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ABSTRACT

The relationship between attention and reading achievement in first graders was investigated for 48 boys and 33 girls in five first-grade classrooms of the Bridgewater-Raritan Regional School District in New Jersey. The statistical analysis provided separate data for boys and girls in regard to the relationship between reading achievement and attention, reading achievement and IQ, and attention and IQ. Findings indicated a significant positive relationship between reading achievement and attention for both boys and girls. Those students who had the higher reading achievement scores had the higher scores on attention, and those students who had the lower reading achievement scores had the lower attention scores. The role of IQ in attention and reading achievement was less clearly defined. The data indicated that the relationship between IQ and reading achievement was not significant for boys but that it was significant for girls. In addition, the relationship between IQ and attention was not significant for boys but it was significant for girls. Boys and girls in the sample were found to be similar in regard to their reading performance and percentage of attention. (Author/TS)

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN INDIVIDUAL DIFFERENCES IN ATTENTION AND READING ACHIEVEMENT IN FIRST GRADE

A THESIS

SUBMITTED TO THE FACULTY

OF THE GRADUATE SCHOOL OF EDUCATION

OF

RUTGERS UNIVERSITY

THE STATE UNIVERSITY OF NEW JERSEY

BY

ELIZABETH A. SCHULTZ

IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE

OF

MASTER OF EDUCATION

NEW BRUNSWICK, NEW JERSEY JANUARY 1973

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CHAPTER I

THE PROBLEM

The process of attention was acknowledged as far back as the 1820's with the astronomers' discovery of the personal equation. Since that time it has emerged as a psychological concept of prime importance to the process of learning.

The elusiveness of the concept of attention and the absence of a definition have been the cause of much skepticism on the part of investigators. For a brief period in history psychologists tended to ignore its existence. Included in Mostofsky (1970) is a statement made by William James in 1927:

> "Attention may have to go, like many a faculty once deemed essential, like many a verbal phantom, like many an idol of the tribe. It may be an excrescence on psychology [p. 14]."

Although such skepticism and albeit confusion surrounded the concept of attention and delayed an adequate definition or definitions, the recent trend has been toward a rediscovery and interest in the concept, particularly as a component of the learning process.

Attention has been identified by Samuels (1971) as one of the many processes involved in associational

learning. He suggests that this complex type of learning also includes distinctive feature learning, visual-recognition memory, mediation and hookup, auditory discrimination, and auditory memory. These factors are acknowledged by Samuels as being involved in the reading process, although he is careful to point out that his model of associational learning is not intended as a reading model.

Statement of the Problem

Accepting the evidence provided by research as to the presence of the above-mentioned components in associational learning, this study was undertaken to investigate the effect of attention on reading achievement in first grade.

More specifically, the purpose of the present study was to test the following hypotheses:

1. The mean attention score for girls will be significantly higher than the mean attention score for boys.

2. Reading achievement scores will be significantly higher among those children who are more attentive.

3. Reading achievement scores will be more closely related to attention than to intelligence quotients.

Importance of the Study

The investigation of a variable so closely related to the process of reading should be of value in providing

classroom teachers and reading teachers with an awareness that a factor such as attention must be given consideration in seeking the cause of a child's reading difficulty. If a positive relationship is found between reading achievement and attention, the need for more precise teaching techniques may be indicated for the children who are inattentive or less attentive.

Conducting this study on a first-grade level may also be of value in providing information about good and poor readers before success or failure in reading can be considered as a contributing factor.

Definition of Terms

Attentive--attending to the area of focus and the activity prescribed by the teacher.

Inattentive--not attending to the area of focus and/or the prescribed activity.

Reading Achievement--as determined by scores on the Stanford Achievement Test, Primary I, Form W, Paragraph Meaning subtest.

Overview of the Study

The total population of five first-grade classrooms in one elementary school of the Bridgewater-Raritan Regional School District was observed during reading time over an eight-week period. After numerous visits for the

purpose of accustoming the students to the investigator's presence in the classroom, observations of pupil attention were recorded using a modified version of the Jackson-Hudgins Observation Schedule (Appendix A).

At the close of the observation period, the Paragraph Meaning subtest of the Stanford Achievement Test, Primary I, Form W, was administered for the purpose of obtaining a reading achievement score for each student (Appendix B).

I.Q. scores as achieved by the students on the Goodenough Draw-A-Man Test, administered by the school psychologist in February 1971, were used as the measure of intelligence.

The scores students achieved on the measure of attention were then compared with reading achievement scores and intelligence quotients. In addition, the relationship between reading achievement and I.Q. was statistically analyzed.

Limitations of the Study

This study is limited by the size of the sample, the use of one examiner to conduct the observations and testing, the lack of control over the degree of pressure for attention brought to bear by individual teachers, the questionable validity of attention measures, and the limtations on generalizability of findings using only one school and one grade level.

CHAPTER II

SURVEY OF THE LITERATURE

The ubiquity of the concept of attention is perhaps best described by Pillsbury (1908) who wrote:

> The manifestations of the state which we commonly call attention are protean. No part of the individual is untouched by them. They extend to every part of the physical organism, and are amongst the most profound facts of mind. So numerous and varied are the ramifications of attention, that we find it defined by competent authorities as a state of muscular contraction and adaptation, as a pure mental activity, as an emotion or feeling, and as a change in the clearness of ideas [p. 1].

The literature abounds with material concerning the definition of attention and the methodological approach to the concept. Despite variances in opinions and approaches, attention appears destined to continue as an enduring problem in psychology and learning.

History of Attention

1820's to 1920's. The astronomers' discovery of the personal equation in the 1820's stirred an interest in the concept of attention which continued for approximately one century. The search for an answer as to why there were individual differences among the astronomers in observing the instants of stellar transits appeared to

open a Pandora's box in the then new field of experimental psychology.

Introspective psychologists began to investigate such properties of attention as reaction time, stimulus interaction [illegible] of attention, degree of attention, duration, and the unconscious as a lower level of attention.

Wilhelm Wundt has been acknowledged as the founder of the new experimental psychology, and has been described by Boring (1970) as the indomitable supporter of the introspective method used in the experiments of this era. For Wundt it was attention which turned perception into apperception and so played a central role in the account of sensation and perception. Boring suggests that the history of attention would have been much simpler had Brentano, an act psychologist, dominated the scene rather than Wundt.

Regarding attention as a state of narrow consciousness accessible only to introspection, the experimentalists were limited to subjective descriptions rather than objective analyses of the factors of attention. Despite this limitation, the introspective analysis of the process of attending produced many ideas which are still being utilized in contemporary research on attention.

James (1890) and Ribot (1890) conceived of attention as an active process whose function was selection.

James stressed the active organism determining the nature of its experiences through the selection of certain stimuli. In addition to stressing the active selective nature of the concept, both Ribot and James referred to the possibility of taking muscular and postural changes as indirect measures of attention.

In contrast to James, Titchener (1903), who maintained the Wundtian tradition in America, carefully developed the idea of attention as sensory clearness. In his book, The Psychology of Feeling and Attention, there is a lengthy systematic listing of those factors which catch attention, and a discussion of their role in perception. Included in the list are intensity, extension, duration, repetition, suddenness, movement, novelty, association with ideas already present, accommodation of sense organs, and the cessation of the stimulus. Moray (1969) comments that there would be little that modern work would wish to add to the list other than more precise definitions and a different conceptual framework.

Other investigators of this period who deserve mention are Hamilton and Jevons whose work was concerned with the question of how many things could be held in the mind simultaneously or could be taken in at a glance (Boring, 1970), and Geissler (1909) and Dallenbach (1913) whose work will be discussed in detail in this chapter

under the sidehead of Measurement of Attention.

1920's to 1950's. With the death of Wundt in 1920 and Titchener in 1927, research on attention virtually disappeared. References to the phenomenon by name were not made again until the 1950's.

Numerous suggestions have been made as to the reason for its demise. Boring (1970) suggests that Behaviorism, which had begun to sprout before Titchener's death, now had a free field in which to grow. Broadbent (1958) purports that the reason for the disappearance of such an important field of research was due to the inability of introspective psychologists to agree with one another or to provide objective evidence to back their assertions. Other suggestions include the inability of the introspectionist methodology to come to terms with the attack of Behaviorism because of the difficulty of controlling and interpreting the experiments. In addition, the introspective method ruled out the use of animals and therefore further removed it from the attention of the rapidly growing Behaviorist school. Berlyne (1970) suggests that at that time the problems of stimulus selection were not taken seriously by Behavioral theory.

1950's to Present. During the 1950's psychologists again began to pay attention to attention. McGhie (1969) suggests that this renewed interest was the result of the

psychologists' increasing concern with human communication processes and with man's capacity for processing the flow of information from his environment.

Moray (1969) purports that the renaissance of interest in attention seems to be connected with three developments. He describes these developments as follows:

> 1. The use of operational definition couched in stimulus response language has become accepted to a degree which allows us to undercut the difficulties of the appeal to introspection, and to put the objects of attention and the process itself on a more external footing, with all the advantages in research which that invariably brings.
>
> 2. Towards the end of the Second World War a number of important problems arose for which answers were required from applied psychologists, and which were, whatever they were called at the time, clearly to do with attention. Communication systems in ships, planes, and in air-traffic control centers all produced situations in which there was a very high flow of information, and in which the human operator might be required to do two things at once. The classical problem of the division of attention needed a solution. Also, the growing number of semiautomatic control processes, in which the human operator was required to perform rather little physical exertion, but had to handle great quantities of information displayed on dials and other forms of information readout, again drew attention to the need for a study of how observers handle simultaneously received signals, and how fast they can switch from one task to another.
>
> 3. The development of new kinds of apparatus and techniques have made the control of experiments very much more easy [p. 4].

A review of some of the current theories and investigations of attention follows.

Current Theories and Investigations of Attention

There have been a number of experiments regarding the phenomenon of selective attention. The most important of these deals with the processing of information emitted simultaneously by two separate sound sources. However alert we may be, there is a limit to the number of things to which we can attend at one time.

Two basic problems appear to arise as the result of these experiments regarding information processing in selective attention. The first is how different streams of information are kept distinct by the nervous system, and how a resultant babel is avoided. The second is why only one of the messages is dealt with at any one time. Based on experiments in which two of the messages were fed simultaneously, one to each ear (Moray, 1959; Treisman, 1960), a proposed solution was that the messages were kept distinct by proceeding down separate channels or different neural pathways.

In answer to the second problem, Broadbent (1958) presented a behavioral theory of selective attention. His so-called "Filter Theory" calls the process of selective attention a filter mechanism, to underline its function of selecting out the relevant from a number of competing sensory messages.

In Broadbent's model, as shown in Figure 1, the

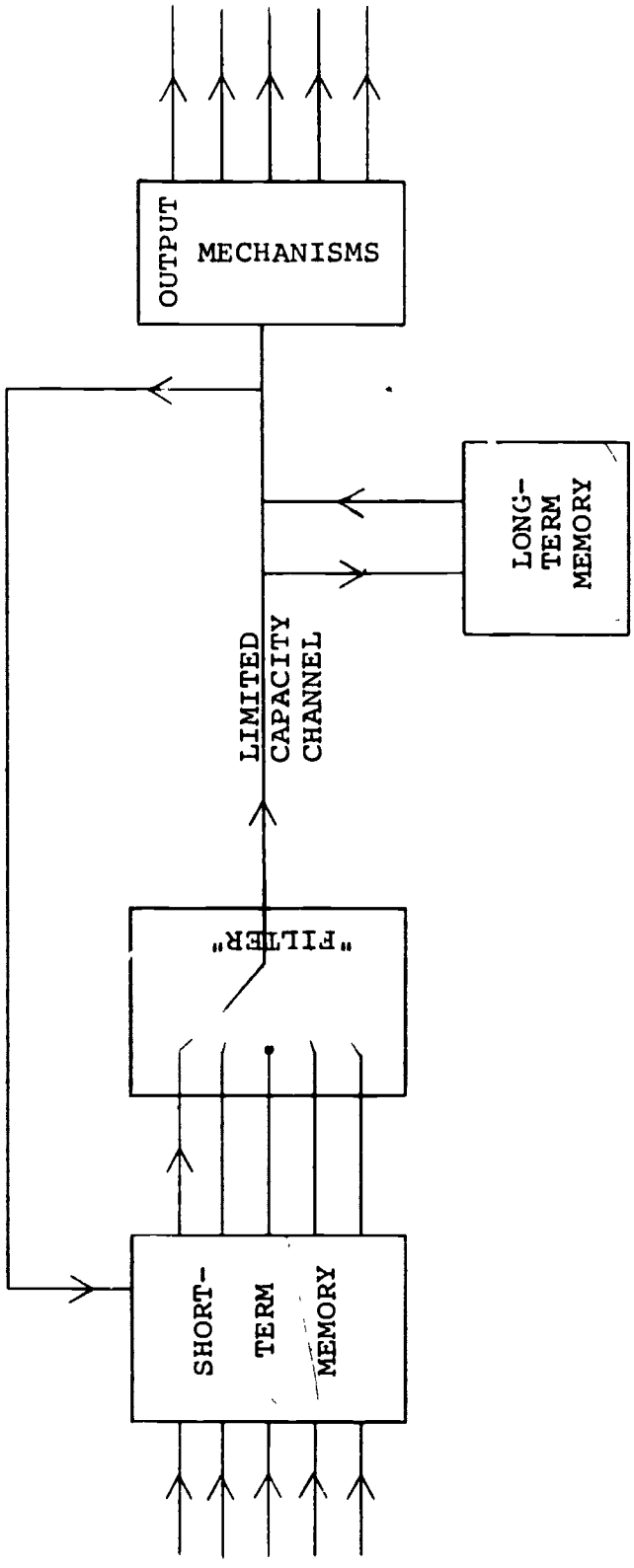

Fig. 1. Broadbent's filter theory. (From Moray, Attention: Selective Processes in Vision and Hearing, 1969.)

information enters the system through a number of parallel sensory channels. These channels are presumed to have a distinct neural representation somewhere in the brain which allows messages to be selected on the basis of their pitch, loudness, and spatial position characteristics. Broadbent postulates a short-term memory store at the inner end of the parallel input lines followed by the filter. The filter has the ability to select one of the input lines and allow its information direct access to the limited capacity channel whose capacity is much smaller than the total capacity of the initial input lines. The limited capacity channel is in turn connected to the long-term memory store to allow the new information to be integrated with previously stored information.

Broadbent purports that the filter has a permanent bias towards passing novel stimuli, and that the more complex stage of the filtering operation ensures that attention will be concentrated upon the most relevant or important aspects of any stimulus presentation.

The major alteration to Broadbent's model has been the generalization of the notion of channel. In addition to the sensory channels initially considered by Broadbent, more recent experiments by Gray and Wedderburn (1960), Treisman (1964), and Broadbent himself (Broadbent and Gregory, 1964) suggest that the channels which the filter

may select are much more varied in kind and include verbal classes, languages, etc.

Precipitated by the need for providing more information about the contents of the filter in Broadbent's model, a series of experiments (Moray, 1959; Treisman, 1960, 1964) were carried out, resulting in a model proposed by Treisman which makes more explicit the selection rules governing the action of the filter, and also the problem of identifying particular signals when they occur.

Treisman presented two messages simultaneously, one to each ear, and subjects were asked to repeat what they heard in one ear. In the middle the messages were switched from one ear to the other, and it was found that subjects tended to repeat words from the wrong ear just after the switch. Treisman postulates that information does flow into the organism through a number of parallel channels and that the messages reach some part of the nervous system where they are analyzed for physical properties such as loudness, pitch, position, etc. As well as extracting these characteristics, the filter can act to attentuate incoming rejected messages. In Treisman's model, these weakened messages are not held in short-term memory, as postulated by Broadbent, but rather pass deeper into the nervous system and eventually reach the pattern recognizer. The pattern recognizer consists of a large

number of "dictionary units" whose thresholds differ and are variable. The dictionary units respond according to their thresholds and the strength of the signal emitted from the filter. The dictionary units which respond to the occurrence of biologically or emotionally important signals have permanently lowered thresholds, and such a signal, even though attentuated by the filter, will trigger a dictionary unit and thus emit a response.

It appears from the model that the firing of a dictionary unit and the conscious perception of a word are the same event.

Deutsch and Deutsch (1963) described experiments by Sharpless and Jasper in 1956, and Thomson and Solomon in 1954, indicating that complex discriminations would be required of the filter, and postulating an additional discriminative system below or at the level of the filter.

In addition, Deutsch and Deutsch (1963) proposed a response selection theory of attention. Using exactly the same experimental data as Treisman, they suggest that by altering the properties of the pattern recognizer, the lower level filter is unnecessary. In their model they eliminate the filter and the input lines run directly to the dictionary. At the dictionary each signal is analyzed and recognized for the particular signal which it is, and the strength of the firing of the dictionary unit is

proportioned to the importance of the signal to the organism. Thus the strength of the firing is dependent upon the importance of the stimulus, not necessarily how strongly it is stimulated. The importance weighting is a function of past experience. The unit firing most strongly is allowed to occupy the output lines until it is displaced by another unit firing more strongly, or until its stimulation by the incoming signal ceases. In this model perception appears to be a response to the output of the pattern recognizer rather than being identical with pattern recognition.

Reynolds (1964) proposed another response selection theory which is unique in that he drew on both visual and auditory work in formulating his model. Reynolds' theory involves a "temporary inhibition of response" which he suggests reflects a genuine perceptual process. Even though stimuli, in this case a red field to one eye and a green field to the other, were presented simultaneously to the subject, the response was successive.

Egeth (1967) does not purport to be putting forth a complete theory, but rather implies that the understanding of attention lies in the discovery of the coding and decoding rules which are applied from moment to moment by the observer who is receiving the stimuli. He suggests that attention is the application of such coding rules

arranged in a hierarchy through which data are transferred and transformed until final recognition and response are obtained.

Neisser (1967) emphasizes the active cognitive aspects of selection. He reserves the name "attention" for a complex, active process of analysis-by-synthesis, which he regards as the central ability of the cognitive mechanisms of the brain.

In addition to the proposed theories concerning the selective aspects of attention, there are other aspects which have been investigated and should at least be mentioned.

Under the general heading of vigilance, studies have been undertaken to investigate situations calling for sustained attention to one signal in an environment. Studies of tasks requiring vigilance demonstrate that performance tends to decline with time. Broadbent (1958) originally viewed these failures in sustained attention as an example of the filter's bias towards novel stimuli, with the tendency for attention to be attracted by irrelevant distracting stimuli in relation to the amount of time spent on monotonous vigilance tasks. More recent studies (Broadbent & Gregory, 1963) suggest that poor vigilance performance may be due to fluctuations in the subject's level of confidence in his own decisions.

Another aspect of attention which has figured prominently in modern psychological theory is that of arousal level. Arousal theory, as explained by McGhie (1969), proposes that the state of alertness of the individual varies along a continuum from sleep to diffuse excitement. At low levels of arousal the individual is likely to be inattentive and easily distracted, while at very high levels he is tense and anxious and performance suffers. At a moderate state of arousal the individual is alert, highly attentive, and functioning at an optimum level of efficiency.

The physiological basis of selective attention is not so easily explored. It has been suggested (Moray, 1969) that the main problem in identifying the physiological basis of attention is the lack of certainty about what needs to be explained. Lacking details of the range of attentional phenomena makes it difficult to seek the counterparts in the nervous system.

Moray suggests that there is a convenient division of physiological studies on attention, necessarily blurred because of the uncertainty about the definitions of attention. The divisions proposed by him are: (a) the waning of sustained attention, or habituation; (b) the catching of attention by new stimuli, or dishabituation; (c) the selection of a neural "channel"; (d) interaction between

stimuli; (e) indices of arousal level and correlates with overall performance; and (f) the question of the physical embodiment of overall strategies of paying attention (p. 160).

When the same stimulus is repeatedly presented to animal or man, both behavioral and physiological indices of response alter. Moray (1969) described numerous experiments involving specific changes in cortical activity. As explained by Moray (1969), Hernandez-Peon and Scherrer in 1955 demonstrated that responses to auditory clicks recorded from the dorsal cochlear nucleus, as well as other placements, diminish with repetition. Horn and Hill in 1964 showed a record in which the number of spikes from a unit in the brain stem of a rabbit declined from 18 to 4 per stimulus in a series of about two dozen presentations. In contrast, Moray describes experiments by Galambos in 1960 who found that it may take days or even weeks of presentations for the neural response to habituate, even though the behavioral response has long since disappeared, and by Sharpless and Jasper in 1956 who reported that the cortical response actually increased in some of their animals at the same time as the behavioral response showed complete habituation.

Moray suggests that investigating specific cortical activity in isolation, or in relation to the reticular

system, is not sufficient, as perception requires the interaction of many different areas of the cortex.

Experiments by Horn and Hill (1964) and Oswald and Treisman (1960) indicate that remarkably slight changes are required to remove habituation. Dishabituation then does appear to relate to the behavioral findings (Broadbent, 1958), that novel stimuli are important elicitors of attention.

Neurophysiological research regarding selection of a neural channel is also controversial. Again many of the important experiments are described and discussed by Moray (1969). Hernandez-Peon and Scherrer in 1955, and Hernandez-Peon, Scherrer, and Jouvet in 1956 reported that click evoked potentials from the cochlear nucleus and auditory cortex of cats were reduced in amplitude when a cat looked at a mouse. The evidence presented by them for the blocking or reduction of irrelevant input in other sense modalities, in the presence of novel or interesting stimuli, is not supported by the results of experiments by Horn in 1960, Oswald in 1962, and Worden in 1966.

Horn found that visual potentials to flash were somewhat reduced when a cat looked at a mouse, but were unchanged when the cat listened to a novel auditory stimulus. Worden reported only small and inconsistent changes in click evoked potentials at the cochlear nucleus and

auditory cortex of cats as a function of behavioral state, when the intensity of the click stimulus was controlled.

Other recent neurophysiological research presented by Moray indicates that an incoming stimulus does interact with another present in the sensory pathways at the same time. Rosensweig and Sutton in 1958, Moushegian, Rupert, and Whitcomb in 1964, and Kiang in 1965 found evidence to indicate that this interaction is inhibitive in nature. A study in 1962 by Hubel and Weisel indicates that the interaction is facilitative.

The classical experiment by Lindsley, Schreiner, Knowles, and Magoun in 1950, as described by Thompson and Bettinger (1970), indicated that behavioral arousal and cortical EEG arousal were closely correlated, and that both could be abolished by lesions of the brainstem reticular formation. EEG arousal continues to be the most widely used neural index of alertness, arousal, or attention, even though recent experiments have complicated the notion that both behavioral and EEG arousal could be abolished by lesions of the brainstem reticular formation.

Thompson and Bettinger also discuss an experiment by Sprague, Chambers, and Stellar in 1961 which reported marked deficits in attentional behavior following extensive brainstem lesions of classical sensory pathways, and an experiment conducted in 1959 by Adametz who reported

alert and attentive behavior in cats with extensive bilateral ablation of the brainstem reticular formation, if lesions were made in several stages.

In summary of the Third Conference on Learning, Forgetting, and Remembering, led by Karl H. Pribam in October 1965, at Princeton, New Jersey, Henry Gleitman of the University of Pennsylvania made a statement concerning the results of the conference. This statement, as included in Kimble (1965), appears to this writer to be applicable to the total contribution of modern neurophysiological work.

> Some seventy years ago, William James could write, "Everyone knows what attention is." This conference certainly reflects a great advance in our uncertainty about the nature of attention, but happily this implies an advance in the amount of information we may expect to acquire in the future [p. 690].

Sex Differences in Attention

Research regarding attention is based on certain basic premises regarding attention response dimension. Silverman (1970) suggests that there are two main selectiveness of attention response factors to be considered as a basis for studying individual differences in attention response.

The first describes the extent to which various segments in a stimulus configuration are perceived in a unified manner, or in terms of a dominant figural form.

At one end of the continuum are those individuals who do not perceive even dominant figural stimuli as gestalts, but rather perceive of them as segments. At the other end are the individuals who tend to perceive stimulus elements in related groups even when the elements are apparently not associated. These individuals are disposed to passive acceptance of an entire configuration as presented, while the former individuals tend to be insensitive to subtle differences between elements in a configuration.

The second factor mentioned by Silverman concerns differences in maintaining distinct figure-ground articulation in the face of other distracting elements. At one end of this dimension are the individuals who are disposed to focusing on certain elements of the stimulus array, and to inhibiting responses to other aspects of the array. At the other end are the individuals whose responses tend to be diffuse or undifferentiated.

A review of the literature indicates that, in spite of the fact that there is considerable overlap in the attentional styles of male and female groups, there is significant evidence for central tendencies of attentional styles which correlate with the Eros-Logos theoretical distinctions of Jung as presented in Hall and Lindzey (1957).

Lipsitt and Levy (1959) and Weller and Bell (1965),

among others, present evidence for sex differences in attentional responses very early in life. These differences observed in infants appear to be associated with differences in physiologic responsiveness and sensitivity to stimulation. When sex differences are found, females typically evidence higher physiologic arousal and greater sensitivity to stimulation than males.

A study by Kagan (1970) indicates that there are also sex differences in response to stimulus patterns of varying novelty and complexity. Kagan used infants as his subjects and found that female infants appear disposed to respond to pattern stimulations which are complex, while male infants prefer stimulus patterns which can be analyzed and compartmentalized. Silverman (1970) describes a study of college-age students by Taylor and Eisenman in 1968. Again male subjects evidenced a preference for less complex stimulus patterns than female subjects.

Silverman (1970) summarizes the differences in male and female attentional styles as follows:

> The prototypic female attentional style is characterized by:
>
> 1. sensitivity to subtle social and nonsocial cues
> 2. distractibility
> 3. a "yielding" nonanalytic, nonrestructuring perceptual attitude
> 4. a receptivity to emotional and intuitive stimuli
> 5. a disposition to reduce the experienced intensity of strong stimulation [p. 89].

The prototypic male attentional style is characterized by:

1. a relative lack of sensitivity of subtle social and nonsocial cues
2. minimal distractibility
3. a "counteracting" analytic, restructuring perceptual attitude
4. an inhibition of response to emotional and nonrational inner stimuli
5. a disposition to augment the experienced intensity of strong stimulation [p. 89].

Variability within sex groups must also be given consideration in studies involving sex differences. Although an attentional response disposition may be significantly correlated with one or the other sex for the sample as a whole, the correlation may be negligible or even negative for a certain part of the sample. If part of the sample is evidencing the predicted relationship and part is not, an overall correlation masks the significance of the complex situation. Silverman terms these variables which further differentiate subjects in this type of situation as "moderator variables."

The individuals whose attention responses define the modal response for their sex usually display lower anxiety, higher ego strength, and masculinity-femininity scale scores consistent with their biological sex.

Individuals whose scores on questionnaires of masculinity-femininity have deviated in the direction of the opposite sex usually display higher anxiety and lower ego strength. In addition, Milton (1957) and Vaught (1965)

conducted studies which indicate that these same individuals have a tendency to perceive and solve problems in the manner of the opposite sex.

Measurement of Attention

The problem of the measurement of attention has been recognized for some time as one of the central problems in experimental psychology.

Geissler (1909) pointed to the need for determining a difference limen for clearness before an exact measure of the concentration of attention could be obtained. Dallenbach (1913) placed emphasis, as did Geissler, on the matter of devising suitable distractors or a method of distraction suitable to the measurement of attention.

Woodrow (1914) discussed measurement of attention in terms of its effect upon, or expression in, efficiency. He chose reaction time as an act in which efficiency varies with the degree of attention. The method he employed in measuring attention is termed a detraction method rather than a distraction method because the detractor lowers the level of attention rather than dividing it as does a distractor.

More recently the concepts of information theory have provided a way of conceptualizing the problem of attention and the alternate solutions to them.

Berlyne (1970) explains that the limitations that

make attentive processes necessary can be usefully described in informational language. The restricted number of stimuli to which we can respond and the restricted number of responses we can make can be identified with the nervous system's restricted capacity for transmitting information, and the restricted capacity of the muscles and glands for outputting information. Berlyne states that in certain conditions the measuring techniques of information theory permit these quantities to be calculated with great precision.

The measurement of pupil attention within a classroom is much less precisely defined, and is carried out by recording pupil attention during a series of observations.

Morrison (1926) was perhaps the first to develop a technique for recording attention in this manner. His procedure involved counting the number of pupils judged to be paying attention each minute of the class period, and expressing these judgments as an index of the level of control exercised over the class by the teacher. His concern for the reliability and/or validity of this measure was negligible. He claimed that most pupils can be unequivocally classified as attentive or inattentive. Validity for Morrison was implicit in the overt behavior of pupils.

Jackson and Hudgins (1965) proposed an observation schedule somewhat more sophisticated. This record measures

the student's degree of attention to relevant classroom activities. An observer looks at each pupil in turn and immediately records the state of his attention. The observer is encouraged to take the stance of the teacher in judging attention. Four classifications are possible.

1. "+" if the pupil is attentive. The pupil has to be attending to the area of focus, namely the subject to which the teacher has called attention, and the prescribed activity.
2. "-" if the pupil is clearly inattentive. The pupil is marked inattentive if he is not attending to the area of focus and/or the prescribed activity.
3. "?" if it is uncertain to the observer whether or not the pupil was attentive.
4. "0" if the pupil's attention was not observable.

Inter-observer reliability on the above scale, defined as percentages of agreement, ranged from 85% to 100%, with a median of 90%, for a series of observations made by Hudgins (1967). In a series of trial observations by Lahaderne (1968), using this same scale, percentages of agreement ranged from 83% to 100%.

The reliability of observation schedules for measuring pupil attention has also been established in other studies by Shannon (1936) and by Clarence Blume in 1936 as reported by Shannon.

The validity of attention scores obtained on measures of this kind is questionable. That certain external evidences of attention may be regarded as valid indications

of attention suggests that mental states have standardized objective physical concomitants (Shannon, 1942).

Attention as a Component of Associational Learning

In searching for the cause of reading difficulty, Samuels (1971) stresses the need to focus on variables considered to be the basic components of the learning-to-read process. He presents a model of associational learning, derived from current conceptualizations in cognitive psychology, which he proposes as a basis for further work on reading difficulty. This model is shown in Figure 2.

The components of associational learning, which Samuels identifies as important in learning to read, consist of attention, visual and auditory discrimination, short- and long-term memory, and mediation.

Samuels designates attention as the allocation of energy and analyzing mechanisms directed at a region within a field. The purpose of allocating attention to a limited region within a broader field is to increase the chance of certain stimuli being received and processed.

When a student is attentive, he is alert to the signals which direct his attention to a region. When the teacher instructs the student to look at the board and differentiate between two letters, his attention is directed first to the teacher's voice and then to the

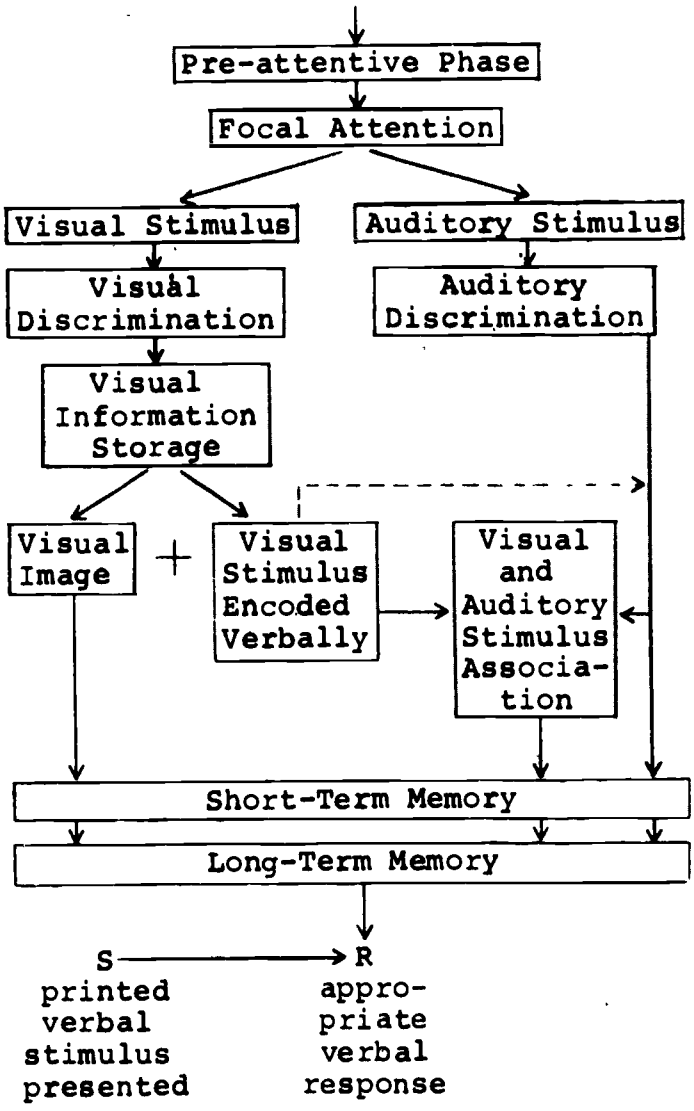

Fig. 2. Model of associational learning. (From Samuels, in Davis (Ed.), The Literature of Research in Reading with Emphasis on Models, 1971.)

specific region she directs. According to Samuels, attention on the part of the student in the learning-to-read situation entails a broad class of behaviors which the classroom teacher views as "cooperation" or "good deportment." These cooperative behaviors, of complying with her instructions, are what the teacher means when she indicates that a student is attentive.

As can be seen in Samuels' model, the learning-to-read situation which requires associational learning involves the presentation of a visual and auditory stimulus. The visual stimulus consists of a single letter, a word, a phrase, or a sentence, and the auditory stimulus consists of the auditory counterpart. The learner's task is to associate the two. He should be able to give the appropriate verbal response to the printed stimulus when associational learning is complete.

Attention and Academic Achievement

Kagan (1970) stated that the central problem in educating children is to attract and maintain focused attention. Bakan (1966) suggests that childhood is characterized by great active energy and has few organized interests by which to meet new impressions and decide if they are worthy of notice. He states that the consequence of this extreme mobility of attention in children is that their first lessons are made more difficult for them.

Santostefano, Rutledge, and Randall (1965) investigated reading disability from the standpoint of the cognitive mechanisms and processes involved in reading activity. Their findings suggest that one cognitive mechanism crucial for reading is concerned with processing information in the context of distractions, and with an individual's ability to withhold attention selectively from irrelevant and intrusive information. This conclusion also receives support from studies by Petty (1939) and Samuels (1967). Santostefano et al. did not find a significant relationship between reading disability and an individual's style in deploying attention and concentration between two objects being compared.

Baker and Madell (1965a, 1965b) investigated susceptibility to distraction in academically underachieving and achieving male college students, and concluded that underachieving male college students are more susceptible to distraction than achieving students. Wilson and Morrow (1962) found that high school underachievers rated themselves as more distractible when trying to study than did achievers.

Cason (1938) conducted an experiment to study the influence of distractions, to which the subjects were more or less accustomed, on activities of cumulative addition, paired associates' learning, arithmetical problem solving,

reading of interesting prose material, and reading of proverbs, sayings, and jokes. The general effect of distractions was to make the conditions more difficult to work under and to lower efficiency. Distractions caused the subjects to exert greater effort, but in spite of the greater effort, efficiency during distractions was lower than during the quiet periods.

Lahaderne (1968) collected data from four sixth-grade classrooms to determine whether children's attentiveness in class was related to their attitudes toward school on the one hand, and to achievement and ability on the other. Using the Jackson-Hudgins Observation Schedule, each pupil's attention to the main class activity was recorded over a two-month period. Questionnaires assessing their attitudes were administered, and I.Q. and achievement test scores were obtained from school records. There was practically no relation between students' attitudes and measures of attention; however, a positive relationship was found between measures of students' attention and scores on achievement and intelligence tests.

Lahaderne concluded that all of the pupils in a classroom may have been subjected to the pressures for attention, but the extent to which they responded appeared to have been tied to general ability and instructional variables rather than to pupils' attitude toward school.

Precision Teaching

Samuels (1971) suggests the need for the use of "precision teaching" in instances where the student is inattentive or less attentive than he might be. Lacking an adequate definition for the term "precision teaching," this writer communicated with Samuels who provided the source for information regarding this technique.

The concept of precision teaching, as outlined by Meacham and Wiesen (1969) in Changing Classroom Behavior: A Manual for Precision Teaching, applies recent scientific developments in the understanding of human learning to the classroom. It involves the basic terms of "behavior" and "response" and the concept of a "contingent" environment, in which the outcomes a student experiences are directly influenced by his behavior.

According to the authors, precision teaching is directly related to the experimental findings of B. F. Skinner, and is a systematic and logical method that permits a teacher to promote the greatest possible amount of learning in the shortest possible time. The technique also takes into full account the individuality of each student and encourages creativity. It is based on the idea that faulty learning is the product of a faulty environment rather than of a faulty student.

Of particular interest were basic suggestions for

increasing student attention. The use of positive reinforcement for the extinction of inattentive behavior was also explored in the manual.

Trabasso (1968) also urges that teachers pay attention to the problem of attention, and suggests that they systematically select those cues which are critical to the solution of a problem and accentuate them, while simultaneously avoiding cues which are irrelevant and distracting. He states that many of the keys to successful teaching or training will be found in the close study of the attentional phases of the learning process. Concerning the study of attention, he says:

> Such study may enable us to build a more productive learning environment and perhaps allow us finally to deal more cleverly with hoary old classroom menaces like the "slow reader" [p. 36].

Place of This Study in Literature

The fact that attention is related to academic achievement on the high school and college level is supported by this literature search (Baker & Madell, 1965a, 1965b; Cason, 1938; Wilson & Morrow, 1962). Lahaderne's study of 1968 included the investigation of attention and reading achievement in four sixth-grade classrooms. The results indicate that there is a positive relationship between attention and reading achievement on the upper elementary level.

Samuels (1971) points out that the role of attention in beginning reading has not been investigated. This study is unique in that it investigates the relationship between individual differences in attention and reading achievement in first grade.

It is intended that this study will also indicate support for Samuels' premise that research on the causes of reading difficulty will be more meaningful if investigators concern themselves with variables which are components of a learning model of reading acquisition.

CHAPTER III

PROCEDURES

This chapter describes the selection procedures, the sample, the tests, measures and methods used in the collection of data and the methods of data analysis.

Selection Procedures

Permission was secured from the Bridgewater-Raritan Regional School District in Bridgewater Township and the town of Raritan, New Jersey, to conduct a study in the five first-grade classrooms of one elementary school.

A meeting was held with the five first-grade teachers to obtain the names of the children in each class and an approximate schedule for reading instruction so that the time for observations and testing could be arranged.

The total population of 111 students was observed and tested although the final sample consisted of 81 students, 48 boys and 33 girls. Eliminated from the sample were those students who had prolonged absences during the eight weeks of observation, those students who were absent when the Stanford Achievement Test was administered, one student who moved, and students for whom I.Q. scores as

determined by the results of the Goodenough Draw-A-Man Test administered in January 1971 were not available.

The students for whom I.Q. scores were not available might have been eliminated from the sample before the observations and testing were initiated; however, it was decided that in observing a reading group, for the purpose of recording attention, it was more efficient to make the "sweep of attention" exactly as proposed by Jackson and Hudgins (1965), including each student in turn. In addition, the testing situation might have been more threatening if all of the youngsters in each of the classrooms were not included.

Description of the Sample

The sample consisted of 81 students, 48 boys and 33 girls, enrolled in five first-grade classrooms of an elementary school. According to the principal, the composition of each of the classrooms was heterogeneous.

I.Q. scores for the sample ranged from approximately 80 to 125. Chronological age ranged from six years three months to seven years three months.

Most of these first-graders come from middle-class families. The occupations of the parents vary including professionals, managers, service workers, production workers, and skilled and unskilled laborers. Religious affiliations are representative of the three major faiths.

The entire sample was Caucasian.

Description of Tests and Measures

I.Q. scores used in this study were obtained from the Special Services Department of the Bridgewater-Raritan Regional School District. As part of the regular screening program, the school psychologist administers the Goodenough Draw-A-Man Test to all students in February of their kindergarten year. The data used in this study, as the measure of intelligence, were obtained in February 1971.

The Draw-A-Man Test was originally published in 1926 by Florence Goodenough. The test calls for the child to "make a picture of a man." This is a simple task which seldom takes more than five or ten minutes to administer. It may be administered either individually or to groups. The child receives one point for each scorable item present in his drawing. Using the child's age to the nearest month, the scorer refers to a table provided by Goodenough (1926), to convert the total number of points to a mental age score. By dividing the mental age by the chronological age, the intelligence quotient is obtained.

Harris (1963) presents a revision of the original Draw-A-Man Test. The changes which he made include: the redevelopment of the Goodenough scoring on a highly objective, empirical basis; a new standardization of the test;

conversion of the I.Q. computation from the old mental age/chronological age ratio concept to the deviation I.Q. concept; the introduction of a companion Draw-A-Woman Test; and a drawing quality score.

Anastasi, in Buros (1972), reports that in both the new scale, and the earlier version of the Draw-A-Man Test, scorer reliabilities are usually over .90. She feels that such inter-scorer agreement reflects the fullness of the scoring instructions and the care exercised in selecting items that can be scored with a minimum of uncertainty. Split-half reliabilities, on the earlier form, as reported by Anastasi, are in the .70's and .80's.

Harris (1963) summarizes correlations obtained between the earlier Draw-A-Man Test and the Stanford-Binet, WISC, WAIS, and a few other intelligence and special aptitude tests. Nearly all of the correlations are significant and most are substantial.

Anastasi (Buros, 1972) feels that the principal evidence for the validity of the Draw-A-Man Test derives from the item analysis procedures followed in developing the scales. She states that the effectiveness of age differentiation criterion employed in item selection is reflected in the consistent and sharp rise in mean raw point scores between ages 5 and 14.

The Paragraph Meaning subtest of the Stanford

Achievement Test, Primary I, Form W, was administered by this writer to all of the students in the five first-grade classrooms. The Primary I Battery is designed for use from the middle of grade one to the middle of grade two.

The Paragraph Meaning subtest consists of a series of paragraphs, graduated in difficulty, from each of which one or more words has been omitted. The pupil's task is to demonstrate his comprehension of the paragraph by selecting the proper word for each omission from four choices that are given. The test provides a measure of the child's ability to comprehend connected discourse ranging in length from single sentences to paragraphs of six sentences. It involves levels of comprehension ranging from simple recognition to the making of inferences from several related sentences.

Kelley, Madden, Gardner, and Rudman (1964) report on the reliability of the Primary I Battery of the Stanford Achievement Test for a random sample of 1000 pupils in grade one. The odd-even split-half reliability coefficient for the Paragraph Meaning subtest is .90. The Kuder-Richardson reliability coefficient for the same subtest is .88. In terms of grade scores, the standard error of measurement is reported to be .5.

Kelley et al. state that the validity of the Stanford Achievement Test is best thought of as the extent to

which the content of the test constitutes a representative sample of the skills and knowledges which are the goals of instruction. The Stanford authors sought to insure content validity by examining appropriate courses of study and textbooks as a basis for determining the skills, knowledge, understanding, etc. to be measured.

. modified version of the Jackson Hudgins Observation Schedule was the tool used for measuring attention. A copy of this observation schedule was obtained from one of the authors, Dr. Philip Jackson of the University of Chicago.

The schedule is included in Appendix A and will be described here as presented by the authors. Minor modifications made for this study, with the permission of Dr. Jackson, will be presented under the next sidehead, Administration of Tests and Observations.

The Jackson-Hudgins schedule, which measures the student's degree of attention to relevant classroom activities, is kept on coding sheets which alphabetically list first the boys' names and second the girls'. Ten columns follow the list of names. Different coding sheets are used whenever there is a change in the unit observed or the area of focus. The attention of each student is recorded by looking at each pupil in turn and marking on his row, in the appropriate column, one of the following:

"+" if the pupil is attentive, attending to both the area of focus and the prescribed activity; "-" if the pupil is inattentive, not attending to the area of focus and/or the prescribed activity; "?" if you do not know whether or not the pupil was attentive, insufficient cues to determine the focus of his involvement; "0" if the pupil is out of the room or out of his seat at the moment of recording. A sample of the recording sheet is also included in Appendix A.

Each column on the sheet represents a "sweep" which is defined by the authors as the scanning of the total group being observed. The attention scores are presented as percentages.

The authors state that a general rule for judging attention is to take the stance of the teacher. A list of specific cues to look for in judging attention is also included in Appendix A. The cues fall under the headings of postural, body movements, facial expressions, and other, such as having a book open to the appropriate page, reciting, etc.

Inter-observer reliability on this measure was discussed previously in the literature review under the sidehead of Measurement of Attention. To summarize, Lahaderne (1968) obtained percentages of agreement ranging from 83% to 100%. For a series of observations made by

Hudgins (1967) the percentages of agreement ranged from 85 to 100 with a median of 90%.

Administration of Tests and Observations

The observer paid preliminary visits to each classroom, during the time reading instruction was being given, in order to accustom the teachers and pupils to her presence. In these and subsequent visits, she placed herself to the side of the room where she could see the pupils involved in reading instruction without being in their direct line of sight.

Observations were made daily during an eight-week period. The times of observation were necessarily staggered in order to observe the 16 different reading groups within the five classrooms. With previous agreement from the teachers, the observer was free to enter the classrooms with no prior notice as to what time she might enter on a particular day. In addition, each teacher agreed to have the students sit in the same seat in the reading circle on each day. The observer was provided with a seating chart, and if a student was absent, his chair was left vacant.

Each student was observed in a situation where he was being instructed in reading on ten separate and inconsecutive days. Reading instruction in all of the classrooms took place in the morning.

The instructions for using the observation schedule do not stipulate the number of observations to be made for each student in recording attention. In a telephone conversation with Dr. Jackson, he indicated that no specific number is intended, but that the more observations which were made, the more valid the scores would be. Pressed for specificity, he stated that as long as attention was being observed in the same area of instruction for this particular study, ten observations of each pupil would be satisfactory. Thus, if a pupil was attentive nine out of the ten times and inattentive once, his percentage of attention score would be expressed as 90%.

Other modifications discussed with him during this same conversation were as follows: listing of the students by groups in the order that they were seated in the circle, rather than alphabetically as intended by the authors; and the use of one sheet for each group with the date inserted at the top of each of the columns, because all of the observations would be in the same subject area.

The Paragraph Meaning subtest of the Stanford Achievement Test, Primary I Battery, Form W, was administered by this writer at the beginning of April, after observations of attention were complete. Each of the five classes was tested separately adhering strictly to the method of presentation contained in the Test Manual.

Methods of Data Analysis

The correlation coefficients for the various tables used in this study were computed using a multiple regression program on a G.E. 400 series computer. The computer time-sharing service at Union Carbide Chemicals and Plastics Company in Bound Brook, New Jersey, was utilized for this work.

Tests for significance of the coefficients were based on the Student's t statistic since this method is particularly effective in cases where the sample size is small, i.e., less than 30.

The only assumption made for the data was that the measured observations were normally distributed, and this is a valid assumption for parameters such as age, I.Q., and test scores.

Summary

Eighty-one students from five first-grade classrooms of one school in a middle-class regional school system were used as the subjects of this study.

Individuals' scores of attention were recorded over an eight-week period, during the months of February and March, using the Jackson-Hudgins Observation Schedule. The Paragraph Meaning subtest of the Stanford Achievement Test, Primary I Battery, Form W, was administered to all of the students at the beginning of April to obtain scores

of reading achievement. Derived data from the Goodenough Draw-A-Man Test were used as the measure of intelligence.

Correlation coefficients of attention and reading achievement, attention and I.Q., and reading achievement and I.Q. were obtained for boys and girls. A comparison of the means and standard deviations for boys and girls was completed for reading achievement, percentage of attention, intelligence quotient, and chronological age. Differences between means were tested for statistical significance using the t test. Computations were made on a G.E. 400 series computer.

CHAPTER IV

FINDINGS AND DISCUSSION

This chapter contains an analysis of the data obtained for 81 first-graders, 48 boys and 33 girls, on measures of attention, reading achievement, and intelligence. It also includes a discussion of the findings and their relation to studies in the literature.

Findings

Hypothesis 1 states that the mean attention score for girls will be significantly higher than the mean attention score for boys. The data did not support this hypothesis. As shown in Table 1, there was no significant difference between the mean attention score for girls and the mean attention score for boys.

Hypothesis 2 states that reading achievement scores will be significantly higher among those children who are more attentive. The data support this hypothesis. As shown in Table 2, the correlation between reading achievement and percentage of attention, for boys and for girls, was significant at the .01 level of confidence.

Hypothesis 3 states that reading achievement scores will be more closely related to attention than to

TABLE 1

COMPARISON OF MEANS AND STANDARD DEVIATIONS FOR BOYS AND GIRLS FOR READING ACHIEVEMENT, PERCENTAGE OF ATTENTION, I.Q., AND CHRONOLOGICAL AGE

	Boys (N=48)		Girls (N=33)		Total (N=81)	P
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	t	
Reading Achievement (Stanford Achievement, Primary, Form W, Paragraph Meaning Subtest)	15.6	9.50	14.9	7.26	.357	ns
Percent Attention (Jackson-Hudgins Observation Schedule)	78.7	18.29	78.2	19.75	.117	ns
Intelligence Quotient (Goodenough Draw-A-Man)	100.5	11.15	104.7	9.35	1.776	ns
Chronological Age	6.8	0.30	6.6	0.28	3.028	.01

Means were rounded to the nearest tenth, standard deviations were rounded to the nearest hundreth.

TABLE 2

INTERCORRELATIONS BETWEEN READING ACHIEVEMENT, ATTENTION, AND I.Q.

Boys (N=48) Girls (N=33) Total (N=81)	Reading Achievement	Attention	I.Q.
Reading Achievement	--	Boys .43[a] Girls .58[a]	Boys .19 Girls .34[b]
Attention	All Pupils .48[b]	--	Boys -.02 Girls .36[b]
I.Q.	All Pupils .21	All Pupils .11	--

[a]Significant at the .01 level.

[b]Significant at the .05 level.

I.Q. The data support this hypothesis. As shown in Table 2, the correlation between reading achievement and I.Q. is not significant for boys. It is significant at the .05 level of confidence for girls.

Table 1 presents the means and standard deviations for boys and girls for reading achievement, percentage of attention, I.Q., and chronological age. Tests of significance to see if differences existed between boys and girls, in regard to the above, reveal no significant differences except for chronological age. The boys' mean chronological age is 6.8 and the standard deviation 0.30 as compared to the girls' mean chronological age of 6.6 and the standard deviation 0.28. Based on the t statistic, this difference is significant at the .01 level of confidence.

Table 2 shows the comparison of correlations between reading achievement and percentage of attention, reading achievement and I.Q., and percentage of attention and I.Q.

The correlation between reading achievement and percentage of attention is significant for both boys and girls at the .01 level of confidence.

The correlation between reading achievement and I.Q. is not significant for boys, but it is significant at the .01 level for girls. The correlation between attention and I.Q. is also not significant for boys, but it is significant for girls at the .05 level of confidence.

Discussion

It is interesting to note that the lower chronological age for girls, as shown in Table 1 and stated previously, is a direct result of the kindergarten screening procedure of the Bridgewater-Raritan Regional School District. The cut-off date for admission to kindergarten is October 1; however, those youngsters whose birthdays fall between October 1 and December 31 are screened for early admission by the school psychologist and learning disabilities specialist. Based on the developmental aspects of boys versus girls, the ratio of early admission is four to one in favor of the girls.

The relationship between reading achievement and percentage of attention, as stated previously and shown in Table 2, is significant at the .01 level for boys and for girls. The average percentage of overlap between reading achievement and attention is approximately 25%, indicating that the factor of attention should be recognized by educators as a variable which deserves consideration in investigating the causes of success or failure in reading.

The correlations between I.Q. and reading achievement and I.Q. and attention were not significant for boys, but were significant for girls. There is, however, little educational significance surrounding the results obtained for the girls. Despite the significant results obtained

for the girls, the percentages of overlap are only 13% for I.Q. and attention, and 11.5% for I.Q. and reading achievement. The educational implications appear to be negligible. It might also be noted that the lower chronological age for girls might have influenced these results by providing I.Q. scores biased on the high side for girls.

Relation to the Literature

The mean attention scores for girls in this study were not significantly higher than the mean attention scores for boys. These results differ from those of Lahaderne (1968) who found positive support for the stereotypes of the docile successful school girl and the active mischievous school boy. The girls in Lahaderne's sample had a higher level of attention than boys, in addition to higher I.Q.'s and greater achievement.

There are two possible explanations for the difference in results concerning the comparison of attention for boys and girls. First, the degree of pressure for attention brought to bear by individual teachers may have differed significantly for the two samples. Second, first-grade boys and first-grade girls may not yet have acquired the typical behaviors.

The findings of this study concerning the relationship between reading achievement and attention concur with those of Lahaderne (1968) whose data provided positive

support for the notion that there is a significant relationship between a student's performance in reading and the amount of attention he expends.

In addition, the significant relationship between reading achievement and attention obtained in this study are in accord with Samuels' (1971) premise that the components of the learning process play an important role in success in reading.

The results of this present study do not support the relationship between I.Q. and reading achievement and I.Q. and attention as strongly as do Lahaderne's results. She found that there was a significant relationship between I.Q. and reading achievement, and I.Q. and attention for both boys and girls in the sixth grade. The less able pupils may have been limited in their capacity to attend just as they were limited in their capacity to achieve academically. It is suggested that the difference in findings may be based on the fact that achievement in the primary grades is said to be much less closely related to capacity measures than in the middle and upper grades (Kelley et al., 1964).

CHAPTER V

SUMMARY AND CONCLUSIONS

This chapter summarizes the study, and presents conclusions regarding the hypotheses and findings of this investigation. Suggestions for further research are also included.

Summary

The relationship between attention and reading achievement was investigated in five first-grade classrooms in one school of a middle-class regional school district. The total population of 111 students was observed and tested; however, incomplete data, prolonged absences, moving, etc., resulted in a final sample of 81 students, 18 boys and 33 girls.

Observations for the purpose of recording attention, using the Jackson-Hudgins Observation Schedule, extended over an eight-week period. The Paragraph Meaning subtest of the Stanford Achievement Test, Primary I Battery, Form W, was administered at the close of the eight weeks to determine reading achievement scores. Derived data, as obtained on the Goodenough Draw-A-Man Test, was used as the measure of intelligence.

Comparisons of the means and standard deviations between boys and girls were made for reading achievement, percentage of attention, I.Q., and chronological age. The significance of these differences was determined by the use of the t statistic.

The correlations between reading achievement and attention, reading achievement and I.Q., and attention and I.Q. were analyzed separately for boys and girls. Tests for significance again were based on the t statistic.

Conclusions Regarding the Hypotheses and Findings

Hypothesis 1 was rejected as discussed in Chapter IV. The mean attention score for girls was not higher than the mean attention score for boys. The conclusion can thus be made that neither girls nor boys in first grade are superior in their ability, or perhaps willingness, to attend.

A statistical analysis of the relationship between reading achievement and attention provided positive support for hypothesis 2 which stated that reading achievement scores would be significantly higher among those children who are more attentive. The correlation between reading achievement and percentage of attention for both boys and girls was significant at the .01 level. Thus, it can be concluded that there is a relationship between

reading achievement and attention in beginning reading.

The data also supported hypothesis 3 that reading achievement scores would be more closely related to attention than to intelligence quotients. The correlation between reading achievement and I.Q. for boys was not significant. The coefficient obtained for girls was significant at the .05 level. The data regarding the relationship between reading achievement and I.Q. appear to be inconclusive. The fact that the girls were significantly younger than the boys indicates that their I.Q. scores were biased on the high side. This also casts doubt about the significant relationship which was found to exist between I.Q. and attention for girls but not for boys. Aside from the questionable significance, the role of I.Q. in attention and reading achievement in first grade appears negligible when one considers the small percentage of overlap which exists, based on the present data.

Suggestions for Further Research

This study contributes information regarding the role of attention in beginning reading; however, the size of the sample, the use of only one school, and the use of one ethnic group suggest the need for further similar studies in order to generalize the findings.

The difficulty in separating cause and effect in studies with older children suggests that more information

regarding the relationship between reading achievement and attention will best be obtained if future studies also investigate the variable on the primary level. Samuels (1971) explains that it is difficult to infer the causality of the relationship between reading achievement and attention with children in the upper elementary grades, since it is possible that poor reading led to inattentive behavior.

One implication from this study is that students who are having difficulty with beginning reading skills might benefit from techniques to overcome difficulties with attention. Samuels (1971) indicates that precision teaching techniques, as described in the literature search, might be a means of improving attention. He suggests that if studies such as the present one show a significant relationship between reading achievement and attention, a follow-up study might select those students who show indications of inattention early in first grade and use precision teaching techniques to determine the effect on reading achievement.

It would appear to this writer that, before difficulties with attention can be overcome, there must also be more studies to investigate the variables that account for fluctuations of attention. In addition, the development of a more precise technique for measuring the effect

of various teaching styles on attention is indicated.

A research project, as outlined by Samuels (1971), which includes an investigation of all of the variables of associational learning which are important to learning to read, would provide the most information regarding the contribution of the components of associational learning to the reading process. He suggests that the subjects for the study should be first-graders who are learning to read by the same instructional method. As early in grade one as possible, data from each student should be gathered on attention, distinctive-feature learning, visual and auditory memory, auditory discrimination, mediation, and intelligence. At the end of the school year, the students would be given reading achievement tests, and the various predictor variables, i.e., attention, distinctive feature learning, etc., would be correlated with the criterion variable and with each other. Samuels notes that a multiple-regression analysis of the accumulated data would provide information on the relative contribution of each of the predictor variables to reading achievement.

Perhaps if enough scientific data were obtained from studies, such as the one outlined by Samuels, the creation of a model of reading would be justified. A model labeled specifically as such, rather than as a model of associational learning, would no doubt encourage

classroom teachers and reading specialists to place the emphasis for remediation of reading difficulty where it may well belong.

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APPENDIX A

JACKSON-HUDGINS OBSERVATION SCHEDULE (REVISED)

This record measures the student's degree of attention to relevant classroom activities. It is kept on coding sheets which alphabetically list first the boys' names and second the girls'. Ten columns follow the list of names. Each column represents a "sweep," that is, the scanning of the total group being observed.

The procedures for coding involves seven steps.

1. Draw a line through the row following names of absent students.
2. Record situation:
   a. The date of observation
   b. The unit observed, that is, whether the entire class is observed or a subgroup.
   c. Area of focus, that is, the subject to which the teacher has called attention; for example, arithmetic, or social studies, or art.
   d. Prescribed activity:
      (1) teacher-class. This includes recitation, discussion, and lectures.
      (2) seat work. This includes tests, writing in workbook, or otherwise working individually at one's desk.
      (3) audio-visual. This includes viewing films, TV, and film strips.
      (4) other specified activity. This would include

any other activities prescribed by the teacher and not included in the above categories.

3. Record time observation period starts.

4. Record attention of each student.

Look at each pupil in turn. (Either according to the seating arrangement or the alphabetical listing. In the latter case, the boys are coded first.) For each pupil, mark on his row in the appropriate column one of the following:

a. "+" if pupil is attentive.

The pupil must be attending to both

(1) the area of focus, and

(2) the prescribed activity.

b. "-" if pupil is inattentive.

The pupil is not attending to

(1) the area of focus, and/or

(2) the prescribed activity.

c. "?" if you do not know whether or not pupil is attentive. This may occur when there are not sufficient cues to determine the focus of his involvement. As an instance, it is sometimes difficult to know whether a doodler is listening attentively to the teacher while drawing or whether he is deeply absorbed in his drawing and is deaf to his teacher's voice.

d. "0" if the pupil is out of the room, on his way out, or returning to his seat. He is also coded "0" if at the moment of sweep he is sharpening his pencil or drinking water.

5. Record time observation period ends.

6. Change coding sheet for each new situation, that is, whenever there is a change in the unit observed, the area of focus, or the prescribed activity.

Cues for Judging Attention

1. POSTURAL: Body, head, eyes are turned toward the object or in the direction expected in the prescribed situation.

Examples of attention:

a. Pupil looks where the teacher has indicated. He looks at the TV screen, or at the blackboard during demonstrations, or at the teacher who is lecturing.

b. Pupil has slight tension of the body, indicating "aliveness." As an instance, he may sit on the edge of his seat ready to break into the discussion or to raise his hand.

Examples of inattention:

a. Pupil looks out the window, at ceiling, or at other students when visual attention is demanded elsewhere.

b. Pupil looks intently at someone else or at some action in room other than where teacher has called

attention, such as looking at film projector being set up while teacher is demonstrating an arithmetic problem.

c. Pupil has slumped posture, or his head resting on desk, or other sleeping positions.

2. BODY MOVEMENTS: There is an alive tone to pupil's movements. His activity is appropriate to the situation.

Examples of attention:

a. Pupil raises hand to respond to teacher.

b. Pupil is involved in prescribed activity, such as reading, writing, and so on.

Examples of inattention:

a. Pupil engages in horseplay.

b. Pupil attends to incorrect activity, such as reading when he should be writing.

c. Pupil is not involved in any activity when an activity is prescribed, such as not reading when should; or not looking up answers in text when asked to do so.

d. Pupil doodles and draws.

e. Pupil listens to another pair of pupils' conversation.

f. Pupil's eyes are vacant or glassy. The body is very still and he stares into space.

3. FACIAL EXPRESSIONS:

Examples of attention:

a. Pupil has bright, alert expression.

b. Pupil changes expression in response to what is going on. He smiles, raises his eyebrows, laughs, sighs.

Examples of inattention:

a. Pupil is sullen, listless, and without expression.

4. OTHER:

Examples of attention:

a. Pupil has book open to proper page.

b. Pupil uses appropriate book.

c. Pupil clears his desk, moves to next period's assignment.

d. Pupil recites and otherwise shows signs of participating.

Examples of inattention:

a. Pupil's book is open to page other than the one teacher has indicated.

b. Pupil is reading a book not assigned by the teacher.

c. Pupil takes a long time clearing his desk and getting to the next task.

d. Pupil does not participate in discussion.

e. Pupil talks with neighbors when this is not permitted.

5. A general rule for judging attention is to take the stance of the teacher. On the one hand, if the pupil is involved in the activity prescribed by the teacher, he is judged as attentive. On the other hand, if the pupil is engaged in activity which the teacher would reprimand, he is judged as inattentive.

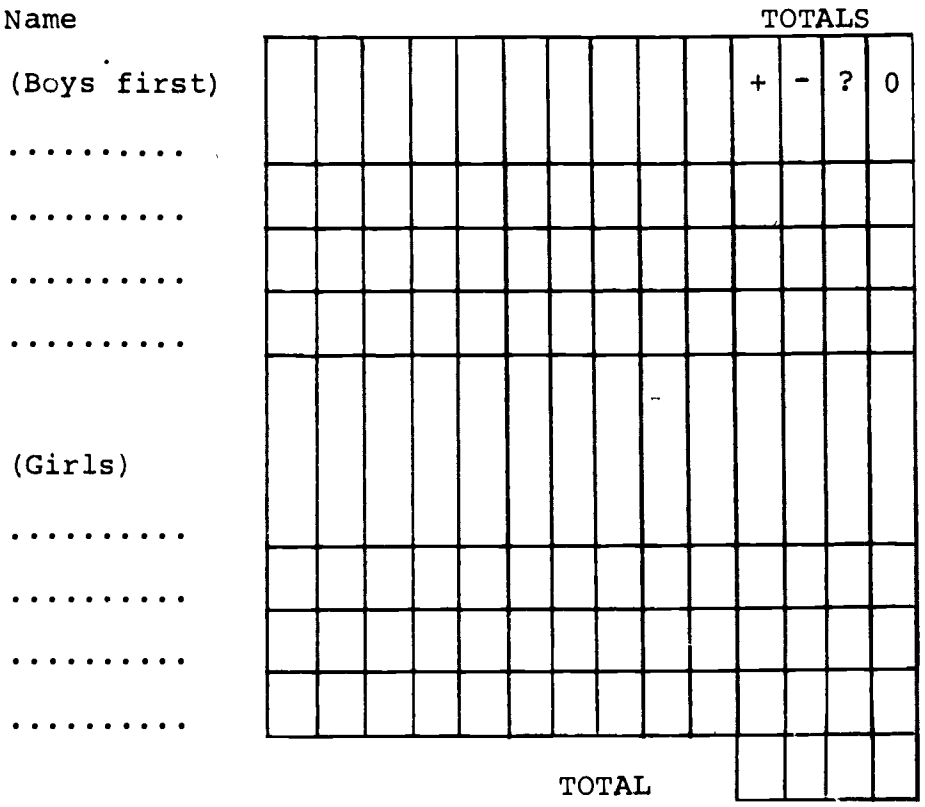
Date_____ Unit_____ Observer_____

Day of Week_____ Area_____

Activity_____

Time Begin_____

Time End_____



APPENDIX B

STANFORD ACHIEVEMENT TEST,

PRIMARY I, FORM W,

PARAGRAPH MEANING SUBTEST

PARAGRAPH MEANING

SAMPLES

The kitten likes ___A___.

A color mew ~~milk~~ make

The boy wanted to cross the street.
He saw a car coming.
He waited until the ___B___ went by.
Then it was safe to ___C___.

B ~~car~~ people time piece
C look cross skip play

Jane has a pet.
He wags his tail.
He says, "Bow-wow."
He is a ___1___.

1 dog cat doll rabbit

Bob went away.
He said, "___2___."

2 Jump Help Good-by Mother

Mary laughed at the surprise.
It was something ___3___.

3 blue funny red little

I can sing.
I can fly.
I am a ___4___.

4 kite rabbit bird frog

See my dog play.
He can ___5___.

5 help want run ball

Dick is with the pony.
The pony is in the barn.
Dick is in the ___6___.

6 house barn car school

The car is red.
It can go __7__.

7 run first ride fast

I give light.
I make you hot.
You see me in the sky.
I am the __8__.

8 sun rain air snow

I am white.
I come from a cow.
Children like to drink me.
I am __9__.

9 meat bread water milk

The fox's tail is red.
The tip of the tail is white.
His tail is red and __10__.

10 blue yellow white black

We have five pet hens.
They give us __11__.

11 milk apples eggs farms

Tom has a toy.
It goes up and up.
It is an __12__.

12 airplane automobile engine orange

The cat and the horse are hungry.
We will give the horse some hay.
We will give the __13__ some milk.

13 horse baby cat calf

I can jump from tree to tree.
I have a long tail.
I am a __14__.

14 dog cat monkey mouse

I can swim fast.
I live in a glass bowl.
I am a __15__.

15 fish baby boy girl

Grandma came to see Alice and Tom.
She brought a doll and an engine.
The engine was for Tom.
The doll was for __16__.

16 me Alice us brother

Dick has a flower garden. He waters it every day. Everyone says, "What pretty __17__ you have in your garden, Dick."

17 tomatoes berries corn flowers

The barn door was open.
The gate was open, too.
The __18__ was gone.

18 train bird toy horse

I am blue.
I am far away.
You cannot touch me.
I am the __19__.

19 table chair garden sky

Betty has a tiny pet.
It has four legs.
It is a __20__.

20 pony duck cow kitten

Pat cut her hand.
It hurt very much.
She said, "I am a big girl.
I will not __21__."

21 laugh cry sing run

I am made of wood.
I have four legs.
People sit on me.
I am a __22__.

22 chair cow lap floor

Minnie goes in the water.
She has two feet.
She is a __23__.

23 cat chicken duck bunny

Something was stealing food. Mother bought a trap. She put cheese in the trap. That night she caught a __24__.

24 fly fish fox mouse

See the children in play clothes. They have packages of apples, sandwiches, cookies, and other good things to __25__. They are Miss Allen's class on their way to the park for a __26__.

25 sell buy cook eat
26 ride picnic trip visit

Sally had an apple.
The skin was red.
It was __27__ inside.

27 white red blue orange

Sue must stay in bed today.
Her face feels very hot.
She does not want her breakfast.
Sue is __28__.

28 happy sick hungry lazy

You should be careful when you cross a street. Watch out for __29__. Always look __30__.

29 airplanes birds dogs cars
30 for boys both ways back pretty

John, Paul, and Fred played.
Each had a ball.
There were __31__ balls.

31 two three four five

Billy did a trick.
He stood on his head.
His __32__ went up in the air.

32 hands head ball feet

I am very sweet. Boys and bears like to eat me. I am ___33___.

33 honey milk bread fish

We saw a TV show about cowboys. They rode very fast on their horses and shot bad men with their guns. Mother said, "Real ___34___ work hard taking care of ___35___. They do not spend their time ___36___ bad men."

34 horses cowboys men people
35 grass sheep cattle land
36 shooting beating shaking scaring

John wanted to buy a cake.
He went to the ___37___.
He also bought some ___38___.

37 country baker builder airport
38 butter meat fish bread

APPENDIX C

RAW SCORES

CLASS ONE

Student	Sex	C.A.	M.A.	I.Q.	Attention % Score	Read. Test # Correct*
1	M	7-0	6-3	85	100	14
2	M	7-0	6-0	82	70	15
3	M	7-1	7-3	103	90	29
4	M	6-11	7-0	102	90	14
5	M	6-4	6-6	103	50	11
6	M	6-6	7-9	126	80	23
7	M	7-0	7-3	105	100	25
8	M	7-2	6-3	84	50	16
9	M	6-6	7-0	110	60	32
10	M	7-3	7-0	96	70	14
11	F	6-6	6-3	95	20	3
12	F	6-6	6-0	90	70	11
13	F	6-6	6-9	105	100	29
14	F	7-0	7-0	100	70	9
15	F	6-5	6-9	107	90	11
16	F	6-3	6-9	110	80	16
17	F	6-8	7-6	117	100	31
18	F	7-1	6-9	94	70	16
19	F	6-5	7-0	112	90	17

*38 possible number correct.

CLASS TWO

Student	Sex	C.A.	M.A.	I.Q.	Attention % Score	Read. Test # Correct
1	M	6-4	6-0	93	100	33
2	M	6-5	6-9	107	80	35
3	M	6-10	7-0	103	50	14
4	M	7-2	7-0	97	100	32
5	M	6-9	6-9	100	50	10
6	M	6-11	7-0	102	90	11
7	M	6-11	6-9	97	80	12
8	F	7-3	7-0	96	50	5
9	F	7-0	7-9	114	80	14
10	F	6-9	6-9	100	80	19
11	F	6-3	6-9	110	80	29
12	F	6-7	6-6	98	60	19
13	F	6-5	6-6	102	80	18

CLASS THREE

Student	Sex	C.A.	M.A.	I.Q.	Attention % Score	Read. Test # Correct
1	M	7-0	7-3	105	80	13
2	M	7-1	6-9	94	100	10
3	M	6-9	7-3	110	80	4
4	M	6-11	5-6	74	90	8
5	M	6-7	7-9	123	90	38
6	M	6-7	7-3	113	100	27
7	M	6-7	5-6	78	90	20
8	M	6-11	7-0	102	90	11
9	M	7-3	6-6	87	100	21
10	M	6-6	6-3	95	80	4
11	M	6-6	6-6	120	100	25
12	M	6-9	7-0	105	100	11
13	F	6-8	6-6	97	100	11
14	F	6-10	8-0	123	100	14
15	F	6-8	7-0	107	100	22
16	F	7-0	6-6	91	90	14
17	F	6-5	7-0	112	90	9

CLASS FOUR

Student	Sex	C.A.	M.A.	I.Q.	Attention % Score	Read. Test # Correct
1	M	7-1	7-0	99	100	31
2	M	6-10	6-9	99	70	14
3	M	6-7	6-3	93	70	7
4	M	6-10	7-3	108	70	9
5	M	6-10	6-6	94	40	11
6	M	7-3	7-0	96	90	13
7	M	6-3	7-0	116	50	9
8	M	7-0	7-9	114	90	3
9	M	7-1	7-9	112	60	5
10	F	6-6	7-6	120	70	11
11	F	6-7	6-9	103	100	25
12	F	6-6	6-6	100	80	6
13	F	6-4	7-0	114	70	12
14	F	6-7	7-3	113	60	8
15	F	6-4	6-9	109	100	20

CLASS FIVE

Student	Sex	C.A.	M.A.	I.Q.	Attention % Score	Read. Test # Correct
1	M	7-3	6-9	91	70	13
2	M	7-3	7-3	100	70	11
3	M	6-4	7-0	114	70	11
4	M	7-0	7-3	105	100	15
5	M	7-1	6-6	90	100	14
6	M	6-8	6-3	92	90	14
7	M	6-7	7-0	108	50	5
8	M	6-9	6-6	95	50	2
9	M	6-5	7-0	112	70	10
10	M	6-8	6-3	92	60	8
11	F	6-8	7-0	107	90	22
12	F	6-6	6-3	95	90	15
13	F	6-5	7-0	112	50	11
14	F	6-6	5-9	85	40	3
15	F	7-1	7-6	108	100	9
16	F	6-9	7-6	115	70	21
17	F	7-1	6-9	94	60	11

COURSE WORK FOR MASTER'S DEGREE IN READING

		Instructor
Fall, 1967		
572.31a	Theories of Personality (Newark State Teachers College)	Dr. Peckham
Spring, 1968		
320:561	Foundations of Reading Instruction	Dr. Mountain
Summer, 1968		
610:581	Reading Materials for Children	Mrs. Howell
Fall, 1968-1969		
320:564	Remedial Reading	Dr. Fry
290:540	Principles and Theories of Learning	Dr. Gillooly
Spring, 1969		
290:520	Curriculum, Materials and Methods for Teaching the Exceptional Child	Dr. Hicks
320:565	Laboratory in Remedial Reading	Dr. Fry Sister Mary Luke
Fall, 1969-1970		
290:501	Educational and Psychological Measurement	Dr. Geyer
Spring, 1970		
290:513	Developmental Psychology	Dr. Ostfeld
Fall, 1970-1971		
290:616	Identification and Assessment of Learning Disabilities	Dr. Strichart

		Instructor
Spring, 1971		
290:617	Remediation of Learning Disabilities	Dr. Strichart
Fall, 1971-1972		
299:566	Seminar in Reading Research and Supervision	Dr. Kling
Spring, 1972		
299:599	Master's Thesis Research	Dr. Kling
290:508	Practicum Special Education	Dr. Strichart
Fall, 1972		
290:583	Physiological Basis of Human Learning	Dr. Montare

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1965-1968:	Bridgewater-Raritan Regional School District, New Jersey Supplemental Teacher
1956-1958:	Gardnertown School District Newburgh, New York Classroom Teacher, Grade One
1954-1956:	Killeen Independent School District Killeen, Texas, East Ward Elementary School Classroom Teacher, Grade Two