

AN INVESTIGATION OF THE RELATIONSHIPS AMONG FIELD DEPENDENCE/
INDEPENDENCE, HYPOTHESIS TESTING/FOCUSING BEHAVIOR,
AND PERFORMANCE ON A PREDICTIVE READING TASK

THESIS

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Abstract

This study investigated the relationships among field dependence/independence, hypothesis testing/focusing behavior, and performance on a predictive reading task.

A sample population of 32 third grade students and 20 sixth grade students were given the Peabody Picture Vocabulary Test, the Levine methodology for the measurement of hypothesis testing/focusing behavior, a standard cloze passage, and a measure of field dependence/independence (third grade subjects received the Children's Embedded Figures Test while sixth grade subjects received the Group Embedded Figures Test).

The test scores were analyzed to determine correlation coefficients and partial correlation coefficients.

A significant relationship was found between focusing behavior and field dependence/independence at both grade levels. A significant relationship was also found between field dependence/independence and predictive reading ability at the sixth grade level.

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Chapter I

Statement of the Problem

Purpose

The purpose of this research study was to determine the relationships among hypothesis testing/focusing behavior, cognitive style, and performance on a predictive reading task. Cognitive style was measured along the field dependence/independence dimension.

Need for the Study

In recent years, a great deal of research in education has been devoted to cognitive style. Kazmierski (1979) defines cognitive style as ". . . those human preferences, attitudes, or approach strategies that characterize an individual's manner of perceiving, remembering, thinking, and problem solving" (p. 1.). Field dependence/independence is one of several dimensions of cognitive style which is used to describe individual differences in cognitive task performance.

According to Kazmierski, field independent individuals tend to approach the environment from an analytical perspective. They are able to perceive figures as discrete from their backgrounds or embedding contexts. Field dependent individuals have a more global approach to perceiving their environment. They have greater difficulty keeping the parts of a perceptual array separate from a surrounding field.

There have been a number of studies comparing reading ability and degree of field dependence/independence. The majority of the research indicates that a positive relationship exists between scores on a test of field dependence/independence and various measures of reading achievement. However, due to some disparity of results and differing measures of reading behavior among studies, Blanton and Bullock (1976) contend that ". . . it is difficult to determine exactly what kind of reading behavior is coordinated with cognitive style" (p. 279). Athey (1976) suggests that further research be conducted to determine what specific facets of the reading process are related to cognitive style.

This study investigated the relationship between degree of field dependence/independence and predictive reading ability (as measured by a standard cloze passage). The importance of prediction in reading has been emphasized by Goodman (1967), who refers to the reading process as a "psycholinguistic guessing game" where the reader makes simultaneous use of syntactic, semantic, and graphic information to form predictions from the visual input received. According to Goodman (1973):

. . . skill in reading involves not greater precision but more accurate first guesses based on better sampling techniques, greater control over language structure, broadened experiences, and increased conceptual development. As the child develops reading skill and speed, he uses increasingly fewer graphic clues. (p. 9)

Smith (1975) refers to predictive reading behavior as a form of hypothesis testing. According to Smith:

a growing number of analyses of reading are paying particular attention to the use that a reader must make of prior knowledge relevant to the material that he/she is endeavoring to read. In formal psychological jargon, this use of prior knowledge is referred to as hypothesis testing . . . (p. 305)

Smith contends that, due to the limitations of the brain's information processing capacity (Smith & Holmes, 1971), the secret to efficient reading lies in reducing the amount of visual information the brain has to process. The efficient reader does this by utilizing the knowledge he brings to the reading situation (experiential and linguistic) along with related thought processes to base his prediction of a word on a most likely alternative. The reader then confirms or rejects his prediction by selecting the fewest and most productive clues necessary from print.

Blanton and Bullock (1973), in a review and interpretation of research conducted by Davey (1976), propose that a relationship between cognitive style and oral reading behavior may be explained by a poor reader's inefficient cue selection and hypothesis testing strategies while reading.

Levine (1966) developed a procedure for the measurement of hypothesis generation/testing and subsequent information processing efficiency using a blank trials discrimination learning task. Information processing efficiency, labeled "focusing," was measured by the subject's use of stimulus clues to sample from a correct set of hypotheses. That is, the subject must make use of all the information obtained as a result of experimenter feedback to eliminate unlikely alternatives. As more information becomes available, more

unlikely alternatives should be eliminated bringing the subject closer to the solution.

According to Eimas (1969), Levine (1966), and Shapson (1977), a prerequisite to focusing behavior is the mental process of intersection. Intersection involves processing the overlap of cues from all the different forms of present and past information to predict and sample from a set of most likely hypotheses. It is possible that hypothesis generation/testing behavior and the process of intersection (measured by focusing behavior) are necessary for successful and efficient prediction during reading. A child who has the ability to intersect information gained from linguistic clues and experience should have a greater potential to generate accurate hypotheses.

This study investigated the relationship between hypothesis testing/focusing behavior (as measured by Levine's methodology) and performance on a predictive reading task (as measured by a standard cloze passage).

A final investigation of this study is the relationship between cognitive style and hypothesis testing/focusing behavior.

Definitions

Hypothesis generation. The ability to form a prediction based on available cues. In this study, hypothesis generation was measured by hypothesis testing behavior.

Hypothesis testing. The behavior exhibited by hypothesis generation (i.e., the observable testing of a prediction).

Focusing. The efficient processing of information gained from stimulus cues. In this situation, focusing is measured by a subject's ability to eliminate unlikely alternatives and choose from a viable hypothesis set.

Intersection. The simultaneous processing of the overlap of cues from all the different forms of present and past information to predict and sample from a set of most likely hypotheses. Intersection is a mental process underlying focusing, and is measured by an individual's focusing behavior.

Outcome trial. An experimental trial in which the experimenter provides verbal feedback for the subject. In this case, "right" or "wrong."

Blank trial. An experimental trial in which the experimenter provides no verbal feedback for the subject.

Cognitive style. "Those preferences, attitudes, or approach strategies that characterize an individual's manner of perceiving, remembering, thinking, and problem solving" (Kazmierski, 1979, p. 1).

Field dependence/independence. One of several dimensions of cognitive style that is used to describe individual differences in cognitive task performance. Field independent individuals tend to approach their environment from an analytical perspective, while field dependent individuals tend to perceive their environment in a more global fashion.

Standard cloze passage. This procedure involves the elimination of every fifth word in a reading passage (50 deletions in all), substituting a uniform line, and asking the subject to supply the

missing word (Pultz, 1979). In this study, a standard cloze passage is used as a measure of predictive reading ability.

Limitations of the Study

Two major limitations of this study involve the small number (20) of sixth grade subjects used, along with the fact that the total testing population was selected from a school in an upper middle class district. Consequently, the conclusions reached may not be applicable to other populations without further research.

Summary

There is a need to investigate the relationships between cognitive style and specific facets of the reading process. This study will investigate predictive reading ability and its relationship to field dependence/independence. Also under investigation is Levine's methodology for the measurement of hypothesis testing/focusing behavior and its relationship to degree of field dependence/independence and predictive reading ability.

Chapter II

Review of the Literature

Purpose

This chapter contains five parts: the first, a general discussion of cognitive style (more specifically, the field dependence/independence dimension); the second, a review of research which has investigated field dependence/independence and its relationship to reading ability; the third, a general discussion of hypothesis testing/focusing as viewed from a concept attainment perspective; the fourth, a brief review of hypothesis testing and its relationship to reading; and the fifth, a review of research involving hypothesis testing/focusing and its relationship to cognitive style.

Cognitive Style

In recent years, experimental research has shown an increased interest in cognitive style and its relationship to education. The recognition and identification of individual differences among children (whether they concern a child's abilities, achievements, values, attitudes, or personality traits) has proven to be an important component of the learning process.

Although the descriptions and applications of cognitive style vary from discipline to discipline, and indeed from researcher to researcher, there is general agreement on the definition of cognitive

style as a basic concept. Davey (1976), Kazmierski (1979), Kogan (1971), Messick (1970), Witkin and Cox (1975), and a host of others all describe cognitive style as the individual variation and preference in perceiving, remembering, and thinking.

First, cognitive styles are concerned with the form rather than the content of cognitive activity. They refer to individual differences in how we perceive, think, solve problems, learn, relate to others, etc. The definition of cognitive styles is thus cast in process terms.

Second, cognitive styles are pervasive dimensions. They cut across the boundaries traditionally--and, we believe, inappropriately--used in compartmentalizing the human psyche to its proper status as a holistic entity.

A third characteristic of cognitive styles is that they are stable over time. This does not imply that they are unchangeable; indeed, some may easily be altered. In the normal course of events, however, we can predict with some accuracy that a person who has a particular style one day will have the same style the next day, month, and perhaps even years later.

Fourth, with regard to value judgments, cognitive styles are bipolar. This characteristic is of particular importance in distinguishing cognitive styles from intelligence and other ability dimensions. To have more of an ability is better than to have less of it. With cognitive styles, on the other hand, each pole has adaptive value under specified circumstances, and so may be judged positively in relation to those circumstances. (Witkin, Moore, Goodenough, & Cox, 1977, pp. 15-16)

There are several dimensions of cognitive style. Nine such dimensions, according to Kogan (1971), are listed below:

1. Field independence vs. field dependence
2. Scanning
3. Breadth of categorizing
4. Conceptualizing styles
5. Cognitive complexity vs. simplicity
6. reflectiveness vs. impulsivity
7. leveling vs. sharpening

8. Constricted vs. flexible control
9. Tolerance for incongruous or unrealistic experiences (p. 246)

Field dependence/independence, the most widely known and researched of the dimensions mentioned, was the only dimension under investigation in this study.

According to Daku (1978), field independent individuals tend to be more analytical, articulated, and interact more actively with their environment, while field dependent individuals tend to be more global in their interaction with the environment. In terms of disembedding ability, individuals who are adept at locating an embedded figure are considered more field independent, while individuals who have difficulty locating an embedded figure are considered more field dependent.

Witkin, Dyk, Faterson, Goodenough and Karp (1962) state that:

The person with a more field-independent way of perceiving tends to experience his surroundings analytically, with objects experienced as discrete from their backgrounds. The person with a more field-dependent way of perceiving tends to experience his surroundings in a relatively global fashion, passively conforming to the influence of the prevailing field or context. (p. 35)

Initially, the research concerning field dependence/independence involved the perceptual ability of individuals to orient themselves in space. The subject was required to judge the position of an item (e.g., a rod, his body) in a field and adjust it to the true vertical (Pultz, 1979). The Rod and Frame Test (RFT) (Witkin, Lewis, Hertzmann, Machover, Meissner, & Wapner, 1954) and the Body Adjustment Test (BAT) were used to measure degree of field dependence/independence in this fashion.

A later approach to measuring degree of field dependence/independence, the Embedded Figures Test (EFT) (Witkin, 1950) involved the presentation of a set of complex geometrical figures. The experimental task consisted of the location of a simple figure embedded within each complex pattern in as little time as possible.

All three early measures of field dependence/independence required the subject to separate a part of the field from the whole. Witkin, Oltman, Raskin, and Karp (1971) observed a high consistency in subjects' mode of performance across the EFT, RFT, and BAT.

A number of other related measures have evolved from the Embedded Figures Test. These include: a shorter version of the EFT (1956); two versions for children, the CHEF (Goodenough & Eagle, 1963) and the Children's Embedded Figures Test (CEFT) (Karp & Konstadt, 1971; in Witkin et al., 1971); and the Group Embedded Figures Test (GEFT) (Witkin et al., 1971).

Field Dependence/Independence and Reading

The following are descriptions of research studies which investigated the relationships between field dependence/independence and reading.

Smith (1973) determined the interrelationships among five measures of reading comprehension and three measures of cognitive style in 34 first grade students. Cognitive style was measured by the Children's Embedded Figures Test (CEFT), the Matching Familiar Figures Test (MFFT), and the Sigel Cognitive Style Test. Reading comprehension was measured by five reading comprehension subtests

taken from the Wisconsin Tests for Reading Skills Development. The Wechsler Intelligence Scale for Children was used to obtain an IQ score for each subject. Significant relationships were found between the CEFT and reading for details among female subjects ($r = .611$, $p < .01$) and for the total sample ($r = .480$, $p < .01$). Smith concluded that field independent females were better able to selectively attend to and recall details from a short paragraph than field dependent females. This relationship did not exist for males when controlling for IQ. A similar relationship was observed for the ability to find the main idea or paragraph topic.

Watson (1969) examined field dependence/independence with 75 first, second, and third grade boys as it related to the reading portion of the Stanford Achievement Test and the Draw-a-Person Test. The Children's Embedded Figures Test was used to measure field dependence/independence. Significance was found for Word Study Skills, Paragraph Meaning, and Total Reading. Watson concluded ". . . that field independent boys in grades one through three are better readers than field dependent boys of the same age" (p. 43).

Cox (1976) investigated the relationship between field dependence/independence and early reading success in 100 kindergarten children. Using the Portable Rod and Frame Apparatus (PRFA) as a measure of field dependence/independence, the Slosson Intelligence Test (SIT) as a measure of each child's IQ, and the Slosson Oral Reading Test (SORT) as a measure of reading ability, Cox found no significant differences in cognitive style between early and non-early

readers. It was concluded that field independent children were not more likely to be early readers than field dependent children.

Gill, Herdtner, and Lough (1968) explored perceptual differences in 194 nursery, kindergarten, and first grade children. The Modified Rod and Frame Test (MRFT), a Frostig test, and the Metropolitan Achievement Test (MAT) were the instruments used. The MRFT was found to be a moderate predictor of reading success for males ($r = .45$, $p < .01$). The Frostig test and the MAT proved to be better predictors of reading success for females.

Fiebert (1967) observed low-level relationships between field dependence/independence and the reading ability of deaf girls. Psychological differentiation was determined through the administration of the Rod and Frame Test (RFT), the Children's Embedded Figures Test (CEFT), and the Poppleuter Test. No significant correlations were found for deaf boys.

Dermott (1978) investigated the utilization of measures of field dependence/independence to predict specific reading skill achievement levels at the end of first grade. Two different measures of field dependence/independence, the Portable Rod and Frame Test (PRFT) and the Children's Embedded Figures Test (CEFT), were administered to a group of first grade subjects. Correlations were computed between degree of field dependence/independence and each of nine different reading skills. It was concluded that, although the CEFT served as a better predictor than the PRFT, both the CEFT and the PRFT were poor predictors of first grade reading performance.

Gluck (1972) administered the Children's Embedded Figures Test (CEFT), the Portable Rod and Frame Test (PRFT), and the Stanford Reading Test to 54 first grade children. Gluck found the CEFT to be significantly related to reading achievement ($r = .56, p \leq .01$). Results of the PRFT were not significant, but showed a strong trend in the expected direction.

Conoley (1977) determined differences in cognitive style and visual motor ability of 89 fourth grade students who were previously divided into "good," "average," and "poor" readers. The Children's Embedded Figures Test was used to measure field dependence/independence; the Matching Familiar Figures Test (MFFT) was used to measure conceptual tempo (i.e., the speed with which subjects make decisions under conditions of uncertainty); and the Developmental Test of Visual Motor Integrity was used to measure visual motor ability. Significant differences in field dependence/independence were found between the three groups. No significant difference in conceptual tempo between groups was observed. It was concluded that good and average readers were significantly more field independent than poor readers.

Estes (1976) investigated the effect of teachers' cognitive style on their first grade students' reading achievement and field articulation. The Group Embedded Figures Test (GEFT) was used to measure the cognitive style of each teacher; the Portable Rod and Frame Apparatus (PRFA) was used to measure the cognitive style of each first grade student; and the reading subtests of the Cooperative Primary Tests were used to measure reading achievement. No significant results were obtained.

Baber (1977) determined the relationship between field dependence/independence and silent reading comprehension in 71 first graders and 94 fourth graders. Significant correlations between field dependence/independence and silent reading comprehension were observed at both grade levels.

Bruininks (1969) tested 105 disadvantaged male subjects enrolled in the second and third grades and found a significant relationship ($r = .367$, $p < .05$) between degree of field dependence/independence (as measured by the Children's Embedded Figures Test) and reading achievement.

Santostefano, Rutledge, and Randall (1965) determined the cognitive styles of 24 boys classified as remedial readers and a control group of 23 boys classified as good readers. All subjects ranged from eight to thirteen years of age. The authors concluded that:

To accomplish the task of reading, an individual's ego must call on a particular constellation of cognitive mechanisms or principles which actively select, organize, assimilate and process shapes and forms which ultimately are learned as symbols representing sounds and objects. The failure to have available these critical mechanisms results in a reading disability. (p. 61)

Keogh and McG. Donlon (1972) administered the Portable Rod and Frame Test to 25 boys with mild hearing disorders and 27 boys with severe learning disorders. They found that the population used was significantly more field dependent than norms would suggest. An additional finding was that when field dependence and impulsivity were combined within a single subject, the degree of learning disability was generally more severe.

Kaplan (1970) determined correlations among cognitive styles, personality, and reading achievement in 104 fourth grade students. The Embedded Figures Test (EFT) was used to measure field dependence/independence while the Metropolitan Reading Achievement Test was used to measure reading achievement.. A significant positive relationship was observed between reading achievement and field independence at the .01 level ($r = .464$).

Wineman (1971) investigated the relationship between field dependence/independence and reading ability in 270 fourth, fifth, and sixth grade students. Field dependence/independence was measured by the evaluation of human figure drawings (using methods described by Witkin et al., 1962). The California Reading Test was used to measure reading ability. Significant correlations ($p < .01$) were found for both males and females on Reading Vocabulary ($r = .49$ and $.92$ respectively) and Reading Comprehension ($r = .52$ and $.97$ respectively).

Daku (1978) investigated the relationship between field dependence/independence and reading achievement in 222 sixth grade students. The Group Embedded Figures Test (GEFT) and the Iowa Tests of Basic Skills (Vocabulary and Comprehension sections) were administered to measure degree of field dependence/independence and reading achievement, respectively. No significant differences were found in the reading achievement of field dependent and field independent students when controlling for IQ.

Cohn (1968) explored the relationships between field dependence/independence and reading comprehension in 122 sixth grade students.

The Embedded Figures Test (EFT) was used to measure field dependence/independence; the Sangren-Woody Reading Test was used to measure reading comprehension; and the Lorge Thorndike Intelligence Test was used to measure IQ. Cohn found that a significant positive relationship existed between the EFT and four reading subtests: Details, Main Ideas, Sequence, and Total Reading Score. According to Cohn:

Field independence was positively and significantly correlated with those aspects of comprehension that required reorganization of a field to solve a problem, apparently when the solution had to be found through new cognitive activity rather than through reliance upon experience and external authority. (p. 476-477)

McDaniel (1973), using a testing population of 48 public school children (grades 1-6), found that the Embedded Figures Test (EFT) scores obtained correlated significantly with reading achievement scores as measured by the Iowa Tests of Basic Skills. McDaniel obtained correlation coefficients ranging from .21 to .65.

Boersma, Muir, Wilton, and Barham (1969) presented a number of anagram tasks to both field dependent and field independent subjects. No significant difference was obtained between field dependents and field independents on task performance. However, after observing each subject's corneally reflected eye movements, it was concluded that field independent subjects made a greater number of shifts in fixation. An additional finding was that field independent males attended to more letters than field dependent males, while for female subjects, the reverse was true.

Buriel (1978) investigated the use of the Children's Embedded Figures Test (CEFT) and the Portable Rod and Frame Test (PRFT) to predict the reading achievement of 40 Mexican American and 40 Anglo American children. The Metropolitan Achievement Test (MAT) was used to measure reading achievement. The results obtained showed no significant main effects due to field dependence/independence.

Stuart (1967) gave the Embedded Figures Test (EFT) to 83 seventh and eighth graders. Reading ability was measured by the Metropolitan Reading Achievement Test. Stuart found a strong positive correlation between field independence and reading achievement. In conclusion, he stated that ". . . it appears that field independence may be associated with better reading skills, and identification of individual perceptual styles before reading instruction is initiated might prove useful for planning" (p. 138).

Ausburn, Back, and Hoover (1976) explored differences in the cognitive style of 40 non-remedial reading students, ranging from 15-17 years of age. Remediality or non-remediality was determined by the Reading for Understanding Placement Test. Each subject was measured along two different dimensions of cognitive style. The Hidden Figures Test (HFT) was used to measure field dependence/independence and the Matching Familiar Figures Test (MFFT) was used to measure reflectivity/impulsivity. It was found that non-remedial readers scored significantly higher than remedial readers on both tests of cognitive style, leading the researchers to conclude that the non-remedial readers were generally more field independent and

reflective than the remedial readers. After analysis of the HFT scores ($F = 9.4947$; $df = 1, 78$; $p < .005$), MFFT errors ($F = 5.4818$; $df = 1, 78$; $p < .025$), and latency on MFFT ($F = 13.5333$; $df = 1, 78$; $p < .001$), it was concluded that both measures of cognitive style used were significant predictors of reading status.

Higgins and Gage (1968) administered the Embedded Figures Test (EFT) and the Nelson-Denny Reading Test (pre- and post- tests) to 12 college students. No significant difference between field dependence/independence and reading ability was evident before instruction. After instruction, however, field independent subjects exhibited greater gains in reading scores.

Nadien, Schaeffer, and Schmeidler (1969) compared the degree of field dependence/independence and scores from the Nelson-Denny Reading Tests of 35 college students with regard to strong ocular dominance and the mood of the subject. Field dependence was found to be related to weak ocular dominance and poor comprehension only for those subjects who exhibited a negative mood.

Pultz (1979)⁶ determined the relationships among field dependence/independence, learning style, and targeted reading skills in 18 college students. The Group Embedded Figures Test (GEFT), the Grasha-Riechmann Student Learning Styles Questionnaire, and the McGraw-Hill Basic Skills System (MHBSS) Reading Test were used to measure field dependence/independence, learning style, and targeted reading skills. Pultz found that field dependence/independence correlated significantly with retention ($r = .660$, $p < .05$), skimming and scanning ($r = .564$, $p = < .05$), comprehension ($r = .525$, $p = < .05$),

words in isolation ($r = .700$, $p = < .05$), the number of exact fill-ins on a cloze passage ($r = .781$, $p < .05$), and the number of spaces left blank on a cloze passage ($r = -.719$, $p = < .05$). No significant correlations were obtained between learning style and field dependence/independence or learning style and targeted reading skills.

Martin (1979) found no significant relationships between the Hidden Figures Test (HFT) scores and the reading performance of 123 college students.

Peterson and Magaro (1969) administered the Embedded Figures Test (EFT), the Wide Range Achievement Test (WRAT), and a reading-related figure ordering task (constructed specifically for the study) to 20 high school students (10 enrolled in regular classes, 10 enrolled in a special education class). No significant correlations were found among the three measures, however, it was strongly noted that all statistical outcomes were in the predicted direction. Peterson and Magaro suggested that field dependent students would require more time to master a reading type learning task than field independents.

In summation, the majority of research to date indicates that a relationship exists between field dependence/independence and reading achievement at all developmental levels (i.e., preschool through college). One purpose of this study was to determine the relationship between field dependence/independence and a specific facet of reading (predictive reading) as opposed to the broad measures of reading ability used in many of the previously described studies.

Hypothesis Testing/Focusing

In recent years, great strides have been made in the understanding of children's problem solving behavior when confronted with a concept identification task.

Berger and Richardson (1974) describe the typical concept identification task as one in which the subject is required to classify a number of stimulus patterns (each pattern consisting of several dimensions, with two values along each dimension). Although there have been many variations, this procedure may be aptly described as a basic paradigm of concept identification.

Levine (1966) developed a methodology (described in chapter three) for the measurement of hypothesis testing and focusing behavior. Using a sample population of 80 college students, Levine found that hypotheses were generated and measured on 92.4% of the trials. Efficient information processing behavior (i.e., focusing) was also observed.

Eimas (1969) administered Levine's methodology to 128 second, fourth, sixth, and eighth graders, and 32 college students. Eimas found that the number of hypotheses generated increased with grade level (71%, 73%, 77%, 79%, and 88%). Focusing behavior was also found to be significantly related to grade level.

Gholson, Levine, and Phillips (1972) observed that children in grades K-6 exhibited sufficiently efficient hypothesis generation/testing strategies, but practically no focusing behavior.

Ingalls and Dickerson (1969), Neussle (1971), and Shapson (1977) all obtained results similar to those reported in the previously described studies.

In summation, research indicates that the Levine methodology has become both a popular and viable procedure for the measurement of hypothesis testing and focusing behavior.

Hypothesis Testing and Reading

As discussed in chapter one, the importance of hypothesis testing and its relationship to efficient reading behavior is gaining increased attention among those who investigate reading as a process.

No research studies examining predictive reading ability and its relationship to hypothesis testing/focusing behavior as measured by Levine's methodology (or a procedure similar to it) were located in the literature review.

Cognitive Style and Hypothesis Testing

According to Davis and Klausmeier (1970), ". . . individual difference variables in concept identification have received relatively little attention compared to the consideration given task variables " (p. 431-432).

Hunt (1962) and Bourne (1966), in reviews of the concept identification literature, concluded that the role of cognitive style in the performance of concept identification tasks was largely unexplored.

Davis and Klausmeier (1970) found cognitive style to be significantly related to performance on a concept identification task. Field independent subjects were observed to commit fewer errors than field dependent subjects.

Dickstein (1968) found field independent subjects to be significantly more efficient in concept identification task performance as measured by number of choices to solution, number of incorrect verbalizations, and thoroughness with which attributes were tested.

The following are descriptions of research studies which investigated the relationship between cognitive style and those concept identification tasks which measure hypothesis testing and/or focusing behavior.

Davis (1972) investigated cognitive style and its relationship to the manner in which subjects test hypotheses. The Hidden Figures Test (HFT) was used to identify field dependence/independence. Levine's methodology was one of the instruments used to measure hypothesis testing. It was concluded that field independent subjects exhibited more efficient hypothesis testing/focusing behavior than field dependent subjects.

Davis (1973) used the Hidden Figures Test (HFT) and Levine's methodology to measure the cognitive style and hypothesis testing/focusing behavior in 404 college students. He concluded that analytical (field independent) subjects were generally more proficient hypothesis testers than non-analytical (field dependent) subjects.

Berger and Richardson (1974) measured hypothesis testing behavior in 48 children (12 each at grades K, 2, 4, and 6) and found that hypothesis testing ability was positively related to grade level. An additional finding was that younger children were more likely to maintain an incorrect hypothesis despite negative feedback.

Shapson (1977) employed Levine's methodology and the Children's Embedded Figures Test (CEFT) to measure hypothesis testing/focusing behavior and field dependence/independence in 46 third grade subjects. Shapson found that, although both field independents and field dependents generated hypotheses, field independent subjects made a great deal more focusing responses than field dependent subjects. An additional finding was that, by providing various stimulus aids, the focusing behavior of field dependents improved significantly.

Summary

This review of the literature indicates that a relationship exists between field dependence/independence and reading achievement at all developmental levels. Due to the fact that broad measures of reading achievement were used in the majority of studies, our ability to pinpoint what specific reading skills are related to field dependence/independence is restricted. This study will deal with field dependence/independence and its relationship to predictive reading ability.

This chapter also reviewed the research concerning the measurement of hypothesis testing/focusing behavior from a concept identification perspective. No research studies dealing with hypothesis testing/focusing and reading ability were located. The research did reveal a relationship between cognitive style and hypothesis testing/focusing behavior (as measured by Levine's methodology).

Chapter III

Design of the Study

Purpose

This research study was designed to investigate the degrees of relationships among field dependence/independence, hypothesis generation/testing and focusing behavior, and performance on a predictive reading task. The study dealt with the following questions:

1. Does a significant relationship exist between field dependence/independence and hypothesis generation/testing?
2. Does a significant relationship exist between field dependence/independence and focusing behavior?
3. Does a significant relationship exist between field dependence/independence and performance on a predictive reading task?
4. Does a significant relationship exist between hypothesis generation/testing and performance on a predictive reading task?
5. Does a significant relationship exist between focusing behavior and performance on a predictive reading task?

Methodology

Subjects

The sample consisted of 32 third grade students (16 male, 16 female) ranging from eight to nine years of age, and 20 sixth

grade students (10 male, 10 female) ranging from eleven to thirteen years of age, selected from a school in an upper middle class district. An equal distribution of "low," "average," and "high" achievement readers were chosen at each grade level.

Instruments

The Children's Embedded Figures Test (CEFT), Consulting Psychologists Press, Inc., 1971, was used to determine the degree of field dependence/independence in all third grade subjects. The CEFT was developed as an alternative to the Embedded Figures Test (EFT), Consulting Psychologists Press, Inc., 1971, when dealing with subjects between five and ten years of age (Witkin et al., 1971).

The CEFT is an individually administered, untimed perceptual test. Each subject is asked to locate a previously seen simple figure within a larger and more complex figure. The size, proportion, and direction of the simple figure remains the same in its embedded state (Witkin et al., 1971). One score is obtained, the total number of correctly identified embedded figures out of a possible 25. Higher CEFT scores reflect greater degrees of field independence while lower CEFT scores correspond to greater degrees of field dependence.

The CEFT has a reliability estimate of .87-.88 for the sample population used (Tryon, 1957). A validity coefficient of .71 for 9-10 year olds was obtained when compared with the Embedded Figures Test. No validity coefficient for eight year olds was available.

The Group Embedded Figures Test (GEFT), Consulting Psychologists Press, Inc., 1971, was used to determine the degree of field

dependence/independence in all sixth grade subjects. The GEFT is an adaptation of the individually administered Embedded Figures Test, designed to make group testing possible.

The GEFT is a timed test which requires each subject to locate a simple form in an embedded context. One score is obtained, the total number of correctly outlined figures out of a possible 18.

The GEFT has a reliability estimate of .82 for both males and females as computed by the Spearman-Brown prophecy formula. The validity coefficients for the GEFT are .82 and .63 for males and females respectively when compared with the EFT. The norming population of the GEFT consisted of male and female enrollees of an eastern liberal arts college.

The Peabody Picture Vocabulary Test (Forms A & B), American Guidance Service, Inc., 1965, was used as a general measure of each subject's language base. The PPVT was designed to measure verbal intelligence through the assessment of hearing vocabulary (Dunn, 1965).

The administration of the PPVT involves the presentation of a series of picture cards (plates), with each plate containing four different pictures. Each plate is accompanied by a word, orally presented by the examiner. A raw score is obtained for each child and, upon taking into account the chronological age of the subject, this is then converted into a verbal IQ score.

The PPVT has a reliability coefficient of .79 and .74 for eight and nine year old subjects respectively. The PPVT has reliability coefficients of .81, .78, and .70 for 11, 12 and 13 year old subjects respectively. All reliability estimates were computed

using the Pearson Product Moment Correlational Technique (Dunn, 1965). The validity coefficient for the PPVT is .86 when compared with the WISC-V (Lavitt, 1963).

Hypothesis generation and focusing behavior were measured by the utilization of a discrimination learning methodology developed by Levine (1966). In Levine's model, the subject is presented with eight separate series of stimulus cards (5" x 8"), each series (or problem) containing 16 previously ordered cards. Within each problem, all stimulus cards contain the same two letters. The letters differ along four dimensions (letter name, size, color, and right or left position) with only two values along each dimension. These comprise a set of eight variables or potential hypotheses (i.e., S-O, red-blue, large (3")-small (1"), right-left). The experimental task requires the subject to sample from a set of variables (hypotheses) to identify the one variable (hypothesis) which is the solution to the problem.

The first, sixth, eleventh, and sixteenth cards presented within each problem are labeled "outcome" trials. It is only on these trials that experimenter feedback ("right" or "wrong") is provided. The remaining cards (i.e., 2-5, 7-10, 12-15) are labeled "blank" trial presentations as no experimenter feedback is provided. The presentation order of all stimulus cards in this study was counter-balanced within and between subjects. A memory aid was provided.

Hypothesis generation is measured by the child's guessing behavior (hypothesis testing) between outcome trials. That is, his choices between trials 2 through 5, 7 through 10, and from 12 to 15.

A child maintaining the same variable (i.e., testing the same hypothesis) over consecutive blank trials is considered to have generated a hypothesis. In using a blank trials methodology, the measurement of hypothesis generation/testing is obtained without the confounding effects of reinforcement and nonreinforcement (Eimas, 1969).

Information processing efficiency, labeled "focusing," was measured by the subject's use of stimulus cues (experimenter feedback) to eliminate incorrect hypotheses and sample from the correct set of hypotheses.

After each of the four outcome trials within a 16 trial problem, the number of possible solutions to the problem decreases by one half. Therefore, after the third trial, only one hypothesis remains as a possible solution.

Two scores are obtained for each subject using Levine's method: The total number of hypotheses generated/tested out of a possible 24 (three potential hypotheses per problem), and the total number of focusing responses out of a possible 24 (three potential focusing responses per problem).

A standard cloze passage, every fifth word deleted, was used to assess each subject's predictive reading ability. Reading passages were chosen from the Diagnostic Reading Inventory (DRI), (Jacobs and Searfoss, Kendall/Hunt Publishing Company, 1977).

All third grade subjects received the same cloze passage which was rated at the first grade level. One score was obtained, the total number of exact responses out of a possible 50. The third

grade standard cloze passage has a coefficient of internal consistency of .67 using the Kuder-Richardson 20 formula (KR-20).

All sixth grade subjects received the same cloze passage which was rated at the fourth grade level. One score was obtained, the total number of exact responses out of a possible 50. The sixth grade standard cloze passage has a coefficient of internal consistency of .85 using the Kuder-Richardson 20 formula (KR-20).

Procedure and Research Design

The third grade population received the full battery of tests (PPVT, CEFT, hypothesis testing/focusing model, cloze) before the testing of sixth grade subjects began. At both grade levels, each test was administered to all subjects before proceeding on to the next test.

The third grade population received the Peabody Picture Vocabulary Test, followed by the Children's Embedded Figures Test, the Levine methodology for measurement of hypothesis generation/testing and focusing behavior, and the standard cloze reading passage.

The sixth grade population received the Peabody Picture Vocabulary Test, followed by the Levine methodology for measurement of hypothesis generation/testing and focusing behavior, the Group Embedded Figures Test, and the standard cloze reading passage.

All data collected by the preceding instruments were analyzed to determine correlation coefficients among the variables.

Chapter IV

Analysis of the Data

Purpose

The relationships among hypothesis generation/focusing, field dependence/independence, performance on a predictive reading task, and verbal IQ were investigated in this study. This chapter contains the analysis of the data, and the findings and interpretations.

Findings and Interpretations

Correlation coefficients, at both grade levels, were computed between hypothesis generation/testing and performance on a cloze passage; hypothesis generation/testing and degree of field dependence/independence; hypothesis generation/testing and verbal IQ (PPVT score); focusing behavior and performance on a cloze passage; focusing behavior and verbal IQ; performance on a cloze passage and degree of field dependence/independence; performance on a cloze passage and verbal IQ; and, degree of field dependence/independence and verbal IQ.

Refer to Table 1 (p. 31) for the results of third grade subjects and Table 2 (p. 32) for results of sixth grade subjects.

Table 1
Correlation Coefficients Among Third Grade Data

	Predictive Reading Ability	Field Dependence/ Independence	Verbal IQ
Hypothesis Generation	.076	.317	.058
Focusing Behavior	.373*	.502*	.299
Predictive Reading Ability		.321	.571*
Field Dependence/ Independence			.437*

r_{crit} ($\alpha = .05$, $df = 30$) = $\pm .349$

* = significant correlation

There were 32 subjects used at the third grade level, therefore the correlation coefficients computed from the third grade data must be equal to or greater than .349 for a significant relationship to exist. When comparing the third grade findings with this critical value, several significant relationships were observed.

Focusing behavior exhibited significant relationships with predictive reading ability ($r = .373$) and field dependence/independence ($r = .502$).

Verbal IQ correlated significantly with predictive reading ability ($r = .571$) and field dependence/independence ($r = .437$).

Hypothesis generation did not correlate significantly with any other variable. No significant correlations were found between

verbal IQ and focusing behavior; and predictive reading ability and field dependence/independence.

Table 2
Correlation Coefficients Among Sixth Grade Data

	Predictive Reading Ability	Field Dependence/ Independence	Verbal IQ
Hypothesis Generation	.277	.402	.107
Focusing Behavior	.390	.463*	.189
Predictive Reading Ability		.605*	.421
Field Dependence/ Independence			.671*

r_{crit} ($\alpha = .05$, $df = 18$) = $\pm .444$

* = significant correlation

There were 20 subjects at the sixth grade level, therefore the correlation coefficients computed from sixth grade data must be equal to or greater than .444 for a significant relationship to exist. When comparing the sixth grade findings with this critical value, three significant relationships are observed.

Field dependence/independence correlated significantly with focusing behavior ($r = .463$), predictive reading ability ($r = .605$), and verbal IQ ($r = .671$).

Hypothesis generation did not correlate significantly with any other variable. No significant relationships were found between focusing behavior and predictive reading ability or verbal IQ. Although no significant correlation was found between predictive reading ability and verbal IQ, the correlation coefficient obtained may indicate a trend.

To eliminate the effects of individual differences in verbal IQ, partial correlations were computed. In this study, a partial correlation enables the experimenter to hold constant the verbal IQ for all subjects when computing correlation coefficients between predictive reading ability and all other variables.

Refer to Table 3 for the results of third grade subjects and Table 4 (p. 34) for results of sixth grade subjects.

Table 3

Grade Three Partial Correlation Coefficients Between Predictive Reading Ability and: Hypothesis Generation; Focusing Behavior; and Field Dependence/Independence with Effects of Verbal IQ Held Constant

	Predictive Reading Ability
Hypothesis Generation	.052
Focusing Behavior	.081
Field Dependence/Independence	.096

r_{crit} ($\alpha = .05$, $df = 30$) = .349

* = significant correlation

No significant correlations were observed among partial correlations computed at the third grade level.

Table 4

Grade Six Partial Correlation Coefficients Between Predictive Reading Ability and: Hypothesis Generation; Focusing Behavior; and Field Dependence/Independence with Effects of Verbal IQ Held Constant

	Predictive Reading Ability
Hypothesis Generation	.257
Focusing Behavior	.348
Field Dependence/Independence	.479*

r_{crit} (alpha = .05, df = 18) = .444

* = significant relationship

A significant relationship between predictive reading ability and field dependence/independence ($r = .479$) was observed after computing the partial correlation.

No significant partial correlation were observed between predictive reading ability and hypothesis generation or focusing behavior.

Summary

The only variable found to significantly correlate with predictive reading ability was degree of field dependence/independence at the sixth grade level. A strong trend in the expected direction

existed between focusing behavior and predictive reading ability at the sixth grade level.

Focusing behavior and field dependence/independence correlated significantly at both grade levels.

Verbal IQ and field dependence/independence correlated significantly at both grade levels.

Chapter V

Conclusions and Implications

Purpose

This chapter contains conclusions that may be drawn from this study, implications for further research, and implications for the classroom.

Conclusions

The initial findings, obtained from the computation of direct correlations, indicate that several significant relationships exist among hypothesis generation/testing, focusing behavior, predictive reading ability, degree of field dependence/independence, and verbal IQ at both the third and sixth grade levels.

The significant relationship between focusing behavior and degree of field dependence/independence, at both grade levels, supports the earlier finding by Shapson (1977), that field dependent children do not respond to stimuli on the basis of all their component parts. It appears that the field dependence puts constraints on an individual's information processing ability to the point of interfering with and/or inhibiting the mental process of intersection.

The significant relationships obtained between verbal IQ and degree of field dependence/independence was not a primary concern of this study.

The central investigation of this study involved the relationships between predictive reading ability and degree of field dependence/independence, hypothesis generation, and focusing behavior. After factoring out the effects of verbal IQ, only one significant relationship was obtained. Predictive reading ability was found to be significantly related to degree of field dependence/independence at the sixth grade level. No significant relationship was observed at the third grade level. The conclusion reached here is that the poor focusing behavior observed in sixth grade field dependent subjects could, in part, affect the way a child utilizes the information he brings to the reading situation (syntactic, semantic, and experiential). A child who is unable to efficiently intersect the language and experience cues that are made available to him, will experience greater difficulty in the prediction of a word while reading.

The contradictory non-significant correlation obtained between field dependence/independence and predictive reading ability at the third grade level could be linked to differing measures of cognitive style and/or cloze passages used between grade levels.

It must be noted that correlation does not signify causation. Therefore, the findings of this study should be interpreted in conjunction with the findings of related studies.

Implications for Research

This study raised many additional questions, several of which are stated below.

What are the relationships among field dependence/independence, hypothesis testing/focusing behavior, and predictive reading ability at other grade levels?

Would a replication of this study using a different measure of hypothesis testing/focusing behavior result in more significant correlation coefficients?

What are the relationships among field dependence/independence, hypothesis testing/focusing behavior, and performance on a cloze passage which scores for exact response and synonyms?

Would a replication of this study using a different measure of predictive reading ability result in more significant correlation coefficients?

Considering the significant relationship found between degree of field dependence/independence and verbal IQ found in this study; it may prove worthwhile to investigate the relationship between field dependence/independence and early language acquisition/development.

Considering the fact that many of the statistical findings of this study indicated strong trends in the expected direction, would a replication of this study, using a different and much larger sample population, exhibit significant results?

Would a retrospective/introspective approach to evaluating a child's cloze procedure performance yield a greater understanding of the relationship between field dependence/independence and predictive reading ability?

Implications for Classroom Practice

The relationship between field dependence/independence suggests that training on predictive reading tasks may prove beneficial for field dependent children. By breaking up the task into smaller component parts, the field dependent child may be able to achieve an understanding and mastery of each part, and in turn, gain a greater understanding of how it fits together as a whole.

Due to the abstract nature of this study, many of the findings cannot be directly transferred to the classroom. Further research, emphasizing both theoretical and practical questions, must be conducted.

Bibliography

Bibliography

- Athey, I. Reading research in the affective domain. In H. Singer and R. B. Ruddell (Eds.), Theoretical Models and Processes of Reading. Newark, Delaware: International Reading Association, 1976, 352-380.
- Ausburn, L. J., Back, K. T., & Hoover, B. A comparison of remedial and non-remedial readers on selected perceptual style variables. Paper presented at the Association for Educational Communications and Technology Annual Conference, Anaheim, Calif.: March 1976. (ERIC Document Reproduction Service No. ED 118 127)
- Baber, E. C. Field dependence-independence, memory, logical thinking tasks, and efficiency in reading comprehension (Doctoral dissertation, Memphis State University, 1976). Dissertation Abstracts International, 1977, 37, 6256A.
- Berger, D. E., & Richardson, R. P. Using and testing hypotheses in concept identification by children. Paper presented at the Annual Convention of the Western Psychological Association, San Francisco, Calif.: April 1974. (ERIC Document Reproduction Service No. ED 108 022)
- Blanton, W. E., & Bullock, T. Cognitive style and reading behavior. Reading World, 1973, 12(4), 276-287.
- Boersma, J., Muir, Wilton, & Barham. Eye movement during anagram tasks. Perceptual and Motor Skills, 1969, 29, 371-374.
- Bourne, L. E. Human conceptual behavior. Boston: Allyn & Bacon, 1966.
- Bruininks, R. H. Auditory and visual perceptual skills related to the reading performance of disadvantaged boys. Perceptual and Motor Skills, August 1969, 29, 179-186.
- Buriel, R. Relationship of three field-dependence measures to the reading achievement of Anglo American and Mexican American children. Journal of Educational Psychology, 1978, 70(2), 167-174.
- Cohn, M. L. Field dependence-independence and reading comprehension (Doctoral dissertation, New York University, 1968). Dissertation Abstracts International, 1968, 29(91A), 476-477.

- Conoley, J. L. Differences in cognitive style and visual motor ability in groups of poor, average, and good readers (Doctoral dissertation, University of Texas at Austin, 1976). Dissertation Abstracts International, 1977, 37, 7680A.
- Cox, D. K. Field independence/field dependence and precocious kindergarten readers. Masters in Education Thesis, Rutgers, The State University of New Jersey, 1976. (ERIC Document Reproduction Service No. ED 124 916)
- Daku, J. J. The relationships between field dependence/field independence and reading achievement at the sixth grade. New Brunswick, New Jersey: Rutgers, The State University of New Jersey, 1978. (ERIC Document Reproduction Service No. ED 149 288)
- Davey, B. Cognitive style and reading achievement. Journal of Reading, November 1976, 20(2), 113-120.
- Davis, J. K. Strategy development and hypothesis testing as a function of an individual's cognitive style. Final Report. Report prepared for the Office of Education (DHEW), Washington, D.C.: Bureau of Research, 1972. (ERIC Document Reproduction Service No. ED 071 010).
- Davis, J. K. Cognitive style and hypothesis testing. Paper presented at the American Educational Research Association, New Orleans, 1973. (ERIC Document Reproduction Service No. ED 072 388)
- Davis, J. K., & Klausmeier, H. J. Cognitive style and concept identification as a function of complexity and training procedures. Journal of Educational Psychology, 1970, 61, 423-430.
- Dermott, R. A. Two dimensions of field dependence-independence: How they and nine other variables interrelate and predict specific reading skills at the end of the first grade (Doctoral dissertation, University of Maine, 1977). Dissertation Abstracts International, 1978, 38, 5304A-5305A.
- Dickstein, L. S. Field independence in concept attainment. Perceptual and Motor Skills, 1968, 27, 635-642.
- Dunn, L. M. Expanded manual for the Peabody Picture Vocabulary Test. Circle Pines, Minn.: American Guidance Service, Inc., 1965.
- Eimas, P. D. A developmental study of hypothesis testing behavior and focusing. Journal of Experimental Child Psychology, 1969, 8, 160-172.

- Estes, D. B. Some effects of student and teacher field dependence-independence on reading achievement at the end of grade one (Doctoral dissertation, University of Maine, 1975). Dissertation Abstracts International, 1976, 36, 6376A.
- Fiebert, M. Cognitive styles in the deaf. Perceptual and Motor Skills, 1967, 24, 319-329.
- Gholson, B., Levine, M., & Phillips, S. Hypotheses, strategies, and stereotypes in discrimination learning. Journal of Experimental Child Psychology, 1972, 13, 423-446.
- Gill, N. T., Herdtner, J., & Lough, L. L. Perceptual and socio-economic variables, instruction in body-orientation, and predicted academic success in young children. Perceptual and Motor Skills, 1968, 26, 1175-1184.
- Gluck, E. A. T. Psychological differentiation and reading achievement in first grade children (Doctoral dissertation, Boston University, 1972). Available from Educational Testing Service, Princeton, New Jersey.
- Goodenough, D. R., & Eagle, C. A modification of the embedded-figures test for use with young children. Journal of Genetic Psychology, 1963, 103, 67-74.
- Goodman, K. S. Reading: A psycholinguistic guessing game. Journal of the Reading Specialist, May 1967, 6, 126-135.
- Goodman, K. S. Miscues: Windows on the reading process. In K. S. Goodman (Ed.), Miscue Analysis: Application to Reading Instruction. Urbana, Illinois: ERIC Clearinghouse on Reading and Communication, NCTE, 1973.
- Higgins, N., & Gage, G. Perceptual mode and reading improvement of college students. Perceptual and Motor Skills, 1968, 26, 1249-1250.
- Hunt, E. B. Concept learning. New York: Wiley, 1962.
- Ingalls, R. P., & Dickerson, D. J. Development of hypothesis behavior in human concept identification. Developmental Psychology, 1969, 1, 707-716.
- Kaplan, H. A. Relationships among cognitive style, personality traits and reading achievement at the elementary school level. Dissertation Abstracts International, 1970, 30(10A), 4278.
- Kazmierski, P. R. Cognitive Styles Primer. Paper prepared for the Rochester Institute of Technology Learning Development Center, 1979.

- Keogh, B. K., McG. Donlon, G. Field dependence, impulsivity, and learning disabilities. Journal of Learning Disabilities, 1972, 5, 331-336.
- Kogan, N. Educational implications of cognitive styles, (Ch. 10, p. 242-292). In Psychology and Educational Practice, G. Lesser (Ed.). Glenview, Ill.: Scott Foresman, 1971.
- Lavitt, J. Comparison of the Peabody, Wechsler, Binet, and California tests of intellectual ability among 7th to 9th grade pupils. Unpublished paper, Westfield, Mass.: Westfield Public Schools, 1963.
- Levine, M. Hypothesis behavior by humans during discrimination learning. Journal of Experimental Child Psychology, 1966, 71(3), 331-338.
- Martin, D. C. Predicting reading achievement in college students (Doctoral dissertation, University of Missouri-Kansas City, 1978). Dissertation Abstracts International, 1979, 39, 7185A.
- McDaniel, E. Ten motion picture tests of perceptual abilities. Perceptual and Motor Skills, 1973, 36, 755-759.
- Messick, S. The criterion problem in the evaluation of instruction: Assessing possible, not just intended outcomes. In M. D. Wittrock & D. E. Wiley (Eds.), Evaluation of Instruction. New York: Holt, Rinehart, & Winston, 1970.
- Nadien, M., Schaeffer, D. S., & Schmeidler, G. R. Mood as a confounding variable in eye dominance, field dependence, and reading. Perceptual and Motor Skills, 1969, 29, 277-278.
- Neussle, W. P. The influence of conceptual tempo on the hypothesis testing behavior of children. Unpublished doctoral dissertation, University of Pittsburgh, 1971.
- Peterson, S., & Magaro, P. A. Reading and field dependence: A pilot study. Journal of Reading, 1969, 12(4), 287-294.
- Pultz, J. Relationships among cognitive style, learning style, and targeted reading skills. Masters in Education Thesis, The State University of New York at Brockport, 1979.
- Santostefano, S., Rutledge, L., & Randall, D. Cognitive styles and reading disability. Psychology in the Schools, 1965, 2(1), 57-62.
- Shapson, S. M. Hypothesis testing and cognitive style in children. Journal of Educational Psychology, 1977, 69(4), 452-463.

- Smith, F. The role of prediction in reading. Elementary English, 1975, 52, 305-311.
- Smith, F., & Holmes, D. L. Letter, word, and meaning identification in reading. Reading Research Quarterly, 1971, 6(3), 394-415.
- Smith, K. M. The influence of cognitive style and intelligence variables in aided reading comprehension. Madison, Wisc.: Wisconsin University, 1973. (ERIC Document Reproduction Service No. ED 094 354)
- Stuart, I. R. Perceptual style and reading ability: Implications for an instructional approach. Perceptual and Motor Skills, 1967, 24, 135-138.
- Tryon, R. C. Reliability and behavior domain validity: Reformulation and historical critique. Psychological Bulletin, 1957, 54, 229-249.
- Watson, B. L. Field dependence and early reading achievement. Unpublished doctoral dissertation, University of California, Los Angeles, 1969.
- Wineman, J. H. Cognitive style and reading ability. California Journal of Educational Research, 1971, 22, 74-79.
- Witkin, H. A. Perception of the upright when the direction of the force acting on the body is changed. Journal of Experimental Psychology, 1950, 40, 93-104.
- Witkin, H. A., & Cox, P. W. Cognitive styles: New tool for career guidance. Educational Testing Service Findings, 1975, 2, 1-4.
- Witkin, H. A., Dyk, R. B., Faterson, H. F., Goodenough, D. R., & Karp, S. A. Psychological differentiation: Studies of development. New York: Wiley, 1962.
- Witkin, H. A., Lewis, H. B., Hertzmann, M., Machover, K., Meissner, P. B., & Wapner, S. Personality through perception. Westport, Conn.: Greenwood Press, 1972. (originally published, 1954)
- Witkin, H. A., Moore, C. A., Goodenough, D. R., & Cox, P. W. Field dependent and field independent cognitive styles and their educational implications. Review of Educational Research, 1977, 47, 1-64.
- Witkin, H. A., Oltman, P. K., Raskin, E., & Karp, S. A. A manual for the embedded figures tests. Palo Alto, Calif.: Consulting Psychologists Press, Inc., 1971.