the grade six children was 11.2 years, an age span of two years. Based on this age differentiation, it was felt that differences in reading ability attributable to evolving cognitive structures would be readily identifiable.

As a point of summary, then, forty teachers of whom twenty were male and twenty were female were randomly selected from a total possible population of 276 grades four and six teachers. Although the sample of teachers was not stratified according to the male-female ratio of the total population, the sampling procedure did represent an attempt to control for possible differential effects which could be attributed to sex differences among the teachers.

Among the teachers in the sample, the men tended to be younger and to have fewer years of teaching experience than the women; among the children, boys outnumbered the girls selected from the grade 6 population while the converse was true for those selected from the grade 4 population.

4. Organization of the Data

This section is concerned with the organization of the data and with the statistical procedures used to analyze that data. Included in this section is an outline of the

TABLE IV

Students Involved in the Experiment:
Numbers, Sex, Age

Grade	Method of Instruction	Number	Sex	Mean Age	σ
4	P.I.M.*	178	F	9.4	.56
	P.I.M.	141	M	9.1	.80
	L.Exp.**	182	F	9.1	.76
	L.Exp.	136	M	9.3	.83
6	P.I.M.	120	F	11.4	.74
	P.I.M.	198	M	11.2	.36
	L.Exp.	143	F	11.1	.45
	L.Exp.	158	M	11.2	.72

* P.I.M. - Prepared Instructional Materials

** L.Exp. - Language-Experience Approach

main statistical procedure, the inferential analysis of the data, and the statistical processes used to test for the assumptions underlying the selected procedures. These latter processes included Levene's²¹ test for homogeneity of variance, the test for homogeneity of regression, the determination of the X, Y relationship and the determination of the proportion of increase in precision by using the co-variate.

Following mark-sensing, by the Ottawa Board of Education computer, the data was organized according to the outline suggested by Dayton²² for a factorial analysis of co-variance. Since pre-test scores were provided as measures of reading ability among the classes at the outset of the experimental period, thus controlling for previous learning, it was deemed appropriate to utilize an analysis of co-variance. In this study, mean class scores in reading were used as both the criterion measure and the co-variate. Because the study involved two independent variables, the final design took the form of a two-way factorial analysis of co-variance with two levels of each independent variable.

21 H. Levene, "Robust Tests for Equality of Variances", in I. Olkins, ed., Contribution to Probability and Statistics, Stanford, Stanford University Press, 1960, p. 278-292.

22 C. Mitchell Dayton, The Design of Educational Experiments, Toronto, McGraw-Hill, 1970, p. 331-338.

Using the York Terminal System of the University of Ottawa's Faculty of Education, the computer programme for a factorial analysis of co-variance was written in APL^{23,24,25}, based on the procedure suggested by Dayton²⁶. Following the initial writing, the programme was tested and verified using the numerical examples cited by Dayton²⁷ and Winer²⁸.

Levene's²⁹ test for homogeneity of variance was used, the test being done on the absolute values of the deviations of the mean scores from the group mean. No further test for homogeneity of variance was carried out.

The test for homogeneity of regression was based on Keith's³⁰ procedure and was of the order

$$F = \frac{s_2/(k-1)}{s_1/k(n-2)}$$

23 Bayne Logan, ANCOVA 2, York Terminal System, University of Ottawa, 1972, 2 p., (see Appendix VIII).

24 Bayne Logan, ANCOVA, York Terminal System, University of Ottawa, 1972, 2 p., (see Appendix IX).

25 Bayne Logan, ANOVA, York Terminal System, University of Ottawa, 1972, 1 p., (see Appendix X).

26 C. Mitchell Dayton, Op. Cit., p. 331-338.

27 C. Mitchell Dayton, Op. Cit., p. 331-338.

28 B.J. Winer, Statistical Principles in Experimental Design, Toronto, McGraw-Hill, 1962, p. 595-604.

29 H. Levene, Op. Cit., p. 278-292.

30 Virginia Keith, Design and Analysis in Experimentation, Ottawa, University of Ottawa, 1969, p. 263.

where s^2 is the difference between the sums of squares for pooled and separate regression lines and s^1 represents the sums of squares for separate lines.

The X, Y relationship was likewise determined by the procedure outlined by Keith³¹ and was of the order,

$$r_{XY} = \frac{SS_{XY(T)}}{\sqrt{SS_{X(T)}SS_{Y(T)}}$$

where $SS_{XY(T)}$ represents the total sums of the squares of the cross products of the raw scores, $SS_{X(T)}$ represents the total sum of the squares of the X values, and $SS_{Y(T)}$ represents the total sum of the squares of the Y values.

To test for the increase in precision by using the co-variate, the procedure as outlined by Keith³² was used. It is as follows,

$$r_w^2 = \frac{[SS_{XY(e)}]}{SS_{X(e)}SS_{Y(e)}}$$

where $SS_{XY(e)}$ represents the error term of the sum of the squares of the cross products of the raw scores, $SS_{X(e)}$ represents the error term of the sum of the squares of the X term and $SS_{Y(e)}$ represents the error term of the sum of the squares of the Y term.

31 Ibid., p. 262.

32 Ibid., p. 262.

The computer programmes for testing for homogeneity of regression, determining the X, Y relationship, and the proportion of increase in precision, were written in APL³³ using the University of Ottawa's York Terminal System and were tested and verified using the numerical examples cited in Keith.

In summary, a factorial analysis of co-variance was selected as the appropriate procedure to analyze the data collected during the experiment. Based on the recommendations and procedures outlined in Dayton, the data was organized and analyzed with mean post-test reading scores providing the criterion measure and mean pre-test reading scores being used as the co-variate.

Levene's test was used to determine homogeneity of variance, while the test for homogeneity of regression, the procedure for determining the X, Y relationship and the test for increase in precision were based on procedures outlined by Keith.

Computer programmes, based on procedures and examples outlined in Dayton, Winer and Keith, were written at the University of Ottawa's Faculty of Education. The programmes were then tested and verified according to the numerical examples presented in the aforementioned sources.

33 Bayne Logan, ANCOVA, Op. Cit., 2 p.

5. Summary

This chapter has been concerned with the procedures involved in conducting the experiment to test the hypotheses outlined in the previous chapter. The chapter began with a description of the two research instruments used in the project, the Co-operative Tests of Educational Progress: Levels 4A and 4B. This description was then followed by an outline of the research methods used in the experiment. Following this outline, the population sample was then described with particular emphasis being placed on the rationale underlying the selection procedure and the resulting experimental unit. Based on the descriptions of the research methods and the procedures used in the selection of the population sample, a brief explanation of the organization of the data and an outline of the specific statistical operations concluded the chapter.

CHAPTER IV

PRESENTATION OF RESULTS

In this chapter, the results of the experiment, designed to test the research hypotheses, are presented. As an introduction to the chapter, the research problem and hypotheses are reviewed. Subsequent to the review of the problem and hypotheses, a brief description of the raw data is presented. This description of raw data is then followed by the inferential analysis where a factorial analysis of co-variance, as described in the previous chapter, is used. A brief summary concludes the presentation of the results.

1. Review of the Problem and Hypotheses

The problem on which this study is predicated, as presented originally in the second chapter was: If one controls for personological interactions among children and accounts for variance attributable to individual differences among teachers, what are the relative effects of evolving intellectual abilities, as determined by the grade level of the subjects, and approaches to reading used by the teacher on the acquisition of higher order reading abilities at the junior grade level?

In view of the definition of the problem, three hypotheses were presented as forming the nucleus of the study:

1. There is a significant difference in the acquisition of higher order reading abilities between older (grade 6) and younger (grade 4) subjects at the junior grade level.
2. There is a significant difference in the acquisition of higher order reading abilities between two different approaches to the teaching of reading at the junior grade level, the Language-Experience and Prepared Instructional Materials Approaches.
3. There is a significant interaction between age or evolving intellectual abilities of subjects and instructional approaches to reading at the junior grade level in the acquisition of higher order reading abilities.

2. Description of the Data

This section consists of a description of the raw data as it was compiled. Class, group, and grade means for reading are presented for both the pretest and post test in order to provide a basis for comparison. To determine the relative dispersion of scores for both the pretest and post test, again as a basis for comparison, standard deviations within classes, groups and grades are included. In the latter two cases, that is for groups and grades,

the standard deviations provided are measures of dispersion of the class means about the group and grade means.

For purposes of clarity, the description of the data is arranged in a specific sequence or order. Descriptions and relevant comparisons are made, first, within the context of the pretest situation. Within this initial context, descriptions and comparisons are made by grade; that is, comparisons and descriptions of the data are made between fourth and sixth grade mean scores and standard deviations. Then, comparisons and descriptions are made by group; that is, data obtained from the language-experience group and the prepared instructional materials group are discussed and compared within the grade four level, then within the grade six level. Finally, descriptions and comparisons are made by class within each of the groups included by grade level.

Comparing the pretest means by grade, it was found that the pretest fourth grade mean was 36.76, while the pretest sixth grade mean was 48.50. This constituted a difference between means of 11.74 for grade levels four and six. The dispersion of class means about the overall mean by grade level was indicated by a standard deviation of 1.55 at the grade four level and a standard deviation of 2.15 at the grade six level. The measures of dispersions of scores, the standard deviations, revealed that the

dispersion of class means about the grade mean was greater at the grade six level than at the grade four, a finding which tends to corroborate the research findings reported by Lamb¹. The measures of dispersion also indicated that, at three standard deviations from the mean of each grade level, the scores, within each grade level, were mutually exclusive; that is, at three standard deviations there was no overlapping of scores from one grade level to the next.

The pretest scores at the grade four level indicated that the two groups, the language-experience group and the prepared instructional materials group, were reasonably evenly matched at the outset of the experiment. The group mean for those classes using the Language-Experience Approach was 36.70, while that for the group using prepared instructional materials was 36.82. Comparing the standard deviations of class means about the mean for each group revealed that the class means for the language-experience group had less dispersion than those for the prepared instructional materials group. For the former group, the standard deviation was .93, while for the latter group, the standard deviation was 1.90. Since the teachers were randomly selected from thirty-four schools and were

1 Rose Lamb, Op. Cit., 18 p.

randomly assigned to the two different treatment groups, it was assumed that this discrepancy between the standard deviations was purely coincidental.

At the grade six level, the pretest scores indicated that the language-experience group and the prepared instructional materials group were, as at the grade four level, reasonably evenly matched at the outset of the experiment. For those classes using the Language-Experience Approach, the group mean was 48.94; for the group using prepared instructional materials, the group mean was 48.05. Comparisons of the standard deviations of the class means about the mean for each group revealed little discrepancy, unlike the fourth grade situation. For the language-experience group, the standard deviation was 1.82; for the group using prepared instructional materials, the standard deviation was 2.32. While it will be noted that, as at the grade four level, less dispersion existed among the language-experience group than among the group using prepared instructional materials, it should also be noted that procedures for selection and assignment of teachers was consistent for all teachers; therefore, as at the grade four level, it was assumed that any differences in dispersions of class means was purely coincidental.

At the grade four level, an examination of pretest class means and standard deviations within classes revealed that, among the classes using prepared instructional materials, the highest class mean was 40.18; the lowest was 33.05. Among the classes using language experiences, the highest mean was 38.31, the lowest, 35.31. A comparison of the standard deviations within classes and those among classes showed that, for both groups, the variance within classes was greater than that among classes. In the prepared instructional materials group, the greatest within-class standard deviation was 7.28; the smallest was 3.40. For the language-experience group, the greatest within-class standard deviation was 5.63; the smallest was 4.12. As reported earlier, the smallest standard deviation among classes, that for the language-experience group, was .93; the greatest standard deviation among classes, that for the prepared instructional materials group, was 1.90. Greater variance within classes should demonstrate the increased stability of class means, particularly in view of the decreased variance among these means.

A survey of the pretest class means and standard deviations within classes at the grade six level indicated that, among the classes using prepared instructional materials, the highest class mean was 51.97; the lowest

was 44.03. Among the classes using language experiences, the highest mean was 52.47, the lowest, 46.34. As at the grade four level, a comparison of the standard deviations within classes and those among classes showed that, for both the language-experience and prepared instructional materials groups, the variance within classes was greater than that among classes. Within the prepared instructional materials group, the greatest within-class standard deviation was 6.51; the smallest was 4.82. Within the language-experience group, the greatest within-class standard deviation was 8.56; the smallest was 3.68. At the grade six level, the smallest standard deviation of class means within a group, that of the language-experience group, was 1.82; the greatest standard deviation among class means within a group, that of the classes using prepared instructional materials, was 2.32. As at the grade four level, the greater variance within classes should demonstrate the increased stability of the class means, again in view of the decreased variance among these means.

To this point, a description has been presented of the pretest data. For purposes of clarity, this description followed a pre-established order. Descriptions and comparisons were made first by grade; that is, comparisons and descriptions were made between fourth and sixth grade

means. Then, comparisons and descriptions were made by group; that is, data obtained from the language-experience and prepared instructional materials groups were discussed within the context of the grade four group and then within the context of the grade six level. Finally, descriptions and comparisons were made by class within each of the groups included by grade level. Again, for purposes of clarity, the same format is followed for the description of the post test scores.

Comparing the post test means by grade, it was found that the fourth grade mean was 42.50; the sixth grade mean was 57.76. The mean difference between the fourth and sixth grade means was 15.26. Compared with the comparable mean difference of the pretest scores of 11.74, it was found that the difference had increased with the post test. This increase in difference would indicate that the grade six subjects had made more substantial gains in higher order reading competencies than their grade four counterparts. Whether the difference was great enough to be considered significant is discussed in the next section of this chapter.

The dispersion of class means about the overall grade means was indicated by a standard deviation of 2.97 at the grade four level and 2.97 at the sixth grade level.

Unlike the pretest results, the standard deviations of class means about the grade means were identical for the fourth and sixth grade levels.

At the grade four level, the pretest scores indicated that while the two groups, the language-experience and the prepared instructional materials groups, were reasonably evenly matched at the outset of the experiment, in the post test situation there existed a difference of 1.66 between the means. For those classes using prepared instructional materials the group mean was 41.67; for those classes using language experiences the group mean was 43.33. Comparisons of the standard deviations of class means about the group means revealed that, for both groups, the dispersions were much more similar than in the pretest situation. For the prepared instructional materials group, the standard deviation was 1.46; for the language-experience group, it was 1.15.

The post test results at the grade six level indicated that, as at the grade four level, the difference between the means of the two groups, the language-experience and the prepared instructional materials groups, had widened. For the group using prepared instructional materials, the group mean was 56.79; for the classes using language experiences, the group mean was 58.72, a difference of 1.93. In the post test situation, at the grade four

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TABLE V

Pretest Mean Scores in Reading of the Subjects
Selected from Grade 4

Grade	Class	Approach	Class Mean	σ	Group Mean	σ	Grade Mean	σ
4	1	P.I.M.	37.68	5.31				
	2	P.I.M.	40.18	6.83				
	3	P.I.M.	34.36	4.27				
	4	P.I.M.	33.05	7.28				
	5	P.I.M.	36.91	5.95	36.70	1.90		
	6	P.I.M.	37.57	3.40				
	7	P.I.M.	36.96	5.41				
	8	P.I.M.	38.04	5.16				
	9	P.I.M.	36.81	5.68				
	10	P.I.M.	35.48	5.15				
							36.76	1.55
4	11	L.Exp.	38.31	4.12				
	12	L.Exp.	35.31	5.13				
	13	L.Exp.	37.86	5.63				
	14	L.Exp.	35.50	5.34				
	15	L.Exp.	36.45	4.26	36.82	.93		
	16	L.Exp.	37.29	4.88				
	17	L.Exp.	37.17	5.15				
	18	L.Exp.	36.11	4.17				
	19	L.Exp.	37.25	3.65				
	20	L.Exp.	37.12	4.24				

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TABLE VI

Pretest Mean Scores in Reading of the Subjects
Selected from Grade 6

Grade	Class	Approach	Class Mean	σ	Group Mean	σ	Grade Mean	σ
6	21	P.I.M.	50.94	6.51				
	22	P.I.M.	48.09	4.82				
	23	P.I.M.	46.57	5.13				
	24	P.I.M.	49.50	5.85				
	25	P.I.M.	51.97	5.44	48.05	2.32		
	26	P.I.M.	49.73	5.60				
	27	P.I.M.	47.00	5.80				
	28	P.I.M.	44.03	4.86				
	29	P.I.M.	46.64	6.16				
	30	P.I.M.	46.06	5.69				
							48.50	2.15
6	31	L.Exp.	49.14	8.56				
	32	L.Exp.	49.79	7.30				
	33	L.Exp.	47.45	6.44				
	34	L.Exp.	46.34	5.92				
	35	L.Exp.	46.42	4.50	48.94	1.82		
	36	L.Exp.	50.47	3.68				
	37	L.Exp.	48.61	5.65				
	38	L.Exp.	49.55	6.34				
	39	L.Exp.	52.47	8.35				
	40	L.Exp.	48.19	4.45				

level, this difference between the means of the two groups was 1.66, thereby indicating that, on the basis of the post test alone, while the Language-Experience Approach was more effective than the Prepared Instructional Materials Approach at both grade levels, it was slightly more effective at the grade six level. This would tend to support both the second and third hypotheses. Whether the differences were sufficiently great enough to be considered significant is discussed in the inferential analysis.

Comparing the standard deviations of the class means about the mean for each group revealed that, as in the case of the fourth grade, the standard deviations for both groups were much more alike than in the pretest situation. For the prepared instructional materials group, the standard deviation was 2.93; for the language-experience group, the standard deviation was 2.63. Although the post test standard deviations were much more similar for the two groups at the grade six level, when compared with the comparable measures of dispersion at the grade four level, there existed a marked difference. For both groups, the language-experience and the prepared instructional materials groups, at the grade six level, the standard deviations were more than double that of the standard deviation of the class means about the group mean for the Language-Experience Approach at the fourth grade level. This marked difference

would suggest heterogeneity of variance as measured by Levene's² test, a point which is discussed in greater detail in the following section.

At the grade four level, an examination of post test class means and standard deviations within classes revealed that, among the classes using prepared instructional materials, the highest class mean was 42.27; the lowest was 37.92. Among the classes using the Language-Experience Approach, the highest class mean was 44.47; the lowest was 40.62. As in the pretest situation, a comparison of the standard deviations within classes and those among classes showed that, for both the language-experience and prepared instructional materials groups, the variance within classes was greater than among classes. Among the classes using prepared instructional materials, the greatest within-class standard deviation was 8.46; the smallest was 3.75. For the language-experience group, the greatest within-class standard deviation was 5.64; the smallest, 3.86. Compared with among-class standard deviations of 1.46 and 1.15 for the prepared instructional materials and language-experience groups respectively, the increased stability of the class means, again, becomes increasingly more evident.

2 H. Levene, Op. Cit., p. 278-292.

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TABLE VII

Post Test Mean Scores in Reading of the Subjects
Selected from Grade 4

Grade	Class	Approach	Class Mean	σ	Group Mean	σ	Grade Mean	σ
4	1	P.I.M.	41.87	3.75				
	2	P.I.M.	42.27	6.54				
	3	P.I.M.	37.92	5.04				
	4	P.I.M.	38.21	6.40				
	5	P.I.M.	40.94	5.65	41.67	1.46		
	6	P.I.M.	41.79	8.46				
	7	P.I.M.	41.37	6.27				
	8	P.I.M.	41.52	5.18				
	9	P.I.M.	41.08	6.28				
	10	P.I.M.	39.71	5.23				
							42.50	2.97
4	11	L.Exp.	44.03	4.29				
	12	L.Exp.	40.62	5.64				
	13	L.Exp.	43.71	5.22				
	14	L.Exp.	43.20	4.59				
	15	L.Exp.	44.07	5.25	43.33	1.15		
	16	L.Exp.	43.47	5.20				
	17	L.Exp.	44.08	5.08				
	18	L.Exp.	41.78	4.81				
	19	L.Exp.	44.47	3.86				
	20	L.Exp.	43.88	4.24				

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TABLE VIII

Post Test Mean Scores in Reading of the Subjects
Selected from Grade 6

Grade	Class	Approach	Class Mean	σ	Group Mean	σ	Grade Mean	σ
6	21	P.I.M.	59.81	6.41				
	22	P.I.M.	56.59	4.01				
	23	P.I.M.	56.83	4.81				
	24	P.I.M.	59.82	4.88				
	25	P.I.M.	60.87	5.25	56.79	2.93		
	26	P.I.M.	58.36	4.60				
	27	P.I.M.	55.93	5.17				
	28	P.I.M.	50.93	5.20				
	29	P.I.M.	55.18	6.43				
	30	P.I.M.	53.55	5.53				
							57.76	2.97
6	31	L.Exp.	55.37	6.69				
	32	L.Exp.	57.48	5.12				
	33	L.Exp.	53.48	5.81				
	34	L.Exp.	55.22	7.49				
	35	L.Exp.	55.81	6.95	58.72	2.63		
	36	L.Exp.	60.70	4.78				
	37	L.Exp.	57.52	5.17				
	38	L.Exp.	60.03	4.03				
	39	L.Exp.	61.60	5.48				
	40	L.Exp.	60.25	4.66				

An examination of the post test class means and within-class standard deviations at the grade six level indicated that, among the classes using prepared instructional materials, the highest class mean was 59.82; the lowest class mean was 50.93. Among the classes using language experiences, the highest class mean was 60.70; the lowest was 53.48. At the grade six level, as at the grade four level, standard deviations within classes exceeded those among classes. Within the group using prepared instructional materials, the greatest within-class standard deviation was 6.43; the least was 4.01. Within the language-experience group, the greatest within class standard deviation was 7.49; the smallest was 4.03. Again, compared with among-class standard deviations of 2.93 and 2.63 for the prepared instructional materials and language-experience groups respectively, considerably less dispersion of scores existed among classes than within classes.

To summarize, a description has been presented of both the pretest and post test data. To provide for optimal clarity, the description followed a pre-established sequence for both sets of data. Descriptions and any relevant comparisons were first made by grade, then by group and, finally, by class.

Four observations became increasingly more obvious as the descriptions developed. First, in the post test

data, the greater dispersion of class means about the group mean at the grade six level, when compared to the same dispersion at the grade four level suggested that, in the inferential analysis, heterogeneity of variance would be found. Second, the difference in gains made between the pretest and post test, when compared by grade, would suggest that the grade six subjects had made greater gains in higher order reading abilities than their fourth grade counterparts. Whether the difference was great enough to be deemed significant is discussed in the succeeding section. Third, in presenting the group means, the data suggested that greater gains had been made by the language-experience group, a direction which would tend to support the second of the research hypotheses. Whether the differences were sufficiently large enough to be considered significant is discussed in the following section. The fourth observation centered on the possibility of an interaction occurring between evolving intellectual abilities and approach used in the teaching of reading. Differences found between the means in the post test data would suggest that the third hypothesis would be supported. Again, whether the differences were sufficiently large enough to be considered significant is discussed in the ensuing chapter.

3. Inferential Analysis

In this section of the chapter, the inferential analysis of the data is presented. The presentation of the analysis and results consists of five parts a) Levene's test³ for homogeneity of variance, b) the test for homogeneity of regression, c) determination of the X, Y relationship, d) determination of the increase in precision using the pretest reading scores as co-variate, and e) the factorial analysis of co-variance where class mean pretest scores are used as the co-variate and class mean post test scores are used as the criterion measure.

a) Levene's Test for Homogeneity of Variance⁴: Using the absolute values of the deviations of the mean scores of each class from the group mean, a one-way analysis of variance was used to determine the value of the F ratio. The F value, as determined by the test, was 3.56. This value was found to be significant at the .95 level ($F_{(3,36)} = 2.87$).

Although homogeneity of variance is considered by many statisticians⁵ to be a basic assumption for both

3 Ibid., p. 278-292.

4 Ibid., p. 278-292.

5 Virginia Keith, Op. Cit., p.

analysis of variance and analysis of co-variance, Dayton⁶ has argued that, in cases where the samples are of the same size, or approximately the same size, the analysis is virtually unaffected by failure to meet this assumption. According to him,

There is a good deal of evidence that the analysis of variance is virtually unaffected by violations of normality and homogeneity of variance if the samples entering the analysis are of the same, or approximately the same, size... Thus, unless the equivariance hypothesis is of interest in its own right, the experimenter who uses samples of equal size can procede directly to testing the hypothesis concerning treatment effects.⁷

To support his position, Dayton⁸ has cited evidence provided by Norton⁹, Bonneau¹⁰ and particularly Box^{11,12} who has provided convincing mathematical evidence to support this contention. Since the samples included in this study are of equal size, it would appear that the

6 C. Mitchell Dayton, Op. Cit., p. 35.

7 Ibid., p. 35.

8 Ibid., p. 35.

9 Ibid., p. 35.

10 Ibid., p. 35.

11 G.E.P. Box, "Non-Normality and Tests on Variance", Biometrika, Vol. 40, 1953, p. 318-335.

12 G.E.P. Box, "Some Theoremes on Quadratic Forms Applied in the Study of Analysis of Variance Problems", Annals of Mathematical Statistics, Vol. 25, 1954, p. 290-302.

appropriate procedure was to continue to the inferential statistical analysis.

b) Test for Homogeneity of Regression: Using the procedure

$$F = \frac{S_2 (k-1)}{S_1 k(n-2)}$$

as outlined by Keith¹³, an F value of 1.44 was found. This value was not significant at the .95 level ($F_{(3,36)} = 2.87$).

c) Determination of the X, Y Relationship: Although nowhere in the literature pertaining to statistical analysis does there appear to be a firm consensus, it is maintained by some authors that a correlation of not less than .60 should exist between the X and Y variables in order to undertake an analysis of co-variance. Using the procedure

$$r_{xy} = \frac{SS_{xy(t)}}{\sqrt{SS_{x(t)} SS_{y(t)}}}$$

as outlined by Keith¹⁴ it was found that, for this study, the correlation between the two variables, pretest and post test class mean scores in reading, was .98.

d) Proportion of Increase in Precision: Again using the

13 Virginia Keith, Op. Cit., p. 260.

14 Ibid., p. 260.

procedure as outlined by Keith¹⁵, the programme to determine the increase in precision was

$$r^2_w = \frac{[SS_{xy(e)}]^2}{SS_{x(e)} SS_{y(e)}}$$

This ratio yielded a co-efficient of .69; thus, the use of the co-variate, pretest reading scores, increased the precision of the process by an appreciable amount.

e) Analysis of Co-Variance: At this point, the values of the F ratios will be presented according to the order of the hypotheses as they were outlined at the beginning of the chapter.

i) Hypothesis 1. The factor of evolving intellectual abilities (age): The value of the F ratio as derived from the procedure as outlined by Dayton¹⁶ and using the computer programme as written by Logan¹⁷, was 6.23. This value was found to be significant at the .95 level (.95 $F_{(1,35)} = 4.13$).

ii) Hypotheses 2. The factor of instructional procedures: Again using the procedures described by Dayton and the APL computer programmes, the F ratio was found to be 8.19.

15 Ibid., p. 260.

16 C. Mitchell Dayton, Op. Cit., p. 331-338.

17 Bayne Logan, ANCOVA 2, Op. Cit., 2 p.

TABLE IX

Factorial Analysis of Co-Variance: Source Table

Grade	Prepared Instructional Material		Language Experience Approach	
	X	Y	X	Y
4	37.68	41.87	38.31	44.03
	40.18	42.27	35.31	40.62
	34.36	37.92	37.86	43.71
	33.05	38.21	35.50	43.20
	36.91	40.94	36.45	44.08
	37.57	41.79	37.29	43.47
	36.96	41.37	37.17	44.08
	38.04	41.52	36.11	41.78
	36.81	41.08	37.25	44.47
	35.48	39.71	37.12	43.88
6	50.94	59.81	49.14	55.37
	48.09	56.59	49.79	57.48
	46.57	56.83	47.45	53.48
	49.50	59.82	46.34	55.22
	51.97	60.87	46.42	55.81
	49.73	58.36	50.47	60.70
	47.00	55.93	48.61	57.52
	44.03	50.93	49.55	60.03
	46.64	55.18	52.47	61.60
	46.06	53.55	48.19	60.25

Source Table

Source	SS (Adj)	d.f.	M.S.	F Ratio
Approach	13.64	1	13.36	8.19*
Age	10.38	1	10.38	6.23*
Age x Approach	13.10	1	13.10	7.87*
Replications: Age x Approach	58.28	35	1.67	

*Significant at the .95 level of significance.

Since the critical value of F at the .95 level of significance is 4.13, this value was found to be significant ($.95 F_{(1,35)} = 4.13$).

iii) Hypotheses 3. The interaction of age and instructional procedures: Using the procedures as described by Dayton and the APL computer programmes, the F ratio was found to be 7.87. This value was found to be significant at the .95 level ($.95 F_{(1,35)} = 4.13$). Although comparisons of the group means in the post test situation suggested that results lay in a direction which tended to support the interaction hypothesis, the plotting of the adjusted group means indicated that the interaction was in a direction opposite to that predicted. The Language-Experience Approach, in this study, had a greater effect at the grade four level than at the grade six level.

To summarize, Levene's test for homogeneity of variance yielded an F ratio of 3.56, a value which was determined to be significant at the .95 level. Although homogeneity of variance is considered to be a basic assumption for an analysis of co-variance, mathematical support was found for the decision to continue with the analysis. In a similar direction, the test for homogeneity of regression revealed a value of 1.44, a value which was not considered to be significant at the .95 level.

Grade 6

(58.72)

(56.79)

Grade 4

(43.33)

(41.67)

P.I.M.

L.Exp.

Figure 1: Comparison of unadjusted post test group means.

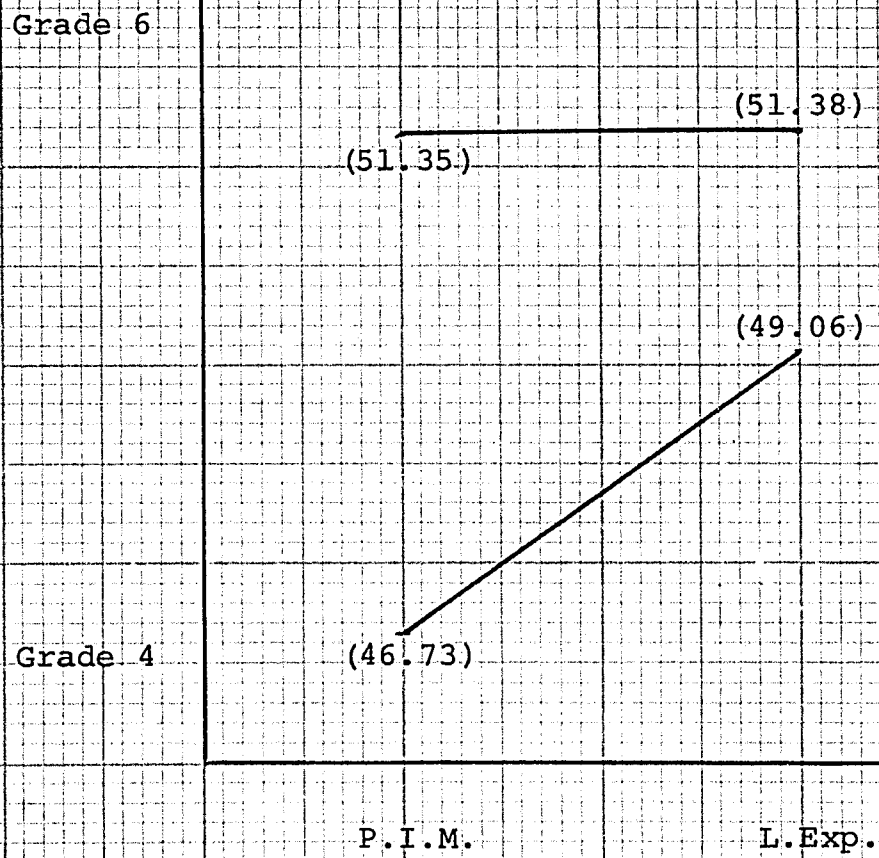


Figure 2: Comparison of adjusted group means.

Determination of the X, Y relationship and the proportion of increase in precision revealed a close relationship between the co-variate and criterion measure. The correlation between the X and Y variables was .98, while the increase in precision was calculated at .69.

Employing the factorial analysis of co-variance as outlined in the previous chapter, the three F ratios were found to be significant at the .95 level. The factor of age, or evolving intellectual abilities yielded an F ratio of 6.23; the factor of instructional procedures provided an F ratio of 8.19; while the interaction yielded an F ratio of 7.87. It was noted that, with this interaction, the results proved to be opposite to the theoretical predictions and to the trends suggested by the post test results. It would appear that the Language-Experience Approach has a greater impact on younger children than it does on older children.

4. Summary

In this chapter, the results of the experiment, designed to test the hypotheses developed in the second chapter, were presented. The chapter was introduced by a review of the research problem and hypotheses. Following this initial review of the problem and hypotheses, a

brief description of the raw data was presented. The descriptive analysis was then followed by the inferential analysis which consisted of a factorial analysis of covariance.

The description of the raw data was presented in a pre-established sequence. For both the pretest and post test data, descriptions and any relevant comparisons were made by class, then by group and, finally, by class. In the course of this description, four observations were made. First, the greater dispersion of class means about the group mean at the grade six level, when compared to the same dispersion at the grade four level, suggested that heterogeneity of variance would be found. Second, the difference in gains made, when compared by grade, indicated that the grade six subjects had made greater gains in higher order reading abilities than their grade four counterparts. Third, in comparing the group means, indications were that greater gains had been made by the language-experience group than by their colleagues using prepared instructional materials. The fourth observation centered on the possibility of an interaction occurring between evolving intellectual abilities in the children and instructional approaches used by the teacher. Differences found between the group means in the post test data indicated that the third theoretical prediction would be

supported; that is, that the Language-Experience Approach would be more effective with older children than with younger children.

The inferential analysis yielded a significant F ratio for the homogeneity of variance assumption and a non-significant F ratio for the homogeneity of regression assumption. For the homogeneity of variance assumption an F ratio of 3.56 was found; for the homogeneity of regression assumption an F ratio of 1.44 was found to exist. Failure to find homogeneity of variance, as argued by Dayton, should not influence the outcome of the analysis if the samples entering the analysis are of the same size. Because the samples entering the analysis, in this particular study, were of identical size, it was deemed appropriate to continue with the analysis.

Three significant F ratios were found to exist for the two main effects and the interaction. For the factor of evolving intellectual abilities an F ratio of 6.23 was found; in the case of instructional procedures, the analysis yielded an F ratio of 8.19; for the interaction an F ratio of 7.87 was found. In this latter F ratio it was found that when the adjusted group means were plotted, the interaction lay in a direction opposite to that predicted in the theoretical rationale.

CHAPTER V

DISCUSSION OF THE RESULTS

In the previous chapter, the results of the experiment, designed to test the research hypotheses, were presented. As a result of the descriptive analysis, four observations were made. First there appeared to be heterogeneity of variance among the class means particularly when the means were compared by grade level. Second, the grade six subjects had made greater gains than their grade four counterparts. Third, greater gains had been made by the language-experience groups than by those using prepared instructional procedures; and fourth, on the basis of the post test scores above, the Language-Experience Approach appeared to have a greater effect at the grade six level than at the grade four level.

The inferential analysis of the data led to statistical confirmation of three of the four observations made in the descriptive analysis. First, the inferential analysis confirmed that the apparent heterogeneity of variance had indeed led to failure to meet the homogeneity of variance assumption. Second, a significant F ratio for the factor of evolving intellectual abilities confirmed that the grade six subjects had indeed made greater gains in higher order reading abilities than did their grade four

counterparts. Third, a significant F ratio for the factor of instructional procedures confirmed that the language-experience groups had made greater gains in higher order reading abilities than did their counterparts using prepared instructional materials. The fourth observation, while leading to a significant F ratio for the interaction hypothesis, was not confirmed. Plotting the adjusted group means revealed that the Language-Experience Approach had a greater effect at the grade four level than at the grade six level.

In this chapter, a discussion of these results is presented. In order to maintain clarity of presentation, the order established in the previous chapter will be followed; that is, the discussion will be centered first on the problem of heterogeneity of variance, then the discussion will be moved to a consideration of the results of each of the three F ratios in the sequence in which they appeared in the previous chapter. A brief summary will then conclude the chapter.

1. Heterogeneity of Variance

Although heterogeneity of variance may exert no appreciable effect on the analysis of the data where samples of equal size are used in the analysis, its presence remains of interest to any researcher who

encounters the phenomenon. This is particularly true in those instances where true differences may be difficult to detect or where the treatment may have exerted differential effects on individual subjects. Usually, heterogeneity of variance is indicative of failure to achieve true randomization of subject selection.

In instances where true differences may be difficult to detect, heterogeneity of variance may affect the analysis in two ways. First, it may have the effect of unduly inflating the within variance, possibly to the point where true differences may be completely concealed. Second, in an analysis of co-variance, heterogeneity may produce a false adjustment to the slope of the regression line for the post test scores. In this particular study, neither effect appeared to be applicable.

For this study, the F ratio for the homogeneity of regression assumption was 1.44, a value which was determined to be non-significant at the .95 level. Differences for each of the main effects and the interaction in the analysis of co-variance were found to be significant, again at the .95 level. It would appear, on the basis of the data presented, that these differences were true differences. Based, then, on the homogeneity of regression assumption and the finding of significant F ratios in the

main analysis, it would appear that heterogeneity of variance did not present an impediment to the analysis.

As noted in the introductory paragraph, failure to meet the homogeneity of variance assumption may mean that the researcher failed to achieve true randomization in the selection of the research sample. To determine whether or not homogeneity of variance existed at the outset of the experiment, Levene's¹ test was conducted on the pretest scores, again using the absolute values of the deviations of the mean scores of each class from the group mean. In this analysis, the F ratio was 2.17, a value which was found to be non-significant at the .95 level ($.95 F_{(3,36)} = 2.87$). This ratio indicated, then, that at the outset of the experiment, homogeneity of variance existed, thereby leading to the assumption that randomization of selection had been in order. It would appear that the treatment had introduced the heterogeneity; it was the treatment, apparently, that had exerted a differential effect on individual scores.

To examine the differential effects on individual scores creates a problem where class means are used as scores. The problem rests in attempting to determine what part of the class mean is attributable to the teacher and

1 H. Levene, Op. Cit., p. 278-292.

what part of the class mean is attributable to each individual score within the class. In both the Anderson² and Petre³ studies, reviewed in the second chapter, it was suggested that Directed-Reading-Thinking-Activities lead to individual differences among older children becoming increasingly more pronounced. If, indeed, this were the case, the increase in variance during the course of the study could be more readily explained since the increased variance among individual subjects would be reflected in the class mean.

To determine whether or not individual differences were more pronounced among the older subjects than among the younger subjects, a one-way analysis of variance was conducted on the within class standard deviations in the post test situation. The F ratio was found to be 2.35; this was considered non-significant at the .95 level ($.95 F_{(3,36)} = 2.87$). Thus, it was concluded that differences among the standard deviations were due to chance rather than to the effect of the Directed-Reading-Thinking-Activities.

This latter finding, that of homogeneity among the within class standard deviations, suggested that the increase in heterogeneity of variance among class means,

2 William Anderson, Op. Cit., p. 1-204.

3 Richard M. Petre, Op. Cit., p. 1-131.

between the pretest and post test was due to an increase in individual differences among teachers. Although all classes evidenced gains in higher order reading abilities, the gains made by some classes were more pronounced than those of others. It would appear that, freeing the teachers from the questions included in prepared instructional materials had served to amplify their individual differences, particularly at the grade six level. Such amplification could create problems for school principals and superintendents who might philosophically prefer stricter homogeneity among teachers under their aegis.

Throughout the review of empirical investigations conducted to investigate aspects of Stauffer's theory, it was noted that, with the exception of one study by Lamb⁴, the teacher variable had not been taken into account. It would appear, on the basis of the results presented here, that variance attributable to individual differences among teachers is a very important phenomenon, particularly if this variance increases with the use of Directed-Reading-Thinking-Activities. To review a point made by Smith and Goodman,

4 Rose Lamb, Op. Cit., 18 p.

...the key factors of reading lie in the child and his interaction with information-providing adults, rather than in the particular material.⁵

Apparently, the child's interaction with information-providing adults is influenced by individual differences among those adults, an important point which is discussed from another perspective later in the chapter. In view of these findings of increased individual differences among teachers, it is recommended that any further extension of these studies take into account variance which may be attributable to increased individual differences among teachers.

To summarize, although heterogeneity of variance may have exerted no appreciable effect on the analysis of the data in this particular study, its occurrence was of particular interest. The first area of interest lay in resolving the question of whether or not true randomization of selection had been achieved. Conducting Levene's test on the pretest scores confirmed that homogeneity of variance was present at the outset of the experiment, thereby indicating that true randomization was achieved. The difference in results with Levene's test between the time of the pretest and that of the post test indicated

⁵ Frank Smith and Kenneth Goodman, "On the Psycholinguistic Method of Teaching Reading", Op. Cit., p. 178.

that the treatment must have exerted a differential effect on the individual scores. Examination of the differential variance among the within-class standard deviations revealed that the increase in variance appeared to rest with the teachers and not with the children. Researchers, extending investigations into the nature of the Language-Experience Approach where Directed-Reading-Thinking-Activities are utilized, would be advised to take the factor of potential increases in individual differences among teachers into account.

2. The Factor of Evolving Intellectual Abilities

The first of the two main effects tested pertained specifically to the effect of evolving intellectual abilities on children's acquisition of higher order reading competencies. The hypothesis, in its research form, was stated as: There is a significant difference in the acquisition of higher order reading abilities between older (grade 6) and younger (grade 4) subjects at the junior grade level. Stated in its null form, the hypothesis would read: There is no significant difference in the acquisition of higher order reading abilities between older (grade 6) and younger (grade 4) subjects at the junior grade level.

For this factor, the F value as determined by the analysis of co-variance was 6.23. This value was found to be significant at the .95 level ($.95 F_{(1,35)} = 4.13$). The null hypothesis was, therefore, rejected. The difference in acquisition of higher order reading abilities between older and younger children is significant.

At the conclusion of the first chapter, the theoretical prediction pertaining to this factor was presented. In its essence, it was predicted that increasing linguistic fluency, evolving intellectual capabilities and developing social interactions should enable children to move more readily from "thought that is predominantly perceptual and intuitive to thought that is conceptual and logical"⁶, to thought that "embraces all types of thinking, evaluating, judging, imagining, reasoning and problem-solving"⁷.

In extending the developmental aspect of Piaget's⁸ cognitive theory to the reading process, Stauffer has contended that reading is thinking; therefore, reading

⁶ Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. 14.

⁷ Russell G. Stauffer, Teaching Reading as a Thinking Process, Op. Cit., p. 9.

⁸ Jean Piaget, The Psychology of Intelligence, Op. Cit., p. 7-82.

involves levels of intellectual functioning as they are conceived by Piaget. Stauffer, in recognizing these stages of intellectual development, has concluded that cognitive development will have a profound influence on changes in reading abilities in children. Because reading is thinking and because thinking is developmental in nature, so too is reading.

The importance of evolving intellectual abilities has also been expressed by Dechant⁹. In supporting the notion that what a child already knows is subject to developmental stages, Dechant, like Stauffer, appears to have been strongly influenced by the developmental theory of Piaget. To Dechant, evolution in a child's conceptual development is reflected in his reading.

According to Dechant, a child comprehends only in terms of the level of conceptual development which he brings to the reading encounter. Thus, in Dechant's theory, as in Stauffer's, intellectual development plays an important role in the child's progression, in reading, to a level of thought that "embraces all types of thinking, evaluating, judging, imagining, reasoning and problem-solving"¹⁰.

⁹ Emerald Dechant, Improving the Teaching of Reading, Op. Cit., p. 70.

¹⁰ Russell G. Stauffer, Teaching Reading as a Thinking Process, Op. Cit., p. 9.

In Smith's theory, as in Dechant's, developing intellectual abilities involve evolving categories and concepts. As the child's experiences broaden in scope, his categories increase in complexity, number and refinement. Thus, implicit in Smith's theory rests the notion of evolving intellectual capacities, constantly developing categories. It is the categories which increase in complexity, number and refinement with each new experience, encounter, and social interaction, newly developed categories which result from accommodation and which permit assimilation at increasingly newer levels of sophistication.

Despite the abundance of theoretical support for the notion that evolving intellectual abilities play a vitally important role in the acquisition of higher order reading abilities, the factor does not appear to have been taken into consideration in the empirical studies. In this study, where comparative reading gains were analyzed, empirical evidence was found which supported the contention that, during a comparable period of time, older children would make greater gains in higher order reading competencies than their younger counterparts.

It is recommended, in any studies designed to investigate further the effect of evolving intellectual abilities in the reading process, that increasingly more

effective means be sought to study the effect of this seemingly important factor. Such improved techniques and procedures should lead to a clearer understanding of evolving intellectual abilities in the reading process.

3. The Factor of Instructional Procedures

The second F ratio presented was concerned primarily with the effect of instructional procedures on the acquisition of higher order reading abilities. In its research form, the hypothesis was: There is a significant difference in the acquisition of higher order reading abilities between two different approaches to the teaching of reading at the junior grade level. Presented as a null hypothesis, the research hypothesis would read: There is no significant difference in the acquisition of higher order reading abilities between two different approaches to the teaching of reading at the junior grade level.

For this factor, the F value as determined by the analysis of co-variance was 8.19. This value was found to be significant at the .95 level ($.95 F_{(1,35)} = 4.13$). The null hypothesis was, therefore, rejected. The difference in the acquisition of higher order reading abilities between the two groups, the language-experience group and the prepared instructional materials group, is significant.

The theoretical prediction pertaining to this factor was presented at the conclusion of the first chapter. At that point, it was predicted that children should make significantly greater gains as a result of the Language-Experience Approach, "almost regardless of their abilities and backgrounds"¹¹.

When compared with language experiences, Stauffer has maintained that prepared instructional materials do not capitalize on the children's intellectual abilities, on their language and wide range of experiences. The Language-Experience Approach, conversely, does take advantage of the children's linguistic, social, intellectual and cultural backgrounds. To Stauffer, the Language-Experience Approach represents a child-centered approach to reading, an approach "where the wealth of an individual is used as a base for skill development"¹².

Within the context of these language experiences, Stauffer has developed what he has defined as Directed-Reading-Thinking-Activities, activities upon which he has provided additional insight and information¹³ in terms of

¹¹ Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. 198.

¹² Ibid., p. 258.

¹³ Russell G. Stauffer, Directing the Reading-Thinking Process, New York, Harper and Row, 1975, p. 318-364.

practical operation. These activities, used with either individuals or groups of children, parallel closely the predicting-selecting-verifying sequence within the constructs of each child's highly personalized language and experiences.

Although Stauffer has not dealt, to any great extent, with the phenomenon of language¹⁴, he has proposed that the child utilizes his language as a means of freeing his thought from a form that is predominantly perceptual and intuitive and to then progress to a level that is conceptual and logical. It is this language of the child, Stauffer has maintained, which should be reflected in his reading materials since "facility in printed language should be acquired in a similar way (to that of oral language)"¹⁵.

Emphasizing that the reading programme should be predicated on the experiences of the child, Stauffer has maintained that a child reads in terms of that which he brings to the reading encounter. In Stauffer's theory, experience is vitally important to reading. A reading programme which is predicated on a child's experiences, a reading programme to which a child brings his experiences is ultimately a reading programme which provides for

14 Ibid., p. 15-21.

15 Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. 198.

maximal assimilation and accommodation, as those processes were defined by Piaget¹⁶.

A reading programme, predicated on a child's experiences, should permit anticipatory schemata to become increasingly more operative. Through the utilization of these schemata, the child is provided the wherewithal to anticipate and to predict. The process of bringing into play the anticipatory schemata permits the child to predict events, to anticipate solutions, to decrease the amount of uncertainty which he encounters in his reading. In short, reading becomes a process of predicting, selecting and verifying that which had been anticipated.

As a point of congruence between the factor of instructional procedures and that of evolving intellectual abilities, three basic ideas were presented. First, through the dual processes of assimilation and accommodation, a child reads in terms of what he already knows; his prior experiences and resultant knowledge make possible the assimilation of new ideas encountered in reading. Second, that which a child already knows permits him to predict, to select and to verify that which had been anticipated. The evolution of anticipatory schemata makes it possible

¹⁶ Jean Piaget and Barbel Inhelder, The Psychology of the Child, Op. Cit., p. 6.

for the child to predict, to find in his encounter that which he has predicted and then to verify his predictions. Third, that which a child already knows is subject to developmental stages. In Stauffer's theory, as in the others presented, reading is thinking; because thinking is developmental in nature, so too is reading. Thus, three basic ideas represented a point of congruence between the two research hypotheses.

Where Stauffer has theorized that children bring three attributes to the reading encounter - evolving intellectual capacity, developing linguistic fluency and ever-widening social interactions - Smith has proposed that they bring non-visual information. Defining non-visual information as information which derives from behind the eyeball, he has proposed that non-visual information is composed of that which the reader already knows about reading, about language and about the world in general.

To Smith reading consists of a trade-off between non-visual and visual information, a process in which a parallel may be drawn with Piaget's notion of assimilation and accommodation. Within the context of this trade-off, the reader utilizes redundancy, the replication within visual and non-visual information; thus, the more non-visual information the reader possesses, the less he must rely on visual information and the better equipped he is

to predict, to select and to verify in his reading. Extending Chomsky's transformational-generative grammar to the reading process, Smith has theorized that reading begins with deep structure, that comprehension precedes word identification. In this way, the reader is able to bring into play his long-term memory in which evolving ideas, concepts, categories and classes are stored; ideas, concepts and categories which are uniquely familiar to the individual.

Goodman's theory has served to extend that proposed by Smith. Common to both theories rests the notion that reading competencies develop most readily in the context of that which is familiar, in materials which most closely approximate the non-visual information and linguistic style of the reader. Providing such material is not an easy task. Each child brings a potentially different conceptual organization, different non-visual information, different linguistic style to the reading task. Reading materials based on deep structure to which each reader can relate his non-visual information and expressed in linguistic forms which reflect the unique language usage of each reader provide for maximal assimilation; they provide optimal opportunity for the predicting-selecting-verifying process to develop. Stauffer has suggested that only the reader can supply such materials through his unique language-experiences.

4. The Interaction of Instructional Procedures and Evolving Intellectual Abilities

The interaction hypothesis dealt specifically with the predicted interaction which should occur between evolving intellectual abilities and instructional procedures. In its research form the hypothesis was stated: There is a significant interaction between age or evolving intellectual abilities of subjects and instructional approaches to reading at the junior grade level in the acquisition of higher order reading abilities. Stated in its null form, the hypothesis would read: There is no significant interaction between age or evolving intellectual abilities of subjects and instructional approaches to reading at the junior grade level in the acquisition of higher order reading abilities.

For the interaction, the F value as determined by the analysis of co-variance was 7.87. This value was found to be significant at the .95 level ($.95 F_{(1,35)} = 4.13$). The null hypothesis was, therefore, rejected. There is a significant interaction between evolving intellectual abilities and instructional procedures at the junior grade level.

At the conclusion of the theoretical rationale, it was predicted that, given that children demonstrate evolving intellectual capabilities and that the Language-Experience

Approach is predicated on this evolving "wealth that children bring with them"¹⁷, it would be surmized that an interaction would occur between evolving intellectual abilities and the approach used; that is, it would be predicted that the Language-Experience Approach would be more effective with older children.

The descriptive analysis of the raw data indicated that, on the basis of the post test scores alone, the prediction had been supported. At the grade four level, the post test group means, for the prepared instructional materials group and the language-experience group, were 41.67 and 43.33 respectively. This constituted a difference between means of 1.66. At the grade six level, the post test group means, for the prepared instructional materials group and the language-experience group, were 56.79 and 58.72 respectively. This represented a difference between means of 1.93. A comparison of the differences between post test group means indicated that, however slight, the Language-Experience Approach had a greater effect at the grade six level than at the fourth grade level.

When the data was subjected to the inferential analysis, however, the differences between the adjusted

¹⁷ Russell G. Stauffer, The Language-Experience Approach, Op. Cit., p. iv.

group means were considerably different from those among the group means where only the post test scores were used. Because the pretest scores were used as the co-variate, a considerable adjustment was made in the group means. A comparison of both the pretest and post test group means with the adjusted group means, as presented in Figure 2, would indicate considerable inflation of the grade four group means and deflation of the grade six group means. Plotting the adjusted group means, then, indicated that, while there existed a significant interaction, the interaction was in a direction opposite to that predicted in the theory. At the grade six level, it appeared to make little difference which approach was used; the adjusted means were remarkably similar. At the fourth grade level, however, the adjusted means indicated that the results obtained with the Language-Experience Approach were superior to those obtained with prepared instructional materials.

Since class means were used as both co-variate and criterion measures and since it was found that the treatment appeared to have had a differential effect on individual teachers, this reversal of the predicted interaction prompted a review of the teachers' reactions during the course of the study. Throughout the experimental period, the fourth grade teachers were virtually unanimous

in expressing the feeling that they were simply continuing the teaching of primary reading and that the Language-Experience Approach would probably be as effective as the prepared instructional materials, if not more effective¹⁸. As the experiment progressed, the teachers using language experiences expressed the feeling that they were becoming more comfortable with the approach. Since none of the teachers had previously used the approach, they felt that it required some time to become accustomed to the increased freedom to learn that had to be afforded the children. They also felt that this increased freedom for the children had produced a change in attitude, on the part of the children, toward reading and language activities; they agreed that this change in attitude was a change for the better. At the conclusion of the experiment, one teacher chose to revert to using prepared instructional materials; nine elected to continue using the Language-Experience Approach. None of the teachers using prepared instructional materials opted for the Language-Experience Approach.

At the grade six level, the attitudes among the teachers using the Language-Experience Approach were markedly different from those using the approach at the

18 Bayne Logan, unpublished notes collected during the course of the investigation.

grade four level. They were unanimous in conceding that the Language-Experience Approach was predicated on a sound theoretical foundation but they were also unanimous in their belief that, it wouldn't work at the grade six level¹⁹. Throughout the duration of the experiment, the teachers appeared to feel that their classes were falling behind²⁰ those of their colleagues using prepared instructional materials. The ten teachers were unanimous in agreeing that they were not teaching the basics, that the less capable children were falling farther behind²¹, and that the Language-Experience Approach was a method intended for the teaching of beginning reading in grade one. While they observed considerably more activity among the youngsters in their language activities, the teachers tended to attribute this to creative writing²² and did not appear to see that this activity had a great deal to do with reading at the junior grade level.

With the testing at the conclusion of the experiment, all but one of the ten teachers using the Language-Experience Approach expressed concern that the test results

19 Ibid.

20 Ibid.

21 Ibid.

22 Ibid.

would confirm their suspicions that their classes had made less progress than those using prepared instructional materials. All appeared genuinely surprised, and pleased, with the post test results. Despite their surprise, however, at the conclusion of the experiment, all teachers returned to using prepared instructional materials, believing that, while the Language-Experience Approach is theoretically sound, it does not have applicability at the grade six level.

The forty teachers who participated in this study had all taken part in the same introductory course in children's reading. All had encountered the same theories, the same knowledge; yet, differences existed in their beliefs about the application of this knowledge. Combs, Avila and Purkey, as a result of their investigations into the nature of teaching as one of the helping professions concluded,

It goes without saying that an effective professional worker must be well informed about his subject. We have also observed that mere knowledge is not enough to guarantee successful application. For effective professional work, knowledge about the subject must be so personally meaningful to the helper as to have the quality of belief.²³

23 Arthur W. Combs, Donald L. Avila, and William W. Purkey, Helping Relationships: Basic Concepts for the Helping Professions, Boston, Allyn and Bacon, 1971, p. 11.

These teachers were well informed about their subject; they could enter into relevant discourse on any of the major theorists whom they had studied and were all considered by their colleagues to be good practitioners; but, these teachers did not believe that the theory could be successfully applied at the grade six level. It may have evolved, in large part, from a lack of belief in themselves as "information-providing adults"²⁴. As Combs has noted,

The practitioner, without commitment to his knowledge, cannot be counted upon to use what he knows when it is called for. Even an Einstein must believe in his theory to put it into practice.²⁵

For an Einstein to put his theory into practice, he must not only believe in his theory, he must also believe in himself. The teachers at the grade six level appeared to have an ever-abiding faith in their instructional materials and appeared not to see themselves as major resources in the reading process but rather as users of materials and methods. In large part, the teachers at the grade six level appeared to derive their identity from the materials they used. Their comments tended to reflect their concern for selecting appropriate reading materials which would be

24 Frank Smith and Kenneth Goodman, "On the Psycholinguistic Method of Teaching Reading", Op. Cit., p. 178.

25 Arthur W. Combs, Op. Cit., p. 11.

accompanied by a comprehensive guide book. They did not appear to relate as closely with the children as they did with the materials.

Smith and Goodman have emphasized that "the key factors of reading lie in the child and his interaction with information-providing adults, rather than in the particular materials used"²⁶. As if to echo this claim, Combs and his colleagues have written,

The task of professional workers is dependent upon entering into some kind of a relationship with others. But, one cannot have a relationship with a non-entity. Effective helpers must be somebody. They must possess sufficient personal strength to make sharing possible. They need to feel personally adequate to deal effectively with life.²⁷

This observation of the grade six teachers should not detract in any way from their value as teachers; rather, it should serve to direct increased attention toward the perceptual orientation of teachers at the junior grade level. It would appear prudent, at this point, to suggest that, unless teachers see themselves as information-providing adults capable of entering into a more meaningful and complete relationship with children, the Language-Experience Approach might not be as effective as theorized.

26 Frank Smith and Kenneth Goodman, Op. Cit., p. 178.

27 Arthur W. Combs, Op. Cit., p. 13.

From the vantage point of research design, it would be suggested that a quasi-experimental design²⁸ might be a more appropriate technique in investigating the effect of a Language-Experience Approach. In using such a design, no assignment of teachers is made to a particular approach; thus, teachers are permitted to use the approach with which they feel most comfortable, or in which they have greatest belief. In this study, teachers were randomly selected and randomly assigned to an approach. Never, in day-to-day practice, are teachers randomly assigned to an approach. Thus, while the internal validity of this investigation may have been maximized, the external validity of the study may have been seriously limited. It is suggested that in any further investigations, serious consideration be given to the utilization of a quasi-experimental design, thereby maximizing the external validity by taking into account the belief systems of the teachers.

To summarize, this section began with a review of the hypothesis and a decision to reject the null hypothesis. While the interaction was found to be significant, it was also found that the interaction lay in a direction opposite

28 Donald T. Campbell and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research, Chicago, Rand McNally, 1966, 84 p.

to that predicted. This reversal in direction of the anticipated interaction suggested that a closer observation be made of the teachers' expressed reactions during the course of the investigation. While teachers at the grade four level tended to view the Language-Experience Approach as an extension of the primary reading programme, the teachers using the approach at the grade six level indicated that, while they appreciated the theoretical foundations of the approach, they did not believe it could be applied at the grade six level. As a reflection of this belief, they tended to identify with certain materials and methods rather than seeing themselves as major resources in the reading process.

5. Summary

In this chapter, a discussion of the results obtained from the inferential analysis was presented. The discussion centered first on the phenomenon of heterogeneity of variance. Then the discussion moved to a consideration of each of the three hypotheses investigated in the previous chapter. It was found, first, that heterogeneity of variance was attributable to individual differences among teachers rather than to differences among children. On the basis of a comparative analysis of the increase in variance, it was found that the treatment had exerted a

differential effect on individual teachers. Freed from the prepared questions which accompany the published instructional materials, the teachers began to demonstrate individual differences, differences which reflected the uniqueness of the teacher. While the second and third hypotheses were supported in this study, the third hypothesis, that in which an interaction was predicted between instructional procedures and evolving intellectual abilities, was found to be significant but in a direction opposite to that predicted. In the interaction hypothesis, as in the heterogeneity of variance, teachers played an important role. It would appear that the belief systems of the teachers was an important determining factor in the direction taken in the interaction hypothesis.

SUMMARY AND CONCLUSIONS

Major reading theorists have, for some time, believed that the most important element in the reading encounter is the child and all that he brings with him to that encounter. Foremost among these theorists has been Russell Stauffer who has theorized that children bring three attributes to the reading encounter: evolving intellectual capacity, developing linguistic fluency, and ever-widening experiences and social interactions. These, he has claimed, have greater influence on a child's evolving reading competencies than the materials and methods used in the reading programme.

Having chosen Gate's definition of reading as his point of departure, Stauffer has maintained that reading is not a simple perceptual activity; rather, it is a process which involves the entire conceptual apparatus which a child brings, including his ability to think, to evaluate, to judge, to imagine, to reason and to solve problems. It is within the context of this concept of reading, that Stauffer has given form to his theory.

Stauffer's theory, predicated on a well-known and time-tested approach to the teaching of beginning reading, has revealed fundamental principles which may find a high degree of application at all grade levels. In this study, it was found that when Stauffer's theory was extended to the more comprehensive cognitive theory of Piaget and to

the more recent psycholinguistic theories of reading, it assumed as great, if not greater, a degree of applicability at the junior grade level.

When Stauffer's theory was interpreted within the broader context of Piaget's cognitive theory, three basic principles evolved. First, through the dual processes of assimilation and accommodation, a child reads in terms of what he already knows; his prior experiences and knowledge make possible the assimilation of new ideas encountered in reading; these new ideas encountered in reading, in turn, cause changes to occur in existing mental structures; thus, accommodation.

The second idea consisted of the notion that what a child already knows permits him to undertake three integral sub-processes in reading; what a child already knows allows him to predict, to select, and to verify that which had been anticipated. The development of anticipatory schemata make it possible for the child to predict, to select from his encounter that which he predicted and thus to verify his prediction. Through the existence of anticipatory schemata, and when combined with the dual processes of assimilation and accommodation, the reader is able to find regularities, patterns, and predictable sequences within his reading encounter.

The notion that what the reader already knows is subject to developmental stages constituted the third idea developed within the context of Piaget's theory. In Stauffer's theory, reading is thinking; because thinking is developmental in nature, so too is reading. At the traditional stage of beginning reading, the child's reading represents intuitive thought or preconceptual operation. The child's thinking in his reading then evolves through the level of concrete operations to the stage of formal operations where his thought is freed from its ties to the concrete. In developmental terms, the child's reading should, theoretically, reflect evolution in form from that of preconceptual to that of formal thought.

These three basic principles were found to constitute a large part of the common denominator for three major reading figures whose theories served to complement and to extend that proposed by Stauffer. It was found that Dechant has defined that which the child brings in terms of evolving concepts and categories, the richness and scope of which are in direct proportion to the richness and scope of the experiences from which they are derived. Through the utilization of these concepts, reading becomes, according to Dechant's definition, a process of relating the graphic symbols used by the author to one's own fund of experiences.

Smith has viewed this exchange as a trade-off between visual and non-visual information, where visual information was defined as the information emanating from the printed page and non-visual information as that which the reader already knows about reading, about language and about the world in general. Borrowing from the transformational-generative grammar of Chomsky, Smith has proposed that this trade-off occurs within the child's long-term memory and at the level of the deep structure of the passage being read. Using the deep structure of the passage, the child is then able to make predictions about the yet-unread passage, to select or sample from the passage and thus to verify his predictions.

In reflecting Smith's theory, Goodman has contended that the child, once he can relate his prior experiences to the deep structure of the passage, is then able to make predictions, or educated guesses, within the context of the surface structure. If the child is unfamiliar with the syntactic and semantic complexity of the surface structure, he will miscue, a process for which is is frequently penalized, but also a process which often provides the only clue that he has comprehended.

Common to both the theories of Smith and Goodman rested the notion that children read most readily within the context of that which is most familiar. In the terms

of reference of the psycholinguists, this would constitute providing reading materials rich in deep structure to which each child could relate his prior experiences and expressed in a linguistic form which would reflect the unique language usage of each child. It has been Stauffer's contention that only the child can provide such material. Thus, the child becomes the major portion of the common denominator for the theories reviewed.

To summarize their contributions to the field of reading, Smith and Goodman have contended that their major contribution has been in the insights they have provided for the teachers of reading. To them, the key factors of reading lie in the child and his interaction with information-providing adults. It is within the child and his interaction with adults that all the necessary ingredients for a successful reading programme lie.

A review of empirical studies, designed to investigate Stauffer's theory, revealed that, while the child was consistently considered, the teacher was not. Failure to take into account individual differences among teachers indicated that not only had the researchers not accounted for variance attributable to these differences, but also that they had failed to account for personological interactions among the children. Thus, it was decided that, in this study, consideration had to be given to these apparently important variables.

The presentation of the theoretical rationale and review of related literature led to the statement of the research problem and hypotheses. The research problem was stated as follows: If one controls for personological interactions and accounts for variance attributable to individual differences among teachers, what are the relative effects of evolving intellectual abilities, as determined by the grade level of the subjects, and approaches to reading used by the teacher on the acquisition of higher order reading abilities at the junior grade level?

In the light of the stated research problem, three hypotheses were investigated:

1. There is a significant difference in the acquisition of higher order reading abilities between older (grade 6) and younger (grade 4) subjects at the junior grade level.
2. There is a significant difference in the acquisition of higher order reading abilities between two different approaches to the teaching of reading at the junior grade level.
3. There is a significant interaction between age or evolving intellectual abilities of subjects and instructional approaches at the junior grade level in the acquisition of higher order reading abilities.

As a result of the inferential analysis, support was found for all three hypotheses; however, the third hypothesis was found to lie in a direction opposite to that predicted.

Finding empirical evidence to support the first hypothesis indicated that differences in the acquisition of higher order reading abilities are a function of evolving intellectual abilities. These findings beg discussion of two issues, both of which are important from a practical point of view.

The first of the two issues has to do with the appropriate age at which reading should be introduced. From the review of theory and related literature it would appear appropriate to conclude that reading can be introduced at any age, providing it is introduced in a form commensurate with the child's level of intellectual functioning, a point of view which serves to reflect Bruner's claim that, "any subject can be taught effectively in some intellectually honest form to any child at any stage of development"¹.

To illustrate, if reading is introduced at the preconceptual level, a period extending from about age two to about age four, it would be expected that a child's reading would be predominantly perceptual in nature. Basic language patterns reveal that the child can internalize his experiences only to the extent that he can form at

¹ Jerome S. Bruner, The Process of Education, New York, Vintage, 1960, p. 33.

least a basic understanding of classes. Because the child may not yet distinguish between apparently identical or even similar members of the same class, his intellectual functioning in reading will be at what Piaget has defined as the preconceptual level.

At the intuitive stage, the traditional stage of beginning reading, thought in reading as in any other intellectual enterprise, will be influenced more by perception than by logic. Thought, oral language and reading will tend to be egocentric; experiences will be interpreted from the child's point of view and within the context of his personalized language. As social interactions gain increasing importance, language and thought begin to be directed more toward the child's ever-expanding social interactions providing him with the wherewithal to move in the direction of operational thought.

At the stage of concrete operations, experiences with the real world, internalized in more or less conceptualized form, provide the non-visual information against which the child can interpret experiences gained through his reading. The child's new-found abilities to deal with classes and to use classes to extend his thought will be evidenced in his reading and through his reading. Although his thought will be still tied to the world of

the concrete, the child's reading should reflect his increasing ability to internalize that which he has read in more or less conceptualized form.

Should reading be introduced at the level of formal operations, the child's reading should reflect his new-found ability to move into the realm of propositional and abstract thinking. In his reading and through his reading, the child's thinking is freed from its ties with the concrete. His reasoning can shift from the real to the hypothetical, from the actual to the potential. As in the earlier stages, each level of intellectual functioning possesses its own unique characteristics of which the educator should be intimately aware. Reading can be introduced at any level, if the characteristics of that stage are respected.

The second issue has to do with the age at which the child normally begins to read, if freed from the context of instructional expectations. Left to his own devices, the child must surely begin his reading from the moment he begins to interact with his environment. A child reads in terms of what he already knows. From the moment the child first begins to explore, experience, and manipulate his world, he begins to build a store-house of information, a global montage of people, places, things. These experiences, explorations and encounters are later

organized into categories, conceptualized and internalized; concepts, the richness and scope of which reflect the richness and scope of the experiences from which they were derived, concepts which the child will eventually bring to his encounter with the world of the printed language.

Thus, to arrive at a viable conclusion regarding these two issues, it would appear, first, that reading can be introduced at any age, providing it is done at a level in keeping with the appropriate stage of the child's intellectual functioning. Second, it would appear that, left to his own devices, a child probably begins to read when he first interacts with his environment.

In view of these two conclusions, the concept of "reading readiness" acquires new dimensions. Interpreted within the context of the ideas presented in this section, the child is always "ready" to read. Readiness may lie with the teacher and not the child; readiness may well be an indicator of a teacher's preparedness to translate the reading process into a form compatible with the child's level of intellectual functioning. It may well be that "reading readiness" is not a learning or maturational phenomenon but rather a creation of pedagogical shortcomings, a measure of a teacher's ability or willingness to translate learning experience into terms

of reference appropriate to the child's ability to internalize that which has been experienced.

Viewed from the perspective of the child, "readiness" would appear to determine "how" rather than "what" a child will read as he acquires increasingly newer levels of intellectual functioning, an idea developed in greater detail by Logan². Evolving intellectual abilities play a vitally important role in the acquisition of higher order reading abilities. It is the wise teacher who recognizes and accommodates these abilities.

Finding empirical support for the second hypothesis indicated that differences in the acquisition of higher order reading abilities are a function of the instructional approaches used by teachers. Most assuredly these findings cause one to question the fate of published reading materials.

On first impulse one's immediate reaction might be to discard these materials in favour of using the Language-Experience Approach. It should be noted that, at to time during the course of the study, were published reading materials abandoned in the classes using the Language-Experience Approach. That which distinguished

² Bayne Logan, L'apprentissage des mathématiques chez l'enfant, Ottawa, Editions de l'Université d'Ottawa, 1976, p. 16-78.

between the two approaches taken in this study was an element of emphasis. In the Language-Experience Approach, the children's written language formed the basis for the reading programme; prepared instructional materials constituted the additional basis for recreational and independent reading. It would appear, from discussions with both the children and teachers, that these prepared instructional materials satisfied an additional need in the classroom, that of extending the children's horizons to new and exciting vicarious adventures.

The theories of the various individuals outlined in the first and second chapters of this study have prompted publishers of prepared instructional materials and, indeed, test materials, to review the textual format and content of their materials³. Although faced with the formidable task of attempting to provide materials rich in the deep structure to which each child can relate his non-visual information and expressed in linguistic patterns which reflect the unique language usage of each young reader, the publishers are willing to incorporate as much of the theory as is practically possible.

It would appear appropriate to suggest that a unique blend might be achieved in the classroom between

³ Personal interview with John McInnes, Ontario Institute for Studies in Education, April, 1977.

prepared instructional materials and language-experience activities, the language experiences providing the foundation, as in this investigation, for the development of reading abilities and the prepared materials offering an opportunity for extended recreational and independent reading. To deprive children of the opportunity to read widely, beyond their language experiences would appear, at this time, to be an injustice to all children, since the ultimate aim of an effective reading programme must surely be to encourage youngsters to extend their scope of reading activities and interests.

Within the constructs of recognizing the importance of children's evolving intellectual abilities and of providing a rich blend of reading materials for children, the discovery that the interaction, suggested in the third hypothesis, lay in a direction opposite to that predicted, served notice that there exists a third vitally important factor in a child's acquisition of reading abilities: the classroom teacher.

Among the teachers who took part at the grade four level, the prevalent expressed attitude toward the Language-Experience Approach was one of simply continuing the primary reading programme into the grade four level. Although somewhat indifferent to the approach, at the outset of the investigation, the teachers appeared to have

a change in attitude with nine teachers electing to continue with the approach at the conclusion of the experiment.

At the grade six level, the expressed attitude of the teachers was one of accepting the basic tenets of the approach but not believing that those tenets were applicable at the sixth grade level. It was concluded that the belief system held by the teacher was an extremely important factor in determining the degree to which that individual would be successful in applying newly-acquired knowledge about the reading process. It was surmized that unless teachers see themselves and, indeed, believe in themselves as information-providing adults capable of entering into a more meaningful and complete relationship with children, the Language-Experience Approach might not be as effective as theorized.

While the teachers' attitudes were examined and discussed, those of the children were not. This oversight most assuredly reflects the weaknesses which prevail in current research designs and, in this instance, detracted considerably from the contribution made by the study. Throughout the investigation, changes were observed in the children's attitudes, self-concepts and beliefs about themselves as learners. It would seem reasonable to suggest that future research in education might be directed toward an examination of those components of reading considered to

be within the affective domain and that more effective research procedures be sought which would serve to facilitate these directions.

It would appear, from evidence found in this study, that the key factors of reading truly lie within the child. The child is already programmed to read. Within him and all that he brings to the reading encounter lie all the necessary ingredients for a successful reading programme. Within him lies the predicting-selecting-verifying process; within him lies what Dohrmann has referred to as a "veritable cascade of hypotheses"⁴, the process necessary for successful reading to occur. What the child needs most are teachers who see themselves as major resources in developing his competencies as a language-learner. It is then that teachers should truly appreciate the wisdom of Kahlil Gibran:

No man can reveal to you ought but that which already lies half asleep in the dawning of your knowledge.

The teacher who walks in the shadow of the temple, among his followers, gives not of his wisdom but rather of his faith and lovingness.

If he is indeed wise he does not bid you enter the house of his wisdom, but rather leads you to the threshold of your own mind.⁵

⁴ P. Dohrmann, Gedankliches Lesen, Theorie der Ganzheitmethode, Hannover, Hahnsche Buchhandlung, s.d., as quoted in G. de Lansheere, Introduction à la recherche pédagogique, Bruxelles, Thonc, 1966, p. 14.

⁵ Kahlil Gibran, The Prophet, New York, Knopf, 1973, p. 56.

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Adkins, Patricia G., "Relevancy in Children's Language", The Reading Teacher, Vol. 24, No. 1, October, 1970, p. 7-11.

In this study it was hypothesized that the third grade reading material in an English school in El Paso, Texas, was not germane to the education of children whose native tongue was Spanish, nor was it suitable for their progress in learning English. The hypothesis was confirmed. It was suggested that, to help build vocabulary for these disadvantaged children, field trips to every available social, recreational and economic resource should be undertaken and that self-made books (Language-Experience) should be circulated in the classroom throughout the year, thus building a reading programme on the children's language and experiences.

Anastasi, Anne, Psychological Testing, third edition, London, MacMillan, 1968, 665 p.

This book, designed primarily as a text and reference book, outlines the basic theory underlying the principles of psychological testing. Of particular interest to the researcher are the reviews of most of the psychological and achievement tests currently in vogue.

Anderson, Scarvia B., Sequential Tests of Educational Progress, Co-operative Test Division, Educational Testing Service, Princeton, N.J., 1959, 86 p.

Although only the reading subtest was used in this experiment, the STEP tests also measure abilities in Listening, Writing, Mathematics, Social Studies and Science. Each test is presented as a diagnostic instrument outlining each of the component skills being measured by the particular subtests. While they were not used in this project, converted scores and grade equivalent norms, standardized on an American population, are provided.

Anderson, William W., Study of the Effects of Self-Directed Activity Upon Quantity, Quality and Variety of Responses in a Group Directed Reading Thinking Activity, unpublished doctoral dissertation, University of Virginia, 1971, 204 p.

The author, in this investigation, sought to identify the effect of Directed-Reading-Thinking-Activities on the quality, quantity and variety of children's responses. In all respects, Anderson found substantial increments when compared to those elicited from the more traditional Directed-Reading Activities. The author concluded that the "thinking" component of the Directed-Reading-Thinking-Activities is directly responsible for the observed increments.

Balasa, Michael A., "Vocabulary Conceptualization and Reading", Reading World, Vol. 13, May, 1974, p. 272-275.

In this study it was indicated that a child's understanding of words has to be re-interpreted according to his ability to conceptualize. Subjects who chose functional responses scored lower on reading achievement tests than students who chose conceptual responses. The results of this study would indicate that reading is a conceptual rather than a perceptual activity and that the main thrust of a reading programme should be toward the conceptual aspects.

Beebe, Mona J., "Case Studies of Grade-Level Effects on Children's Miscues and Reading Comprehension", Canadian Journal of Education, Vol. 1, No. 2, 1966, p. 51-62.

In this study, the author extended the theoretical rationale of Carroll's concept of language acquisition to the reading process. The investigation, although limited to only four children, provided convincing evidence to support the contention that the material provided for children must be meaningful or understandable to them within the language and experiences, whether concrete or vicarious, which they bring to the reading encounter.

Bernstein, Basil, "Social Structures, Language and Learning", Educational Research, Vol. 3, 1961, p. 163-176.

One of the most frequently quoted articles dealing with the nature of language, this paper has enabled researchers and practitioners, alike, to identify two codes in spoken and written language: the elaborated and the restricted codes. Extended to relevant implications for an effective reading programme, it would be surmized that individuals limited to the restricted, or private code would experience considerable difficulty in attempting to cope with materials written in the elaborated code.

Bormuth, John, "An Operational Definition of Comprehension Instruction", in K. Goodman and J. Fleming, eds., Psycholinguistics and the Teaching of Reading, Newark, International Reading Association, 1969, p. 48.

Bormuth has defined comprehension in terms of context, both syntactic and semantic. In doing so, he has advocated the use of the cloze technique in assessing level of comprehension on the part of the reader. Comprehension appears to be identified in terms of relating prior experiences to the deep structure of the passage being read; and then, using the deep structure of the passage to make educated guesses, predictions about the nature and sequence of the elements included in the surface structure.

Bormuth, John, "Readability: A New Approach", Reading Research Quarterly, Vol. 1, 1966, p. 79.

Traditionally, readability has been defined in terms of the identification of individual items included in the surface structure. In many instances, readability has been defined in terms of the perceptual components of reading. Bormuth has contended that the most important aspect of readability and comprehension is the measure of that which an individual brings to the reading encounter. Taking a much broader concept of the notion of readability, the author has served to elaborate on the role of long-term memory and deep structure in this approach to readability.

Bruner, Jerome S., The Process of Education, New York, Vintage, 1960, 97 p.

This book is probably the best-known and least-understood of the many books and articles written by Bruner. Originally prepared as the report on the now-famous Woods Hole Conference, this book has become one of the best sellers in education. Of the many probing and provoking comments made, that which pertains to the possibility of any subject being taught in some intellectually honest fashion to any child at any stage of development, is that which has attracted most attention and criticism. In the current study, this comment has been regarded from the vantage point of reading instruction.

Burke, Carolyn L., and Kenneth S. Goodman, "When A Child Reads: A Psycholinguistic Analysis", Elementary English, Vol. 47, No. 1, January, 1970, p. 121-219.

One of the foremost proponents of a psycholinguistic approach to reading, Goodman has provided a significant insight into the cognitive processes a child uses including hypothesizing, conjecturing, estimating. In this article, Goodman and Burke have presented a synthesis of considerable research that has been carried out at Wayne State University. Their findings would indicate that reading is a complex process of higher order cognitive operations and not simply a limited perceptual process.

Campbell, Donald T., and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research, Chicago, Rand McNally, 1966, 84 p.

In the current study, it was suggested that, since teachers are seldom, if ever, randomly assigned to an approach or set of materials, different results might have been obtained, had a quasi-experimental design been employed. In this book, Campbell and Stanley have outlined the pros and cons of both experimental and quasi-experimental designs for research. It would appear that, in educational research where attempts are made to maximize the external validity of the study, serious consideration should be given to the possibilities provided by quasi-experimentation.

Chomsky, Carol, "Stages in Language Development and Reading Exposure", Harvard Educational Review, Vol. 42, No. 1, February, 1972, p. 1-33.

This study of language acquisition in children six to ten years investigated their linguistic competence with respect to complex aspects of English syntax, or grammar. Thirty-six children were tested for knowledge of nine complex syntactic structures. Five structures were acquired in sequence indicating developmental stages in acquisition of syntax or understanding of the rules by which words are put together. The nature of the specific disparities between adult grammar and child grammar are discussed, indicating that there is a gradual reduction of these disparities as the children's knowledge of their native language increases.

Chomsky, Noam, Syntactic Structures, The Hague, Mouton, 1957, 286 p.

In the current study, the transformational-generative grammar of Chomsky played a significant role. Although written in a form and style which may prove to be difficult reading for the layman, this book affords insight into Chomsky's investigations into the nature of syntax. These studies, in turn, have served to provide a point of departure for the psycholinguistic theories of reading proposed by Smith and Goodman. For the individual, who might find difficulty comprehending Chomsky's concepts in relation to syntactic structures, a more insightful approach might be gained by first reading the theories of Smith and Goodman.

Chomsky, Noam, Aspects of a Theory of Syntax, Cambridge, Mass., The MIT Press, 1969, 274 p.

The earlier investigations made by Chomsky into the nature of syntactic structures have been more fully developed in this book. Chomsky has proposed that language consists essentially of two levels: the deep and surface structures of the language. Deep and surface structure are both considered to be elements of syntax; both are linked by a set of transformational rules which are applied to deep structure to transfer ideas into surface structure. As in Chomsky's earlier book, the individual newly-introduced to Chomsky's theory might be advised to begin by reading Smith and Goodman.

Clark, Herbert H., and Jeffrey S. Begun, "The Use of Syntax in Understanding Sentences", British Journal of Psychology, Vol. LIX, No. 3, 1968, p. 219-229.

The purpose of this study was to explore the processes by which people understand sentences. The results indicated the existence of two levels of processing. In the first level, it was noted that the first notions acquired are that written language exists in a left-to-right sequence and the second level is that there exists a hierarchy of complexity. This hierarchy may first exist as simple-compound-complex sentences, etc. Considerable time appears to be required for children to acquire these understandings.

Combs, Arthur W., Donald L. Avila, and William W. Purkey, Helping Relationships: Basic Concepts for the Helping Professions, Boston, Allyn and Bacon, 1971, 360 p.

Probably one of the widest-read books to be written as an application of perceptual psychology, this book has afforded additional insights into the nature of teachers as effective helpers. Of special interest to this particular investigation is the emphasis placed on the importance of the belief systems and self-concepts of teachers. In any extensions of the studies pertaining to the Language-Experience Approach to reading, it would be highly recommended that this book constitute a superb point of departure in investigating the effect of the teacher in the teaching-learning exchange.

Criscuolo, Nicholas P., "How Effective are Basal Readers with Culturally Disadvantaged Children?", Elementary English, Vol. XLX, March, 1968, p. 364-365.

The study was conducted in order to determine how effective basal readers were for teaching reading to two groups of culturally disadvantaged children. Two approaches were used: 1) an enrichment approach which combined skill and enrichment sections of the basal reader, and 2) an accelerated approach which used only skill development sections of the reader. A pre and post test indicated significant difference between the reading ability of the two groups in favour of the enrichment approach. It was therefore concluded that the reading of the children who had used the basal text thoroughly had improved significantly as compared with those who were exposed to the accelerated approach. The findings of the study implied that use of the basal reader will produce satisfactory achievement if used a sufficient length of time in order to allow for complete mastery of reading skills and although enrichment is usually advocated only for superior readers, it appears that enrichment is worthwhile for children with lesser reading ability.

Dapolito, Frank, Douglas Barker, and Joseph Wiant, "Context in Semantic Information Retrieval", Psychonomic Science, Vol. 24, No. 4, August, 1971, p. 180-182.

The study investigated the registration and retrieval of semantic linguistic information in memory. The results of the study indicated that recognition performance was highest when the context remained unchanged and that recognition performance was lowest when the context was new and unrelated to that commonly used by the child.

Davidson, Jane L., The Quantity, Quality and Variety of Teachers' Questions and Pupils' Responses During an Open-Communication Structured Group Directed Reading Thinking Activity and a Closed-Communication Structured Group Directed Reading Activity, unpublished doctoral dissertation, University of Michigan, 1970, 121 p.

This study closely parallels that undertaken by Anderson, as reported earlier in the bibliography. In this investigation, however, an added dimension was given to the study. Unlike the Anderson study, Davidson also investigated the quantity, quality and variety of questions posed by the teachers. The study appears to have been weakened through the utilization of only nine teachers and ninety children where only two lessons were taught. In using only the nine teachers, little consideration was given to the role of the teachers and no effort was made to account for individual differences which are apt to occur among teachers.

Dayton, C. Mitchell, The Design of Educational Experiments, Toronto, McGraw-Hill, 1970, 386 p.

In this book is presented a broad overview of most situations in which a univariate analysis is required. Essentially a statistics book, the text covers a wide range of experimental designs used in educational experiments. Of particular importance for this study was the exposition and accompanying examples of a factorial analysis of covariance.

Dechant, Emerald, Improving the Teaching of Reading, New Jersey, Prentice-Hall, 1970, 663 p.

This book is directed primarily toward the classroom teacher and, thus, is more of a practical source book than it is an outline of a theoretical rationale. In spite of its limitations, however, the book does provide some insight into the basic theoretical position which underlies the exposition. Throughout the book, there appears to rest the assumption that effective reading is predicated upon that which the reader brings to the reading encounter. Dechant has proposed that the reader brings evolving intellectual abilities to the reading task in the form of developing concepts, the nature and scope of which are indicative of the nature and scope of the experiences from which they were derived.

-----, Reading Improvement in the Secondary Schools, New Jersey, Prentice-Hall, 1973, 587 p.

Ideas, developed by Dechant in his earlier book, have been examined and refined for application at the secondary school level. As in his earlier book, this book is intended primarily for the classroom teacher and is, thus, a source book for practical ideas. To refer to the book, however, for the sole purpose of obtaining practical ideas would be to overlook Dechant's underlying thesis. As in the earlier book, he has recognized reading as a process of giving the significance intended by the writer to the graphic symbols by relating them to one's own fund of knowledge. To Dechant, success in reading is dependent upon that which the reader brings to the reading encounter.

Downing, John, Thinking About Reading, paper presented at the Annual Meeting of the International Reading Association, New York, May, 1975, 12 p.

A condition of cognitive confusion is the common state of youngsters in regard to concepts of units of writing. During the past ten years, research has been compiled to show that all children pass through the important stage of initial cognitive confusion in learning to read. Children often confuse "writing" with "drawing", "letter" with "number", etc. Cognitive confusion is a natural product of normal environmental conditions which cannot be avoided; however, if it is allowed to persist too long, it may prevent the child from understanding the task of learning to read. Several studies centered on helping children develop language concepts have been conducted. The general key to improving this type of concept learning is the use of the Language-Experience Approach. Children need experiences of spoken and written language which are relevant to them and which allow them to discover the functions of reading and writing.

Furth, Hans, Piaget and Knowledge: Theoretical Foundations, Englewood Cliffs, N.J., Prentice-Hall, 1969, 270 p.

One of the foremost interpreters of Piaget's epistemology, Furth has provided a comprehensive portrayal of the basic elements of Piaget's theory. In many instances, Furth has attempted to answer questions which Piaget has either overlooked or deemed to have been unimportant. To illustrate one of those instances, Furth has proposed that language must serve a greater purpose in enabling the child to make the intellectual leap from concrete operation to the level of formal thought, an idea which Piaget appears to have overlooked. Any attempt to reconcile the reading theory proposed by Stauffer with the developmental theory of Piaget must, at some point, attempt to explain the role of language in evolving intellectual abilities.

Glass, Gene V., and Julian C. Stanley, Statistical Methods in Education and Psychology, Englewood Cliffs, N.J., Prentice-Hall, 1970, 596 p.

Principally a statistics text, the book covers a wide range of statistical operations including measurement principles and descriptive statistics. The text is not limited solely to the mathematical aspects of arriving at statistical solutions. Included in the book is a wide ranging discussion of the fundamentals of experimental design. It is a text particularly useful to students taking an introductory course in univariate analysis.

Goldbecker, Sheralyn S., Reading: Instructional Approaches; What Research Says to the Teacher, National Education Association, Washington, D.C., 1975, 34 p.

In this book several definitions of reading and a number of teaching techniques are presented and discussed. Included is a review of early methods and the basal approach. Also included are recent trends such as the phonics approach, the linguistic approach, the Language-Experience Approach, the initial teaching alphabet, individualized reading, concept development, and programmed and multi-media approaches. A section on reading research considers meaning-emphasis programmes, code-emphasis programmes, as well as instructional approaches, and the problem of definitive research. Implications for the classroom teacher are briefly outlined and selected references are included.

Goodman, Kenneth S., "A Linguistic Study of Cues and Miscues in Reading", Elementary English, October, 1965, p. 639-643.

As in his later studies, Goodman has proposed that children will make errors in associating sound symbols to the printed words if they are unfamiliar with the syntactic-semantic complexity of the passage being read. Taking their cues from the relationship which exists between the language forms which they already possess and those introduced in the reading materials, children will frequently "miscue". In many cases, these miscues will be in the form of substitutions. It is likely that the child is attempting to reconstruct the surface structure of the passage being read into a form which is more familiar to him.

-----, Reading: A Psycholinguistic Guessing Game, paper presented at American Educational Research Association, 1967, mimeograph, 17 p.

Recognizing reading as a higher order cognitive activity and, thus, a psycholinguistic process, Goodman has proposed that the reader uses two levels of language as a means of making educated guesses about the yet-unread material presented to him. Goodman has contended that the effective reader utilizes his knowledge of the deep structure of a passage to make educated and calculated guesses about the elements of the surface structure. Guessing is characteristic of all good readers yet it is a process frowned upon by classroom teachers. To them reading appears to be accurate word-by-word reproduction of words as they are encountered in an isolated left-to-right sequence.

Goodman, Kenneth S., The Psycholinguistic Nature of the Reading Process, Detroit, Wayne State University Press, 1968, 347 p.

In this book, Goodman has outlined his particular approach to the process of reading. As his theory of reading develops, his concept of reading becomes increasingly more clear. To Goodman, reading is much more than a simple perceptual activity; reading involves all of the conceptual abilities which a child brings to the reading process including his ability to think, to evaluate, to judge, to imagine, to reason and to solve problems. In developing his theory, Goodman has contended that, for the teacher to regard reading as anything less than a higher order cognitive activity is to fail to do justice to the teaching of reading and to the child.

-----, "Analysis of Oral Reading Miscues: Applied Psycholinguistics", Reading Research Quarterly, Vol. 1, 1969, p. 9-30.

Rejecting the notion that reading is precise, accurate word-by-word reproduction of the printed language, Goodman has proposed that many "mistakes" or "errors" made in oral reading are really what he has defined as reading "miscues". Miscues arise from the reader's lack of familiarity with the surface structure of a passage or when his "train-of-thought" diverges from the deep structure of the passage being read. As a result of his studies, Goodman has prompted leading producers of reading tests and prepared instructional materials in reading to re-examine the textual content and format of their products, and, in many cases, revising the materials made available to the reader.

-----, "Psycholinguistic Universals in the Reading Process", in Frank Smith, Psycholinguistics and Reading, New York, Holt, Rinehart and Winston, 1973, p. 21-27.

Apparently borrowing from the field of comparative linguistics, Goodman has proposed that there exist certain common denominators in the reading process in all languages. Common to all languages rests the notion of deep and surface structures, sequences, relations, developing concepts. It would be surmized that, in view of these commonalities, certain common processes exist in the acquisition of higher order reading abilities among various language groups, dialectic groups, and social groups possessing a common linguistic style or pattern. In view of Goodman's thesis, there would appear to be an excellent opportunity for the researcher to investigate these claims.

Goodman, Kenneth S., and Catherine Buck, "Dialect Barriers to Reading Comprehension Revisited", The Reading Teacher, Vol. 27, October, 1973, p. 6-12.

In this article, it is suggested that in encouraging divergent speakers to use their language competence, both receptive and productive, and in accepting the dialect-based miscues of these readers, we minimize the effect of dialect differences. In rejecting the concept of dialects, we maximize the effect of "problem readers" by expecting these divergent speakers to read with word-perfect accuracy in an unfamiliar context. When these readers are presented with materials written in a form reflecting the character of their dialect, they demonstrate fewer miscues.

Goodman, Yeta, and Carolyn Burke, Reading Miscue Inventory, New York, MacMillan, 1973, 124 p.

As a natural extension of Kenneth Goodman's psycholinguistic analysis of cues and miscues, Yeta Goodman and Carolyn Burke have developed the Reading Miscue Inventory. Going far beyond identifying miscues as being simply reading errors, Goodman and Burke have classified the types of miscues children will make, according to grapho-phonetic, syntactic and semantic attributes. As in the case of Kenneth Goodman, the work of Goodman and Burke is predicated upon the transformational-generative language model of Noam Chomsky. Probably the most important aspect of Goodman and Burke's contribution to reading has been in the re-examination of reading test materials at the primary grade level where reading has been frequently defined as accurate word-by-word reproduction of the printed symbols.

Hall, Mary Anne, The Language-Experience Approach for the Culturally Disadvantaged, International Reading Association, Newark, 1972, 40 p.

This review on the Language-Experience Approach to reading instruction for the culturally disadvantaged is one of the reading information series. It was designed to review the past, assess the present and predict the future of reading education. A synthesis is provided which examines the research from a critical viewpoint, assesses knowledge, and considers limitations in both coverage and research methodology. The topics discussed in the synthesis section are achievement, readiness, creative writing, spelling, oral language development, student attitudes, teacher attitudes, and research methodology. In the third section, recommendations are made for future research. A bibliography is included.

Henderson, Edmund H., A Study of Individually Formulated Purposes for Reading in Relation to Reading Achievement Comprehension and Purpose Attainment, unpublished doctoral dissertation, University of Delaware, 1963, 155 p.

In this study, Henderson investigated one aspect of the notion that reading is a function of that which the reader brings with him. Examining the nature of individually formulated purposes on the part of the reader, Henderson found support for the idea that the non-visual information which a reader brings can be expressed in his declared purposes. While adding a definite element of credibility to Directed-Reading-Thinking-Activities, particularly the predicting component, this study has also offered significant insight into the problems which can be encountered by the individual who may be totally unaware of that which is contained in newly-encountered reading materials. For that individual, not only will he be unable to individually formulate purposes and thus predict, he will also encounter what may be insurmountable problems in his reading.

Hoyt, Homer, Four Paths to Teaching Reading, San Luis Obispo County, California, Superintendent of Schools, 1969, 88 p.

In this article four different approaches to beginning reading and the relative successes of each are related. Among those examined are the basal reader approach, language-experience, self-selection of books, and programmed instruction. No clear indication is provided of which approach might yield superior results. This book, however, remains as an excellent introduction to different approaches to reading.

Inhelder, Barbel, and Jean Piaget, The Early Growth of Logic in the Child: Classification and Seriation, (trans. E.A. Lunzer and D. Papert), London, Routledge and Kegan Paul, 1964, 302 p.

In the current study, reading was defined as being synonymous with thinking. Major authors have proposed that the child brings evolving abilities in classifying and seriating to the reading encounter. Inhelder and Piaget have reported, in this book, the processes which are basic to a child's ability to classify and to seriate. For the individual interested in an in-depth investigation into the evolution of children's evolving abilities to categorize and to use categories to extend thought processes, this book is required reading. All that remains is for enthusiastic and creative teachers to translate these ideas into necessary pre-requisites for an effective reading programme.

Jacobs, Leland, "Humanism in Teaching Reading", Phi Delta Kappan, Vol. 52, No. 8, April, 1971, p. 245.

Few terms have been more widely misunderstood as "humanism", whether presented in the rather restrictive context of reading or the much wider context of education. In this article Jacobs has used the term as indicating a phenomenon which emanates from within the individual. Proposing that the reading process emanates from within the reader and all that he brings to the encounter, Jacobs has proposed that the reader who brings little to the printed page, takes little from the printed page. Echoing an idea expressed by many others reviewed in the current study, Jacobs has emphasized the importance of evolving intellectual abilities which exist within the reader in the acquisition of higher order reading abilities.

Keith, Virginia, Design and Analysis in Experimentation, Ottawa, University of Ottawa Press, 1969, 268 p.

Designed primarily as a text and guide for graduate students in education and psychology, this book serves as an effective bridge between descriptive and inferential univariate analysis. This book was used as a primary source in this study as a reliable source for the statistical procedures, underlying assumptions, and theoretical rationale for the inferential analysis.

Kolers, Paul, "Reading is Only Incidentally Visual", in K. Goodman and J. Fleming, eds., Psycholinguistics and the Teaching of Reading, Newark, International Reading Association, 1969, p. 8.

Recognizing that reading is a trade-off between visual and non-visual information, Kolers has demonstrated that, for the reader who brings maximal non-visual information, minimal visual information is required from the printed page. The more non-visual information that is brought to the reading encounter, the less visual information that is required; thus, reading becomes a process that is only incidentally visual. Utilizing the knowledge of the deep structure of the passage, the competent reader merely samples the surface structure to select evidence which will verify the predictions which have been made. Fundamental to Koler's work is the idea that reading is a predicting-selecting-verifying process. It is a process which emanates from within the reader.

Kretschner, Joseph C., "Toward a Piagetian Theory of Reading Comprehension", Reading World, Vol. 14, March, 1975, p. 180-187.

In this study the need for developing a model of reading comprehension based upon natural growth of skill is presented. It is suggested that Piaget's theory of intellectual development offers a promising model for developmental research in reading comprehension, an approach which is developed further in the current investigation.

Lamb, Rose, The Language-Experience Approach for Teaching Beginning Reading to Culturally Disadvantaged Pupils, paper presented at the meeting of the American Educational Research Association, Chicago, Illinois, April, 1972, 18 p.

In this study of the ten participating inner-city school teachers, five used a modified basal series and five used the Language-Experience Approach for reading instruction. During monthly training sessions, the Medley and Smith's Observation Scale and Rating-Reading was used to lend objectivity to the observations carried out monthly by each teacher. From the results obtained, it was concluded that, first, for both achievement and attitude no significant differences occurred between the two groups when classes were treated as units; second, achievement differences favoured the language-experience groups when pupils were treated as units; third, when classes were treated as a third group, no significant differences occurred between groups; and fourth, when analysis of variance was used, findings illustrated that girls in the modified basal series were significantly superior in total reading and in I.Q.

Logan, Bayne, A Study of the Possible Distinction Between Developmental and Acquisitional Processes in the Attainment of Higher Order Reading Skills - A Univariate Analysis, unpublished masters thesis, University of Ottawa, 1972, 169 p.

In this study a very limited investigation was made of the effect of maturation and instructional procedures on the acquisition of higher order reading competencies. Although the teacher effect was taken into consideration, the very small sample of teachers made it impossible to determine what effect the teacher might have on the acquisition of higher order reading abilities. Conclusions failed to verify the hypothesis although this was attributed to the highly inflated beta error. It was recommended that a further investigation be made and, in so doing, to investigate the relevance of the psycholinguistic theories of reading which had evolved.

Logan, Bayne, L'apprentissage des mathématiques chez l'enfant, Ottawa, Editions de l'Université d'Ottawa, 1976, 87 p.

In this study, Logan investigated the degree to which Bruner's theory could be applied in the classroom situation. Using a quasi-experimental design, he utilized classes as they existed without random assignment of teachers to an approach or to an age group. By so doing, he attempted to maximize the external validity of the study. Basic to the investigation was an assessment of Bruner's claim that "any subject can be taught in some intellectually honest fashion to any child at any stage of development". Finding support for the claim, in a mathematical context, indicated a need to extend a similar investigation to the reading process.

Lohnes, Paul R., "STEP Reading: A Review", in O.K. Buros, ed., The Sixth Mental Measurements Yearbook, Highland Park, N.J., The Gryphon Press, 1961, p. 810-811.

In his review of the STEP test, Lohnes has levelled a criticism at the lack of statistical data regarding the test; however, he has found the reading test to be among the best available in terms of validation, particularly of construct validation.

Lutz, John, "Some Comments on Psycholinguistic Research in Education", in The Reading Teacher, Vol. 28, October, 1974, p. 36-39.

The author has contended that reading is an outgrowth of language and reading development and it is not necessary to return to the original development level of general language ability. The child should be allowed to use the language structure he already knows. Within the context of reading materials, it would be suspected that using accustomed language patterns would indicate favouring the Language-Experience Approach.

Miller, D.D., and Gail Johnson, "What We've Learned About Teaching Reading to Navajo Indians", The Reading Teacher, Vol. 27, March, 1974, p. 550-554.

It was found that Navajo students develop liking for and increased mastery of reading after having acquired a reading vocabulary of English words. As more English was spoken at home, these students were more capable of mastering reading principles in the English language.

Morgan, Lorraine Lee, Effects of an Integrated Language-Experience Approach and a Basal Language Arts Approach on Language Learning Outcomes in First Grade, Ed.D. dissertation, Pittsburgh, University of Pittsburgh, 1967, 101 p.

The author's findings would indicate that the method of teaching reading really has little bearing on the later reading efficacy of children.

Petre, Richard M., Quantity, Quality and Variety of Pupil Responses During an Open-Communication Structured Group Directed Reading Thinking Activity and a Closed-Communication Structured Group Directed Reading Activity, unpublished doctoral dissertation, University of Delaware, 1970, 131 p.

The fore-runner of many of the studies dealing with the nature of Directed-Reading-Thinking-Activities, this investigation appears to have set the pattern for several subsequent inquiries into the nature of these activities. Although using only two groups of fourth graders, and thereby failing to control for individual differences among teachers and personological interactions among children, the researcher found evidence to support his hypothesis that differential increments should accrue from Directed-Reading-Thinking-Activities.

Piaget, Jean, Structuralism, (trans. C. Maschler), New York, Basic, 1970, 153 p.

Throughout the theory of Piaget runs the idea of structures which are developed by children. Piaget has proposed that, in the process of internalizing, the child reconstructs his world. To do so, the child seeks out patterns and regularities in his environment to which he can relate his existing knowledge. This is the process of adaptation, the process of meeting his world. Through the dual processes of assimilation and accommodation, the child then reconstructs his world in terms which he can comprehend. What is reconstructed within the child are schemata, mental building blocks, cognitive structures which represent the external structures which he has encountered.

Piaget, Jean, The Psychology of Intelligence, (trans. C.K. Ogden), London, Routledge and Kegan Paul, 1971, 182 p.

In this translation of Piaget's investigations into the nature of human intelligence, the basic tenets of Piaget's theory are presented. It is in this book that Piaget's concept of "intelligence-in-action" is presented. Rejecting the idea that intelligence is a fixed, rather nebulous quantity, Piaget has proposed the concept of intelligence as a mobile, though still nebulous quality. According to Piagetian theory, intelligence leads to and results from a child's interaction with his environment; it modifies and is modified by the process of adaptation. It is this evolving, changing, intelligence which is reflected in Piaget's stage theory, a theory which is amply demonstrated and documented within the book.

-----, Psychology and Epistemology, (trans. A. Rosin), New York, Grossman, 1974, 166 p.

It has been argued that Piaget is not really a psychologist; rather, he is an epistemologist. Piaget, in turn, has sought to reconcile any dichotomy which might prevail between the concept of psychology and that of epistemology. In this book he has presented his views on the relationship between the two. To Piaget, a child's development is in terms of the degree to which he adapts to his environment, to the degree to which he comes to know his world. In Piagetian psychology rests the notion that functioning, on the part of the child, is related to the child's understanding of that which occurs in his world. It is this understanding which permits the child to adapt in a more meaningful manner to that which he encounters.

-----, and Barbel Inhelder, The Psychology of the Child, (trans. H. Weaver), New York, Basic, 1969, 173 p.

While Piaget may be best known for his work on cognitive development in children, his investigations have taken place within the context of the child's total interaction with his environment. In this book, Piaget and Inhelder have outlined the nature of that total interaction and adaptation. This book has been claimed to be among the best of the many co-authored by Inhelder and Piaget in that it provides a total perspective of the child in the adaptation process. For readers not totally acquainted with Piaget's theory, this book provides a superb point of departure in becoming acquainted with the theory.

Piaget, Jean, and Barbel Inhelder, The Child's Conception of Space, (trans. F.J. Langdon and J.L. Lunzer), London, Routledge and Kegan Paul, 1971, 490 p.

In this book, Piaget has presented what is probably his best exposition on the nature of anticipatory schemata. To Piaget, the evolution or development of cognitive structure is predicated on the grouping of operations and experiences which combine to form the cognitive structure. This grouping of operations usually occurs in the sequence in which the experiences or operations have been encountered. Out of this sequential grouping develops anticipatory schemata. These schemata serve an important function in the child's adaptation to his environment by providing him the wherewithal to predict the incidence of future operations and experiences, to anticipate and thus to seek out regularities in his environment. For the individual who wishes to acquire a greater understanding of the child's acquisition of anticipatory schemata, this book is required reading.

Salzinger, Suzanne, Kurt Salzinger, and Sally Hobson, "Memory for Verbal Sequences as a Function of Their Syntactical Structure and the Age of the Recalling Child", Journal of Psychology, Vol. LXIV, September, 1966, p. 79-90.

This study was concerned with an examination of preschool children's ability to respond differentially to verbal sequences varying in syntactic structure. It examined the strength of cohesion of these syntactic units for children between the ages of three and six making the assumption that the linking of words through the discriminative properties that constitute their syntactic structure reduces the number of units that need to be encoded in an immediate memory situation. The results were interpreted to demonstrate the early development of the child's sensitivity to linguistic frequency characteristics of English.

Shapiro, Lewis, Nicholas Anastasiow, and Denis Hoban, "The Mature Reader as an Educated Guesser", Elementary English, Vol. 49, No. 3, 1972, p. 418-421.

The study was conducted with twenty-three fourth grade children to investigate the role of syntactic and semantic familiarity on the acquisition of reading abilities. On the basis of the results obtained, it was surmized that familiarity with both syntactic and semantic elements enables the reader to become an educated guesser, an individual capable of using prior knowledge and experience to embark on the predicting-selecting-verifying sequence.

Smith, Frank, Understanding Reading: A Psycholinguistic Analysis of Reading and Learning to Read, New York, Holt, Rinehart and Winston, 1971, 230 p.

In this book, Smith has presented his basic theory of reading. It is in this book that he has described reading as a trade-off between visual and non-visual information. Based on the transformational-generative grammar model of Noam Chomsky, Smith has utilized the concept of deep and surface structure in attempting to explain the phenomenon of acquiring higher order reading abilities. This book has been recognized as one of the major contributing factors in new insights which have been gained into the nature of cognitive and linguistic processes involved in the reading process.

-----, Psycholinguistics and Reading, New York, Holt, Rinehart and Winston, 1973, 211 p.

The second of Smith's two major contributions to reading, this book is a compilation of essays and papers written by Smith and his contemporaries. It is obvious that the selection should include papers which serve to extend and to enlarge upon Smith's basic theory. Of probably most significance are the papers of Smith's close associate Kenneth Goodman. The similarity in approach to the reading phenomenon is quite obvious and clear. For the individual who wishes to pursue the field of psycholinguistics in greater depth, this book would be an appropriate point of departure.

Stauffer, Russell G., ed., The First Grade Reading Studies: Findings of Individual Investigations, Newark, International Reading Association, 1967, 165 p.

This book includes twenty-seven summaries of first grade reading studies carried out in 1964-1965. Most comments are based on sound, scientific findings.

-----, and Hammond W. Dorsey, "The Effectiveness of Language Arts and Basic Reader Approaches to First Grade Reading Instruction - Extended Into Second Grade", The Reading Teacher, Vol. 20, May, 1967, p. 740-746.

The purpose of this study was to test hypotheses that there is no significant difference between the effects of two methods of primary reading instruction when extended and applied at the second grade level. The two methods compared were the language arts approach and the basic reader approach. The objective was to determine if there would be a significant difference in intelligence, performance of boys and girls, writing mechanics, originality, oral reading performance, word recognition, handwriting skills, spelling, etc. The results indicated that no significant difference for chronological age between experimental and control groups existed. The language arts approach was found to be the more effective of the two approaches investigated.

-----, Teaching Reading as a Thinking Process, New York, Harper and Row, 1969, 307 p.

Strongly influenced by Piaget's thought, Stauffer has defined reading as a thinking process strongly affected by the influences of maturational, intellectual, linguistic and social processes.

-----, Directing Reading Maturity as a Cognitive Process, New York, Harper and Row, 1969, 498 p.

This book is considered to be the more intellectual counterpart of Teaching Reading as a Thinking Process. Where the latter book is ostensibly directed more toward the classroom teacher, Directing Reading Maturity as a Cognitive Process has been prepared primarily for the teacher education student. Because of this orientation, greater emphasis has been placed on the theoretical rationale and the results of empirical studies. This book is recommended for anyone who wishes to gain a greater understanding of Stauffer's approach to reading.

Stauffer, Russell G., The Language-Experience Approach to the Teaching of Reading, New York, Harper and Row, 1970, 301 p.

In this book, Stauffer has presented his theory that a reading programme based on the intellectual, linguistic and cultural wealth which a child brings to school should provide consistently superior results when compared to a basal reader approach and, that because reading is inextricably linked to language and intellectual ability, the process of reading is essentially developmental in nature; thus, it is strongly affected by the influence of maturation.

-----, Theoretical Rationale of the Language-Experience Approach, paper presented at the meeting of the International Reading Association, Atlantic City, April, 1971, 17 p.

In this text, the author has described the theoretical background of the Language-Experience Approach to teaching reading by relating research on cognition, child development and teaching. The close relationship between spoken language, reading and writing skills is discussed. The author has listed and described specific practices for teaching and learning in a language-experience programme including dictation, word banks, word recognition skills, creative writing, library usage, curriculum usage, and record keeping. Particular importance is given to the interrelationship between reading and other communication and learning skills and to the importance of affective, social, intellectual and individual factors on the reading process.

Strickland, Ruth, "The Language of Elementary School Children: Its Relationship to the Language of Reading Textbooks and the Quality of Reading of Selected Children", Bulletin of the School of Education, Indiana University, Vol. 38, 1961, p. 1-131.

This investigation of the syntax of children's language became a study of the comparison of that language with the language of prepared reading materials. The most outstanding observation of this study is that the language of the children is much more advanced than that of the reading materials.

Svedman, Shirley, "Semantic Sensitivity and Reading Achievement", The Reading Teacher, Vol. 23, No. 7, 1970, p. 640-646.

Semantic sensitivity refers to an awareness that words have more than one meaning and a particular meaning implied varies with the context. Mature reading skills depend on the development of semantic insights. This study was designed to delineate the term "semantic sensitivity". A test of "semantic sensitivity" was compiled and administered to four heterogeneous classes of sixth grade students. The test was composed of seven sections each testing a facet of "semantic sensitivity". The test could be a beneficial tool for the teacher to use at the beginning of the year or at other times when a quick approximation of the students' reading achievement on language comprehension is needed.

Thorn, Elizabeth A., "Language-Experience Approach to Reading", The Reading Teacher, Vol. 23, No. 8, 1969, p. 3-8.

Further substantiation is provided which supports the assumption that reading is a "thinking process". The author has maintained that a successful school language programme builds on the same learning patterns that operated at the preschool level when the child was developing his own system of learning. It should be realized, therefore, that language develops in relation to experience and a classroom environment that provides a wealth of experiences stretches the child's language. A language-experience programme, then, should serve two major functions. It should enrich and extend each pupil's experience and it should promote facility in the use of oral and written language.

Thorndike, Robert L., "Reading as Reasoning", Reading Research Quarterly, Vol. 9, 1973-1974, p. 135-147.

Evidence is provided which indicates performance in reading is primarily an indicator of general level of thinking and reading processes within the child rather than special skill.

Van Allen, Roach, Language Experiences Which Promote Reading, paper presented at the Early Childhood Lecture Series, Eastern Michigan University, Michigan, September, 1969, 16 p.

In the Language-Experience Approach to reading instruction, communicative skills are viewed without distinction among listening, speaking, spelling, and writing. The children learn to conceive of expression and reception of expression as natural parts of experience, rather than as separate tasks that occur during a break in regular activity. The skillful language-experience teacher weaves opportunities for communication practice (listening, speaking, writing, reading, and dictating) unobtrusively into the fabric of daily experience. Through this practice, the child comes to feel that he can talk about what he thinks, that he can talk about what he can communicate in other ways, and that he can recall what he or others dictate and what he or others write through reading. The child comes to recognize letters and their function, and learns little by little the details of language use, because he wants to. New skills are put to immediate use and receive immediate positive feedback. Through this method, children not only learn to read better, but they also develop mature concepts about the value and use of reading and other communicative skills.

-----, Updating the Language-Experience Approach, paper presented at the International Reading Association Conference, California, May, 1970, 5 p.

In this paper, three recent developments which were representative of some of the modern trends in the Language-Experience Approach were discussed. The first stressed the increased use of multisensory materials which have expanded the chances for success of many language-limited children. The second trend focused on the extended use of learning centers to provide them with a place for personalized learning and, the third emphasized new teaching materials for a Language-Experience Approach focusing on the development of language of higher order content.

Velluntino, Frank R., Robert W. Pruzet, and Joseph A. Stager, "Immediate Visual Recall in Poor and Normal Readers as a Function of Orthographic-Linguistic Familiarity", Cortex, Vol. 9, December, 1973, p. 370-386.

In the hypotheses of this study, it was predicted that visual perception skills of poor readers are comparable to those of normal readers. The prediction was supported. Evidence was provided that visual-spatial deficit was an unlikely cause of reading disability and the view that reading disorders were due to disfunction in visual-verbal integration was supported.

Vorhaus, Renee Pool, Analysis and Comparison of Oral Miscues Generated by First Grade Students on Four Different Reading Tasks, Ed.D. dissertation, University of Pennsylvania, 1976, 144 p.

In this research, miscue responses of twenty first grade pupils to twenty stimulus words were compared and analyzed for four different reading tasks; first, in isolation; second, in ten free-standing sentences; third, embedded in a complete story; and fourth, embedded in an illustrated story. Analysis using the Reading Miscue Inventory indicated a significant gain in correct responses to the stimuli embedded in a meaningful context. A comparison of miscues indicated that miscues spaced across context were not as much of a problem as were a number of meaning-destroying miscues in one sentence, and, that one miscue seems to influence other responses in a sentence. Differences in reading proficiency were not based on ability to identify graphic cues, but on awareness that reading is a meaning-constructing process.

Winer, B.J., Statistical Principles in Experimental Design, Toronto, McGraw-Hill, 1962, 326 p.

Although primarily a statistics text, this book provides considerable insight into the statistical implications of designs which tend to be more complicated than those frequently encountered. Numerical examples for statistical procedures, particularly the factorial analysis of co-variance, were used to test the computer programmes used in this study.

Levene's Test for Homogeneity of Variance:

Post Test Scores

Cell 1	Cell 2	Cell 3	Cell 4
1.20	.70	3.02	2.38
1.60	2.71	.20	.27
2.75	.38	.04	4.27
2.46	.12	3.03	2.53
.27	.74	4.08	1.94
1.12	.14	1.57	2.95
.70	.76	.85	.23
.85	1.55	5.86	2.28
.41	1.14	1.61	3.85
.96	.56	3.24	2.50

Source Table

Source	SS	d.f.	M.S.	F Ratio
Between Variance	16.98	3	5.66	3.56*
Within Variance	57.19	36	1.59	

*Significant at the .95 level of significance (.95 $F_{(3,36)} = 2.87$)

Levene's Test for Homogeneity of Variance:

Pretest Scores

Cell 1	Cell 2	Cell 3	Cell 4
1.18	1.47	2.89	.16
3.68	1.53	.04	.81
2.14	1.02	1.48	1.18
3.45	1.34	1.45	2.64
.41	.39	3.92	2.56
.93	.45	1.68	1.49
.46	.33	1.05	.37
1.54	.73	4.02	1.57
.31	.41	1.41	3.49
1.02	.28	1.99	.79

Source Table

Source	SS	d.f.	M.S.	F Ratio
Between Variance	7.31	3	2.44	2.17
Within Variance	40.44	36	1.12	

This F Ratio was non-significant at the .95 level ($.95 F_{(3,36)} = 2.87$)

Analysis of Variance of Within-Class Standard Deviations

Cell 1	Cell 2	Cell 3	Cell 4
3.75	4.29	6.41	6.69
6.54	5.64	4.01	5.12
5.04	5.22	4.81	5.81
6.40	4.59	4.88	7.49
5.65	5.25	5.25	6.95
8.46	5.20	4.60	4.78
6.27	5.08	5.17	5.17
5.18	4.81	5.20	4.03
6.28	3.86	6.43	5.48
5.23	4.24	5.53	4.66

<u>Source Table</u>				
Source	SS	d.f.	M.S.	F Ratio
Between Variance	6.45	3	2.15	2.35
Within Variance	32.89	36	.91	

Non-significant at the .95 level ($.95 F_{(3,36)} = 2.87$).

RAW DATA

Teacher 1

Subject No.	Pretest	Post Test
1	40	44
2	39	46
3	38	44
4	40	43
5	40	44
6	44	46
7	43	42
8	39	45
9	38	46
10	30	42
11	37	39
12	39	38
13	40	44
14	28	35
15	34	44
16	29	46
17	44	40
18	46	44
19	47	39
20	42	48
21	39	46
22	40	44
23	35	42
24	32	38
25	30	40
26	44	46
27	46	46
28	44	46
29	43	44
30	28	34
31	34	38
32	35	37
33	34	39
34	32	40
35	34	35
36	33	38
37	34	37

RAW DATA

Teacher 2

Subject No.	Pretest	Post Test
38	43	44
39	48	48
40	39	43
41	34	36
42	38	41
43	43	44
44	53	51
45	50	51
46	48	52
47	46	48
48	43	42
49	44	45
50	48	46
51	50	50
52	48	54
53	46	48
54	47	43
55	33	35
56	24	26
57	35	38
58	38	40
59	38	40
60	38	48
61	44	46
62	38	43
63	36	42
64	28	29
65	39	41
66	31	31
67	32	38
68	34	32
69	33	38
70	38	43
71	39	41

RAW DATA

Teacher 3

Subject No.	Pretest	Post Test
72	38	42
73	33	34
74	32	38
75	31	33
76	29	32
77	36	48
78	38	40
79	32	38
80	33	32
81	38	39
82	23	25
83	39	40
84	34	38
85	35	40
86	40	41
87	38	42
88	30	43
89	41	43
90	33	34
91	34	38
92	34	42
93	43	45
94	32	34
95	31	36
96	32	31

RAW DATA

Teacher 4

Subject No.	Pretest	Post Test
107	38	42
108	37	44
109	36	43
110	33	43
111	32	42
112	31	34
113	29	43
114	34	29
115	33	45
116	38	40
117	27	42
118	42	43
119	41	45
120	44	40
121	43	48
122	30	34
123	38	44
124	33	43
125	32	35
126	40	43
127	42	44
128	40	43
129	41	42
130	32	35
131	34	35
132	23	38
133	34	32
134	22	40
135	40	41
136	43	45
137	28	33
138	29	31
139	27	28
140	22	29
141	18	31
142	29	34
143	13	18
144	28	31

RAW DATA

Teacher 5

Subject No.	Pretest	Post Test
145	43	48
146	34	40
147	43	49
148	48	43
149	43	45
150	33	46
151	44	45
152	43	45
153	34	44
154	45	42
155	40	44
156	22	28
157	40	43
158	31	44
159	42	43
160	30	34
161	36	33
162	38	44
163	33	36
164	33	43
165	44	45
166	33	46
167	38	38
168	42	35
169	43	50
170	42	48
171	31	38
172	32	41
173	31	32
174	39	44
175	31	34
176	32	31
177	28	33
178	34	38

RAW DATA

Teacher 6

Subject No.	Pretest	Post Test
179	33	40
180	42	5
181	43	45
182	34	38
183	38	49
184	33	36
185	40	44
186	42	48
187	43	50
188	38	42
189	35	38
190	40	45
191	39	38
192	36	43
193	38	48
194	33	44
195	33	29
196	42	45
197	33	43
198	38	44
199	35	38
200	38	45
201	40	48
202	43	48
203	34	43
204	35	40
205	36	46
206	38	48

RAW DATA

Teacher 7

Subject No.	Pretest	Post Test
207	33	38
208	38	43
209	34	35
210	32	36
211	38	40
212	51	54
213	23	28
214	40	45
215	38	40
216	37	36
217	38	44
218	40	43
219	42	45
220	43	58
221	36	48
222	33	44
223	24	30
224	38	43
225	35	35
226	36	39
227	38	45
228	40	46
229	41	44
230	36	38
231	37	42
232	43	40
233	34	38

RAW DATA

Teacher 8

Subject No.	Pretest	Post Test
234	37	43
235	41	44
236	42	45
237	41	45
238	36	38
239	31	39
240	32	36
241	34	38
242	41	46
243	36	38
244	45	47
245	26	31
246	47	45
247	28	31
248	43	47
249	41	46
250	44	45
251	36	37
252	47	48
253	36	29
254	31	41
255	37	37
256	41	44
257	35	46
258	41	47
259	37	41
260	38	41
261	41	47
262	38	42

RAW DATA

Teacher 9

Subject No.	Pretest	Post Test
263	35	38
264	34	39
265	31	35
266	31	37
267	30	41
268	28	33
269	36	37
270	41	45
271	37	36
272	41	45
273	36	38
274	43	47
275	47	52
276	45	48
277	37	38
278	36	41
279	33	37
280	44	51
281	35	36
282	43	44
283	36	41
284	37	38
285	41	51
286	40	47
287	39	48
288	21	25

RAW DATA

Teacher 10

Subject No.	Pretest	Post Test
289	38	42
290	31	34
291	33	33
292	41	45
293	37	37
294	36	43
295	35	38
296	37	45
297	41	43
298	25	31
299	27	36
300	41	43
301	25	41
302	37	46
303	35	47
304	41	45
305	32	34
306	31	35
307	42	46
308	32	31
309	33	37
310	36	41
311	37	38
312	25	27
313	34	36
314	39	41
315	35	39
316	41	44
317	37	42
318	42	44
319	44	47

RAW DATA

Teacher 11

Subject No.	Pretest	Post Test
320	39	47
321	43	49
322	33	37
323	41	45
324	38	47
325	34	51
326	41	46
327	33	37
328	39	38
329	34	39
330	38	45
331	43	49
332	36	48
333	37	42
334	42	43
335	32	36
336	34	41
337	36	41
338	37	44
339	43	46
340	38	38
341	39	48
342	40	45
343	38	43
344	33	47
345	44	46
346	51	52
347	36	41
348	39	46

RAW DATA

Teacher 12

Subject No.	Pretest	Post Test
349	37	42
350	39	46
351	38	35
352	39	48
353	40	46
354	29	38
355	28	33
356	29	31
357	33	36
358	38	49
359	41	40
360	43	47
361	42	46
362	42	49
363	38	48
364	30	37
365	28	32
366	33	36
367	36	41
368	41	48
369	29	35
370	36	41
371	40	45
372	42	46
373	33	38
374	30	36
375	28	35
376	28	36
377	34	38

RAW DATA

Teacher 13

Subject No.	Pretest	Post Test
378	38	50
379	25	29
380	27	34
381	39	42
382	30	44
383	43	47
384	42	41
385	39	41
386	47	56
387	28	38
388	43	44
389	34	44
390	36	47
391	39	41
392	43	44
393	34	47
394	44	49
395	43	42
396	35	44
397	36	36
389	34	47
399	43	48
400	39	46
401	34	44
402	46	42
403	37	42
404	43	50
405	39	45

RAW DATA

Teacher 14

Subject No.	Pretest	Post Test
406	34	47
407	43	45
408	31	37
409	37	46
410	38	51
411	26	39
412	37	37
413	43	45
414	36	47
415	28	45
416	27	42
417	33	37
418	44	46
419	41	45
420	43	47
421	39	51
422	37	47
423	40	43
424	33	37
425	38	41
426	29	35
427	33	37
428	28	43
429	34	47

RAW DATA

Teacher 15

Subject No.	Pretest	Post Test
430	34	44
431	36	37
432	29	38
433	33	44
434	41	52
435	33	37
436	34	45
437	35	36
438	36	48
439	43	48
440	27	41
441	39	53
442	34	42
443	43	57
444	34	36
445	36	38
446	37	44
447	33	37
448	39	42
449	33	46
450	35	47
451	34	46
452	43	47
453	44	48
454	36	49
455	43	47
456	36	48
457	33	38
458	44	47
459	35	42
460	38	42

RAW DATA

Teacher 16

Subject No.	Pretest	Post Test
461	29	35
462	36	37
463	28	37
464	44	44
465	36	47
466	47	57
467	36	47
468	34	38
469	35	41
470	38	48
471	43	57
472	49	46
473	40	46
474	44	49
475	37	38
476	39	45
477	35	41
478	36	47
479	37	38
480	38	42
481	39	43
482	34	46
483	33	44
484	46	48
485	29	35
486	38	46
487	36	41
488	37	44
489	36	39
490	35	47
491	33	42
492	41	44
493	39	42
494	31	37

RAW DATA

Teacher 17

Subject No.	Pretest	Post Test
495	36	45
496	43	47
497	39	43
498	33	49
499	38	38
500	37	49
501	40	47
502	33	36
503	34	45
504	52	53
505	28	38
506	37	49
507	36	47
508	34	46
509	48	52
510	43	45
511	37	44
512	33	47
513	39	45
514	28	37
515	37	42
516	39	45
518	37	41
519	36	36
520	34	47
521	35	38
522	37	41
523	36	46
524	34	37
525	37	47
526	39	45
527	43	53
528	43	45
529	41	47
530	25	31

RAW DATA

Teacher 18

Subject No.	Pretest	Post Test
531	36	37
532	43	45
533	38	53
534	37	45
535	37	46
536	29	36
537	37	44
538	25	39
539	39	35
540	43	44
541	35	37
542	36	38
543	37	41
544	39	53
545	41	45
546	42	37
547	33	45
548	29	35
549	37	37
550	29	42
551	37	46
552	33	44
553	36	35
554	39	45
555	38	37
556	27	36
557	34	41
558	37	39
559	39	44
560	33	45
561	36	47
562	37	39
563	36	48
564	39	44
565	39	45
566	33	35
567	41	42

RAW DATA

Teacher 19

Subject No.	Pretest	Post Test
568	34	44
569	43	45
570	39	43
571	37	42
572	43	49
573	36	42
574	43	48
575	44	46
476	32	45
577	34	46
578	36	43
579	37	47
580	41	45
581	34	41
582	38	43
583	37	49
584	39	47
485	38	38
586	34	46
587	37	43
588	33	37
489	35	38
590	37	43
591	34	37
592	36	51
593	37	46
594	39	49
595	29	42
596	34	47
597	35	46
598	37	47
599	44	49
600	43	45
601	37	49
602	42	48
603	33	35

RAW DATA

Teacher 20

Subject No.	Pretest	Post Test
604	34	46
605	37	39
606	39	43
607	43	45
608	34	47
609	36	46
610	37	49
611	43	45
612	42	46
613	29	38
614	30	36
615	41	47
616	37	48
617	34	41
618	38	47
619	27	36
620	36	48
621	37	49
622	36	38
623	29	36
624	41	45
625	37	47
626	39	42
628	38	35
629	43	48
630	34	46
631	39	43
632	43	47
633	38	43
634	37	49
635	34	42
636	39	43
637	44	48

RAW DATA

Teacher 21

Subject No.	Pretest	Post Test
638	51	59
639	55	63
640	50	57
641	45	58
642	53	64
643	45	53
644	44	54
645	55	65
646	59	64
647	55	68
848	40	47
649	33	38
650	55	64
651	46	57
652	55	68
653	60	57
645	55	63
655	53	68
645	60	65
657	50	59
658	57	61
659	45	56
660	43	53
661	49	58
662	55	60
663	57	64
664	51	57
665	53	63
666	45	57
667	49	58
668	35	49
669	53	63
670	55	68
671	54	63
672	55	68
673	59	64

RAW DATA

Teacher 22

Subject No.	Pretest	Post Test
674	51	54
675	49	60
676	48	57
677	52	63
678	51	57
679	33	48
680	45	58
681	51	56
682	50	54
683	45	57
684	44	54
685	51	59
686	49	60
687	49	54
688	51	57
689	52	60
690	57	63
691	49	58
692	44	54
693	43	53
694	49	57
695	57	63
696	50	57
697	51	59
698	50	60
699	52	58
700	47	60
701	44	57
702	40	48
703	49	54
704	47	56
705	39	46

RAW DATA

Teacher 23

Subject No.	Pretest	Post Test
706	45	54
707	51	57
708	40	50
709	35	47
710	53	63
711	52	64
712	51	65
713	53	60
714	55	59
715	40	60
716	44	54
717	49	57
718	48	55
719	47	60
720	40	52
721	43	48
722	49	59
723	44	57
724	45	49
725	43	53
726	40	54
727	42	56
728	44	60
729	43	58
730	49	57
731	43	53
732	50	57
733	51	58
734	55	63
735	53	66

RAW DATA

Teacher 24

Subject No.	Pretest	Post Test
736	53	59
737	45	60
738	44	57
739	50	59
740	53	63
741	51	57
742	54	64
743	52	59
744	57	68
745	59	63
746	53	65
747	54	62
748	40	57
749	34	43
750	53	59
751	51	63
752	52	60
753	59	64
754	54	65
755	50	63
756	44	57
757	53	62
758	40	53
759	49	64
760	45	53
761	44	63
762	49	57
763	44	56

RAW DATA

Teacher 25

Subject No.	Pretest	Post Test
764	45	49
765	53	57
766	55	64
767	62	68
768	53	59
769	54	65
770	57	59
771	65	64
772	62	68
773	53	59
774	60	65
775	54	57
776	55	64
777	36	50
778	54	56
779	47	55
780	55	58
781	60	65
782	54	59
783	53	64
784	54	65
785	57	56
786	56	66
787	54	62
788	55	63
789	57	68
790	60	63
791	62	68
792	54	58
793	53	52

RAW DATA

Teacher 26

Subject No.	Pretest	Post Test
794	51	55
795	49	56
796	57	67
797	54	62
798	45	57
799	44	54
800	33	48
801	54	56
802	59	63
803	51	59
804	54	64
805	53	59
806	50	63
807	55	64
808	57	62
809	49	58
810	57	64
811	46	54
812	40	50
813	51	60
814	53	57
815	52	60
816	51	64
817	44	62
818	45	57
619	44	60
820	39	48
821	51	53
822	53	60
823	47	54
824	50	57
825	51	59
826	52	60

RAW DATA

Teacher 27

Subject No.	Pretest	Post Test
827	43	52
828	49	56
829	45	54
830	49	57
831	45	54
832	44	56
833	29	40
834	35	50
835	40	43
836	51	56
837	44	54
838	43	52
839	42	55
840	49	54
841	45	56
842	52	60
843	51	61
844	51	56
845	50	62
846	55	64
847	49	57
848	47	56
849	43	52
850	55	63
851	40	54
852	51	58
853	50	59
854	53	60
855	52	62
856	53	61
857	52	60

RAW DATA

Teacher 28

Subject No.	Pretest	Post Test
858	40	43
859	44	50
860	44	51
861	47	53
862	45	50
863	38	47
864	44	48
865	45	50
866	50	55
867	44	55
868	50	47
869	54	61
870	45	53
871	44	48
872	45	51
873	43	48
874	50	57
875	47	59
876	45	53
877	44	48
878	43	51
879	42	47
880	40	50
881	45	51
882	25	33
883	45	50
884	46	53
885	44	57
886	38	51
887	45	58

RAW DATA

Teacher 29

Subject No.	Pretest	Post Test
889	56	61
890	28	37
891	38	48
892	46	54
893	45	48
894	48	59
895	47	55
896	50	56
897	49	58
898	54	59
899	38	46
900	54	70
901	45	55
902	48	59
903	47	53
904	48	54
905	47	57
906	48	52
907	47	58
908	45	53
909	40	55
910	38	51
911	47	52
912	54	59
913	42	61
914	55	67
915	47	58
916	55	50

RAW DATA

Teacher 30

Subject No.	Pretest	Post Test
917	45	53
918	47	52
919	48	55
920	49	53
921	50	58
922	55	67
923	40	47
924	28	36
925	40	46
926	56	63
927	44	48
928	45	59
929	47	54
930	44	52
931	45	48
932	48	53
933	47	54
934	45	55
935	48	52
936	47	54
937	48	53
938	54	61
939	40	55
940	39	51
941	40	52
942	47	54
943	39	50
944	50	55
945	54	61
946	48	52
947	42	53
948	45	50
949	56	61

RAW DATA

Teacher 31

Subject No.	Pretest	Post Test
950	51	54
951	57	58
952	52	58
953	48	51
954	45	56
955	43	58
956	42	50
957	48	51
958	47	57
959	46	52
960	43	51
961	59	60
962	48	51
963	65	69
964	57	58
965	53	54
966	57	68
967	66	64
968	57	58
969	48	63
970	62	66
971	53	58
972	43	49
973	59	62
974	41	51
975	59	62
976	38	44
977	50	51
978	41	46
979	28	43
980	48	52
981	41	47
982	33	51
983	42	49
984	50	66

RAW DATA

Teacher 32

Subject No.	Pretest	Post Test
985	50	53
986	48	54
987	51	61
988	50	52
989	47	52
990	53	58
991	49	60
992	28	51
993	59	62
994	62	67
995	57	67
996	53	57
997	52	58
998	51	52
999	57	60
1000	48	61
1001	53	61
1002	59	67
1003	52	58
1004	48	62
1005	43	58
1006	43	50
1007	49	62
1008	28	50
1009	50	52
1010	48	53
1011	52	60
1012	53	58
1013	51	51

RAW DATA

Teacher 33

Subject No.	Pretest	Post Test
1014	48	49
1015	46	50
1016	49	57
1017	48	48
1018	45	48
1019	51	54
1020	47	56
1021	26	47
1022	57	58
1023	60	63
1024	55	63
1025	51	53
1026	50	54
1027	49	48
1028	55	56
1029	46	57
1030	51	57
1031	57	63
1032	50	54
1033	46	58
1034	41	54
1035	41	46
1036	47	58
1037	26	46
1038	48	48
1039	46	49
1040	50	56
1041	51	54
1042	49	47

RAW DATA

Teacher 34

Subject No.	Pretest	Post Test
1043	52	53
1044	47	51
1045	40	54
1046	53	56
1047	50	57
1048	47	60
1049	41	46
1050	57	58
1051	33	41
1052	42	52
1053	48	49
1054	51	66
1055	50	63
1056	49	61
1057	50	56
1058	48	61
1059	51	67
1060	40	53
1061	45	58
1062	47	50
1063	38	54
1064	49	62
1065	31	36
1066	38	41
1067	47	59
1068	40	54
1069	53	58
1070	52	59
1071	51	55
1072	48	46
1073	48	69
1074	47	62

RAW DATA

Teacher 35

Subject No.	Pretest	Post Test
1075	50	60
1076	51	62
1077	48	51
1078	45	57
1079	43	49
1080	41	46
1081	50	53
1082	47	62
1083	46	51
1084	45	57
1085	47	59
1086	48	60
1087	41	54
1088	50	56
1089	45	55
1090	52	66
1091	41	51
1092	50	63
1093	48	62
1094	45	57
1095	46	56
1096	48	50
1097	50	67
1098	45	47
1099	33	35
1100	37	50
1101	51	47
1102	50	62
1103	48	61
1104	55	66
1105	43	58

RAW DATA

Teacher 36

Subject No.	Pretest	Post Test
1106	48	56
1107	45	53
1108	57	63
1109	53	63
1110	48	60
1111	45	57
1112	57	68
1113	53	65
1114	48	60
1115	50	66
1116	51	67
1117	48	63
1118	50	62
1119	51	47
1120	58	68
1121	53	66
1122	56	64
1123	52	61
1124	50	63
1125	48	58
1126	50	60
1127	52	57
1128	48	54
1129	56	66
1130	48	61
1131	47	58
1132	43	60
1133	50	60
1134	48	61
1135	51	54

RAW DATA

Teacher 37

Subject No.	Pretest	Post Test
1136	48	55
1137	45	58
1138	50	55
1139	51	57
1140	55	62
1141	48	51
1142	43	57
1143	51	53
1144	46	56
1145	48	53
1146	50	57
1147	45	58
1148	41	54
1149	48	55
1150	57	57
1151	56	64
1152	45	61
1153	35	47
1154	48	61
1155	54	62
1156	53	63
1157	56	58
1158	52	63
1159	57	67
1160	48	65
1161	49	64
1162	43	56
1163	51	53
1164	53	57
1165	48	61
1166	33	43

RAW DATA

Teacher 38

Subject No.	Pretest	Post Test
1167	55	64
1168	51	61
1169	56	60
1170	44	58
1171	56	60
1172	50	53
1173	57	54
1174	46	58
1175	48	57
1176	44	64
1177	40	50
1178	52	59
1179	46	58
1180	55	64
1181	46	61
1182	55	60
1183	47	63
1184	39	54
1185	36	58
1186	57	64
1187	64	69
1188	55	63
1189	57	58
1190	59	60
1191	46	58
1192	52	64
1193	51	63
1194	50	61
1195	52	65

RAW DATA

Teacher 39

Subject No.	Pretest	Post Test
1196	49	61
1197	45	64
1198	54	62
1199	39	54
1200	56	58
1201	62	69
1202	63	60
1203	70	70
1204	28	41
1205	58	58
1206	45	60
1207	54	64
1208	58	66
1209	59	67
1210	65	65
1211	45	58
1212	42	60
1213	47	64
1214	45	58
1215	58	64
1216	50	65
1217	47	58
1218	54	64
1219	49	55
1220	55	64
1221	56	66
1222	58	68
1223	55	60
1224	56	64
1225	52	61

RAW DATA

Teacher 40

Subject No.	Pretest	Post Test
1226	45	55
1227	50	68
1228	47	66
1229	49	64
1230	44	64
1231	48	65
1232	50	60
1233	39	52
1234	56	55
1235	43	63
1236	48	58
1237	45	59
1238	47	60
1239	45	62
1240	51	59
1241	49	65
1242	50	54
1243	56	50
1244	44	57
1245	49	60
1246	42	59
1247	40	57
1248	47	52
1249	54	58
1250	55	60
1251	53	65
1252	45	60
1253	53	66
1254	52	65
1255	53	64
1256	45	66

COMPUTER PROGRAMMES

V ANCOVA2

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[1] 'THIS PROGRAMME IS PREPARED FOR A BALANCED MULTIDIMENSIONAL'
[2] 'MATRIX REQUIRING A TWO WAY ANALYSIS OF COVARIANCE'
[3] 'WITH ONE COVARIATE AND ONE DEPENDENT VARIABLE'
[4] '
[5] 'DATA MUST BE ENTERED IN MATRIX FORM ROW BY ROW'
[6] '
[7] 'THE M DIMENSION OF THE MATRIX OR THE NUMBER OF'
[8] 'COLUMNS IS COUNTED AUTOMATICALLY'
[9] 'THE NUMBER OF LEVELS OF THE A DIMENSION OR THE NUMBER'
[10] 'OF LEVELS OF ROWS MUST BE COUNTED AND ENTERED MANUALLY'
[11] '
[12] 'ENTER THE MATRIX THEN PRESS THE RETURN KEY'
[13] X+□
[14] 'ENTER THE NUMBER OF LEVELS OF THE A DIMENSION'
[15] 'OR THE NUMBER OF LEVELS OF ROWS THEN PRESS'
[16] 'THE RETURN KEY'
[17] NA+□
[18] W+pX[;1]
[19] R+W÷NA
[20] M+pX[1;]
[21] SB+SSB+SBB+SC+SSC+SCC+MC+QC+0
[22] A+1
[23] B+X[;A]
[24] SB+SB+(+/B)
[25] SBB+SBB+(+/B*2)
[26] SSB+SSB+((+/B)*2)
[27] A+A+2
[28] +(A=(M+1))/30
[29] +23×A≤(M-1)
[30] A+2
[31] C+X[;A]
[32] SC+SC+(+/C)
[33] SCC+SCC+(+/C*2)
[34] SSC+SSC+((+/C)*2)
[35] A+A+2
[36] +(A=(M+2))/38
[37] +31×A≤M
[38] A+1
[39] D+A+1
[40] E+X[;A]
[41] F+X[;D]
[42] QC+QC+(+/E×F)

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[43] MC←MC+((+/E)×(+/F))
[44] A←A+2
[45] →(A=(M+1))/47
[46] →39×A≤(M-1)
[47] FA←FE+Q+L+TAM←TTAM←TAAM←KLM←XLY←SZ←ALZ←0
[48] C←(L×R)+1R
[49] A←X[C;]
[50] B←1
[51] G←B+1
[52] D←A[;B]
[53] E←A[;G]
[54] FA←FA+((+/D)×2)
[55] AM←+/D
[56] FE←FE+((+/E)×2)
[57] AC←+/E
[58] TAM←TAM+(AM×AC)
[59] TTAM←TTAM+(AM×2)
[60] TAAM←TAAM+(AC×2)
[61] B←B+2
[62] →(G=M)/64
[63] →51×B≤(M-1)
[64] L←L+1
[65] →(L=NA)/67
[66] →48×C≤(W+R)
[67] L←0
[68] C←(L×R)+1R
[69] A←X[C;]
[70] J←1
[71] OVS←MRS←0
[72] OV←MR←0
[73] B←1
[74] T←B+1
[75] O←A[J;B]
[76] P←A[J;T]
[77] OV←OV+O
[78] MR←MR+P
[79] B←B+2
[80] →(B=(M+1))/82
[81] →74×B≤M
[82] OVS←OVS+(+/OV)
[83] MRS←MRS+(+/MR)
[84] J←J+1
[85] →(J=(R+1))/87
[86] →72×J≤R
[87] KLM←KLM+(OVS×MRS)

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[88] XLY+XLY+(OVS*2)
[89] ALZ+ALZ+(MRS*2)
[90] L+L+1
[91] →(L=NA)/93
[92] →68×C≤(W-R)
[93] AX+((SB*2)÷(NA×R×(M÷2)))
[94] BX+SBB
[95] CX+(XLY÷(R×(M÷2)))
[96] DX+(SSB÷(R×NA))
[97] EX+FA÷R
[98] AXY+((SB×SC)÷(NA×R×(M÷2)))
[99] BXY+QC
[100] CXY+(KLM÷(R×(M÷2)))
[101] DXY+(MC÷(NA×R))
[102] EXY+TAM÷R
[103] AY+((SC*2)÷(NA×R×(M÷2)))
[104] BY+SCC
[105] CY+(ALZ÷(R×(M÷2)))
[106] DY+(SSC÷(R×NA))
[107] EY+FE÷R
[108] AXX+CX-AX
[109] BXX+DX-AX
[110] ABXX+(EX+AX)-(CX+DX)
[111] EXX+BX-EX
[112] AAXY+CXY-AXY
[113] BBXY+DXY-AXY
[114] AABBY+(EXY+AXY)-(CXY+DXY)
[115] EEXY+BXY-EXY
[116] AYY+CY-AY
[117] BYY+DY-AY
[118] ABYY+(EY+AY)-(CY+DY)
[119] EYY+BY-EY
[120] ANDO+(EYY-(((EEXY)*2)÷EXX))
[121] CORA+((AYY+EYY)-(((AAXY+EEXY)*2)÷(AXX+EXX)))
[122] ROCA+((BYY+EYY)-(((BBXY+EEXY)*2)÷(BXX+EXX)))
[123] ROAC+((ABYY+EYY)-(((AABBY+EEXY)*2)÷(ABXX+EXX)))
[124] AAYY+CORA-ANDO
[125] BBYY+ROCA-ANDO
[126] AABBY+ROAC-ANDO
[127] MSAAYY+(AAYY÷((NA)-1))
[128] MSBBYY+(BYY÷((M÷2)-1))
[129] MSOLEO+(AABBY÷(((NA)-1)×((M÷2)-1)))
[130] MSANDO+(ANDO÷(((R-1)×NA×(M÷2))-1))
[131] F1+MSAAYY÷MSANDO

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[132] F2+MSBBYY÷MSANDO
[133] F3+MSOLEO÷MSANDO
[134] FEE+NA-1
[135] FIE+(M÷2)-1
[136] FO+(NA-1)×((M÷2)-1)
[137] FUM+(((R-1)×NA×(M÷2))-1)
[138] CHUG+(W,M)ρX
[139] ' '
[140] 'MATRIX: '
[141] CHUG
[142] ' '
[143] 'SOURCE TABLE: '
[144] ' '
[145] 'SOURCE A: ' ; 'SUM OF SQUARES ADJ: ' ; AAYY; '
      DF: ' ; FEE; ' MEAN SQUARES: ' ; MSAAYY; ' F RATIO: ' ; F1
[146] 'SOURCE M: ' ; 'SUM OF SQUARES ADJ: ' ; BBYY; '
      DF: ' ; FIE; ' MEAN SQUARES: ' ; MSBBYY; ' F RATIO: ' ; F2
[147] 'SOURCE AM: ' ; 'SUM OF SQUARES ADJ: ' ; ABBYY; '
      DF: ' ; FO; ' MEAN SQUARES: ' ; MSOLEO; ' F RATIO: ' ; F3
[148] 'SOURCE E: ' ; 'SUM OF SQUARES ADJ: ' ; ANDO; '
      DF: ' ; FUM; ' MEAN SQUARES: ' ; MSANDO
[149] ' '
[150] ' '
[151] 'LOGAN'

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▽ ANCOVA

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[1] 'THIS PROGRAMME IS PREPARED FOR A BALANCED MULTIDIMENSIONAL'
[2] 'MATRIX REQUIRING A ONE WAY ANALYSIS OF COVARIANCE WITH'
[3] 'ONE COVARIATE AND ONE DEPENDENT VARIABLE'
[4] ' '
[5] 'DATA MUST BE ENTERED IN MATRIX FORM ROW BY ROW'
[6] ' '
[7] 'THE PROGRAMME ALSO CONTAINS A TEST FOR HOMOGENEITY OF'
[8] 'REGRESSION, A DETERMINATION OF THE COEFFICIENT OF'
[9] 'CORRELATION AND AN ESTIMATE OF THE INCREASE IN'
[10] 'PRECISION PROVIDED BY THE USE OF THE COVARIATE'
[11] ' '
[12] 'ENTER THE DATA IN MATRIX FORM THEN PRESS THE RETURN KEY'
[13] X+□
[14] W+ρX[;1]
[15] M+ρX[1;]
[16] SB+SSB+SBB+SC+SSC+SCC+MC+QC+0
[17] A+1
[18] B+X[;A]
[19] SB+SB+(+/B)
[20] SBB+SBB+(+/B*2)
[21] SSB+SSB+((+/B)*2)
[22] A+A+2
[23] →(A=(M+1))/25
[24] →18×A≤(M-1)
[25] A+2
[26] C+X[;A]
[27] SC+SC+(+/C)
[28] SCC+SCC+(+/C*2)
[29] SSC+SSC+((+/C)*2)
[30] A+A+2
[31] →(A=(M+2))/33
[32] →26×A≤M
[33] SSBX+((SSB÷W)-((SB*2)÷((M÷2)×W)))
[34] SSWX+((SBB)-(SSB÷W))
[35] SSTX+SSBX+SSWX
[36] SSBY+((SSC÷W)-((SC*2)÷((M÷2)×W)))
[37] SSWY+(SCC-(SSC÷W))
[38] SSTY+SSBY+SSWY
[39] A+1
[40] D+A+1
[41] E+X[;A]
[42] F+X[;D]

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[43]  $QC \leftarrow QC + (+/(E \times F))$ 
[44]  $MC \leftarrow MC + ((+/E) \times (+/F))$ 
[45]  $A \leftarrow A + 2$ 
[46]  $\rightarrow (A = (M + 1)) / 48$ 
[47]  $\rightarrow 40 \times A \leq (M - 1)$ 
[48]  $SSBXY \leftarrow ((MC \div W) - ((SB \times SC) \div ((M \div 2) \times W)))$ 
[49]  $SSWXY \leftarrow (QC - (MC \div W))$ 
[50]  $SSTXY \leftarrow SSBXY + SSWXY$ 
[51]  $A \leftarrow (SSTY - (((SSTXY) \times 2) \div SSTX))$ 
[52]  $B \leftarrow (SSWY - (((SSWXY) \times 2) \div SSWX))$ 
[53]  $SS \leftarrow A - B$ 
[54]  $MSB \leftarrow (SS \div ((M \div 2) - 1))$ 
[55]  $MSW \leftarrow (B \div (((W - 1) \times (M \div 2)) - 1))$ 
[56]  $F12 \leftarrow MSB \div MSW$ 
[57]  $RMWA \leftarrow ((M \div 2) - 1)$ 
[58]  $QUAS \leftarrow (((W - 1) \times (M \div 2)) - 1)$ 
[59]  $R \leftarrow 0$ 
[60]  $A \leftarrow 1$ 
[61]  $J \leftarrow A + 1$ 
[62]  $C \leftarrow X[;A]$ 
[63]  $D \leftarrow X[;J]$ 
[64]  $MM \leftarrow (+/C \div pC)$ 
[65]  $E \leftarrow C - MM$ 
[66]  $NN \leftarrow (+/D \div pD)$ 
[67]  $F \leftarrow D - NN$ 
[68]  $EE \leftarrow (+/(E \times 2))$ 
[69]  $FF \leftarrow (+/(F \times 2))$ 
[70]  $G \leftarrow ((+/(E \times F)) \times 2)$ 
[71]  $R \leftarrow R + (FF - (G \div EE))$ 
[72]  $A \leftarrow A + 2$ 
[73]  $\rightarrow (A = (M + 1)) / 75$ 
[74]  $\rightarrow 61 \times A \leq M$ 
[75]  $L \leftarrow B - R$ 
[76]  $S \leftarrow (L \div ((M \div 2) - 1))$ 
[77]  $T \leftarrow (R \div ((M \div 2) \times (W - 2)))$ 
[78]  $RF \leftarrow S \div T$ 
[79]  $Z \leftarrow ((SSTX \times SSTY) \times 0.5)$ 
[80]  $BBB \leftarrow SSTXY \div Z$ 
[81]  $AAA \leftarrow ((SSWXY) \times 2)$ 
[82]  $QQR \leftarrow (AAA \div ((SSWX) \times (SSWY)))$ 
[83]  $CHAM \leftarrow (W, M) pX$ 
[84] ' '
[85] 'MATRIX:'

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[86] CHAM
[87] ' '
[88] 'SOURCE TABLE:'
[89] ' '
[90] 'SUM OF SQUARES BETWEEN ADJ: ' ;SS;'
    MEAN SQUARES BETWEEN: ' ;MSB;'
    DF: ' ;RMWA;' F RATIO: ' ;F12
[91] 'SUM OF SQUARES WITHIN ADJ: ' ;B ;'
    MEAN SQUARES WITHIN: ' ;MSW;' DF: ' ;QUAS
[92] ' '
[93] 'TEST FOR HOMOGENEITY OF REGRESSION:' ;RF
[94] ' '
[95] 'COEFFICIENT OF CORRELATION:' ;BBB
[96] ' '
[97] 'INCREASE IN PRECISION:' ;QQR
[98] ' '
[99] ' '
[100] 'LOGAN'
[101] ' '
V
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V ANOVA1

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[1] 'THIS PROGRAMME IS PREPARED FOR A BALANCED MULTIDIMENSIONAL'
[2] 'MATRIX REQUIRING A ONE WAY ANALYSIS OF VARIANCE'
[3] ' '
[4] 'DATA MUST BE ENTERED IN MATRIX FORM ROW BY ROW'
[5] ' '
[6] 'ENTER DATA IN MATRIX FORM AND PRESS RETURN KEY'
[7] X←□
[8] R1←pX[;1]
[9] R2←pX[1;]
[10] M←(R1,R2)pX
[11] SSB←((+/(+/(X)*2))÷R1)-(((+/(+/(X))*2)÷((R1)×(R2))))
[12] MSB←SSB÷((R2)-1)
[13] SSW←(+/(+/(X)*2))-((+/(+/(X))*2)÷R1)
[14] MSW←SSW÷(((R1)-1)×(R2))
[15] F←MSB÷MSW
[16] ALL←(R2)-1
[17] ABB←(((R1)-1)×(R2))
[18] ' '
[19] 'MATRIX:'
[20] M
[21] ' '
[22] 'SOURCE TABLE:'
[23] ' '
[24] 'SUM OF SQUARES BETWEEN: ' ;SSB; ' DF: ' ;ALL; '
    MEAN SQUARES BETWEEN: ' ;MSB; ' F RATIO: ' ;F
[25] 'SUM OF SQUARES WITHIN: ' ;SSW; ' DF: ' ;ABB; '
    MEAN SQUARES WITHIN: ' ;MSW
[26] ' '
[27] ' '
[28] 'LOGAN'

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V

APPENDIX VI

ABSTRACT OF

A Theoretical and Experimental Investigation of Russell Stauffer's Approach to Reading at the Junior Grade Level¹

In this study, an investigation was made of Russell Stauffer's theory of reading development. Viewed from a psycholinguistic perspective, it was noted that his theory has a high degree of credibility within the context established by the psycholinguists. Essential to this psycholinguistic perspective rested the notion that evolving intellectual abilities and instructional procedures, by themselves and in interaction, exert considerable impact on the acquisition of higher order reading abilities.

The review of the literature led to three hypotheses which form the nucleus of the study:

1. There is a significant difference in the acquisition of higher order reading abilities between older (grade 6) and younger (grade 4) subjects at the junior grade level.
2. There is a significant difference in the acquisition of higher order reading abilities between two different approaches to the teaching of reading at the junior grade level.
3. There is a significant interaction between age or evolving intellectual abilities of subjects and instructional approaches at the junior grade level in the acquisition of higher order reading abilities.

¹ Bayne Logan, doctoral thesis presented to the School of Graduate Studies of the University of Ottawa, Ontario, May, 1977, viii-280 p.

As a result of the investigation, conducted with forty classroom teachers, support was found for two of the three hypotheses. The factor of evolving intellectual abilities had significant impact on the acquisition of higher order abilities, as did the factor of instructional procedures. It was found that, while reading could probably be introduced at any stage of intellectual functioning, older children acquired higher order abilities more readily than did their younger counterparts. In a similar direction, it was found that an approach to reading instruction which respects individual development within children produces significantly greater effect among children as they acquire higher order reading abilities.

It was discovered that when these two factors were combined, the interaction lay in a direction opposite to that predicted. As the investigation evolved, it became increasingly more apparent that the classroom teachers had exerted a considerable impact on the effect of each of the two independent variables, particularly when in interaction.

The conclusions included a consideration of the role of maturation in reading, recommendations regarding the use of prepared instructional materials and a consideration of the role of teachers in the teaching-learning exchange in reading. As a result of the study, it was concluded that maturational processes determine "how" rather

than "what" a child will read. Within the context of this broad conclusion, it was suggested that reading can be introduced at any age, providing it is done so in a form commensurate with the child's level of intellectual functioning. In turn, it was concluded that a child begins to read when he first begins to interact with his environment, conclusions which may well digress from traditional views held by many teachers of reading.

It was concluded that, since the objective of an effective reading programme should be to expand children's scope of reading activities and interests, prepared instructional materials serve an important role in any reading programme. In this respect, it was suggested that a unique blend might be achieved in the classroom between prepared instructional materials and language-experience activities, the language-experience providing the foundation for the development of reading abilities and the prepared instructional materials offering an opportunity for extended recreational and independent reading.

With respect to the teachers of reading, it was concluded that, what children need most are teachers who see themselves as major resources in the reading process, people who understand the language learning process, people who appreciate children's competencies as language-learners.