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TEACHER COGNITIVE STYLE AND TEACHING BEHAVIOR

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CHAPTER I

INTRODUCTION

Statement of the Problem

The responsibility of education is to provide individuals with an opportunity for high levels of achievement in life; to guide each individual toward a maximum potential.[1] To achieve this end, education practitioners and researchers seek to identify situational variables and individual differences operating in the teaching-learning process that may affect learning outcome.

Recent research on the teaching-learning process has generally emphasized the learner in the public school. There is limited information about teachers of students in post-secondary institutions.[2] Since learning is a function of instruction[3] and teachers are responsible for devising and applying instructional strategies to the teaching-learning process,[4] it would seem natural that there would be many studies of

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[1] K. Patricia Cross, Accent On Learning (San Francisco: Jossey-Bass, 1976), pp. 3-4.

[2] Samuel Messick et al., Individuality In Learning (San Francisco: Jossey-Bass, 1976), p. 57.

[3] Meriam Goldberg, "Adapting Teacher Style to Pupil Differences: Teachers for Disadvantaged Children," Merrill-Palmer Quarterly 10 (1964):161.

[4] L. Cronbach and R. Snow, Individual Differences In Learning Ability As A Function of Instructional Variables (Stanford: Stanford University, 1969), p. 1.

teachers and teaching behavior. Within the teaching-learning process little is known of teaching behavior.

Research on how teachers behave has mostly been in the social-interpersonal realm.[1] There have been studies of the learner and instructional strategies that have resulted in a growing body of knowledge known as aptitude treatment interaction. There has been research on the interaction of teacher characteristics and learner characteristics that might affect learning outcome. There has been little research on the relationship of teacher characteristics and teaching behavior. The manner in which characteristics of the teacher affect the teaching-learning process and the extent to which the learner achieves the desired outcome is not entirely understood.

Correlating differences in teaching behavior with differences in teacher characteristics could involve many variables and approaches to investigation. One variable that has been shown to be influential in learning and promising in predicting behavior is that of cognitive style.[2] Cognitive style is a dimension of personality that has its beginnings in the study of cognitive functioning in experimental psychology. It refers to ways a person organizes and processes information. A variety of cognitive style dimensions have been identified and investigated. Table 1 lists the more common dimensions of cognitive style and their characteristics. The field-dependence-independence dimension has been extensively researched for over thirty years and

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[1]Herman Witkin et al., "Field-Dependence and Field-Independence Cognitive Styles and Their Educational Implications," Review of Educational Research 47 (1977):27.

[2]Tarrance Grieve and J. Kent Davis, "The Relationship of Cognitive Style and Method of Instruction in 9th Grade Geography," Journal of Educational Research 65 (1971):137.

TABLE 1

DIMENSIONS OF COGNITIVE STYLE

Dimension	Description	Reference
Field-dependence vs field-independence	an analytical, in contrast to a global, way of perceiving which entails a tendency to experience items as discrete from their backgrounds and reflects ability to overcome the influence of an embedding context	Witkin
Scanning	a dimension of individual differences in the extensiveness and intensity of action deployment, leading to individual variations in the vividness of experience and the span of awareness	Holtzman Gardner
Breadth of Categorizing	consistent preferences for broad inclusiveness, as opposed to narrow exclusiveness, in extablishing the acceptable range for specified categories	Pettigrew
Conceptualizing Styles	individual differences in the tendency to categorize perceived similarities and differences among stimuli in terms of many differentiated concepts, which is a dimension called conceptual differentiation, as well as consistencies in the use of formal conceptual approaches as a basis for forming concepts	Gardner Schoen Kagan Moss Sigel
Cognitive Complexity vs simplicity	individual differences in the tendency to construe the world, and particularly the world of social behavior, in a multi-dimensional and discriminating way	Bieri
Reflectiveness vs Impulsiveness	individual differences in the speed with which hypotheses are selected and information processed, with impulsive subjects tending to offer the first answer that occurs to them and reflective subjects tending to ponder various possibilities	Kagan

TABLE 1 - Continued

Dimension	Description	Reference
Leveling-sharpening	individual differences in assimilation in memory, where subjects at the leveling extreme tend to blur similar memories and to merge perceived objects or events with similar but not identical events recalled from previous experience; whereas sharpeners at the other extreme are less prone to confuse similar objects and may even judge the present to less similar to the past than is actually the case	Gardner Holtzman Klein
Constricted vs Flexible Control	individual differences in susceptibility to distraction and cognitive inference	Klein
Tolerance for Incongruous or Unrealistic Experiences	a dimension of differential willingness to accept perceptions at variance with conventional experience	Klein

SOURCE: Samuel Messick, "Measures of Cognitive Style and Personality and Their Potential for Educational Practice," in Developments in Educational Testing, V. I, ed. Karlheinz Ingelkamp (New York: Gordon and Breach, 1968), pp. 329-341.

seems to be one of the most promising of the cognitive style dimensions. It was the dimension used in this study.

Cognitive style is readily identified and measured. It is consistent over time and across situations.[1] Research on cognitive style has not been widely applied to educational practice.[2] What research has been done supports the view that cognitive style is a relevant variable which might be included in studies of teaching behavior.[3] Cognitive style, personality, and behavior have all been shown to be related.[4] Cognitive style and instructional research is limited. The available information on teacher cognitive style and its relationship to teaching behavior is partly research, mostly speculative, and often conflicting in results.

Teaching behavior may reflect differences in teaching characteristics and/or conscious choices in teaching behavior. Study of the teaching-learning process involves interaction of the environment, learner, and teacher(see Figure 1). Behavior of learner and teacher is a result of unique personality and cognitive characteristics of the individual. It is this uniqueness that results in different types of individual responses to the same environment.

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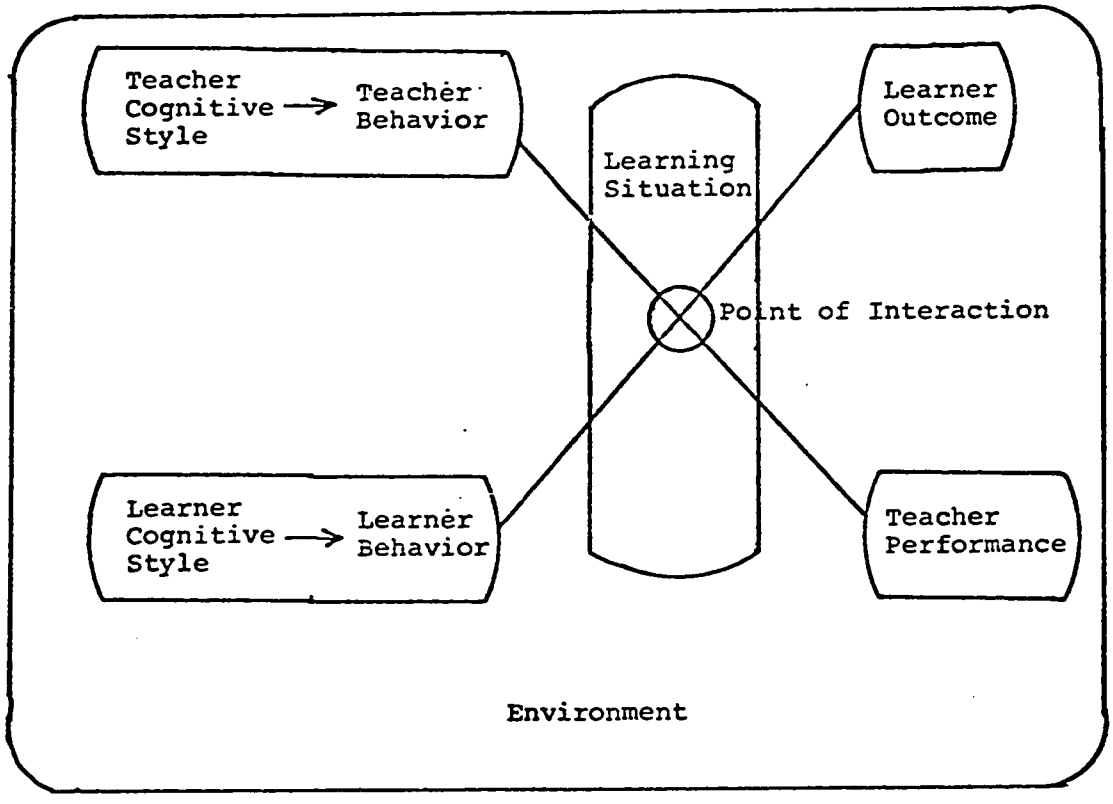
[1]Herman Witkin, "Origins of Cognitive Style," in Cognition: Theory, Research, Promise, ed. Constance Scheerer (New York: Harper and Row, 1964), p. 173.

[2]Messick, Individuality, p. v.

[3]Fred Ohnmacht, "Factorial Invariance of the Teacher Characteristics Schedule and Measures of Two Cognitive Styles," The Journal of Psychology 69 (1968):198.

[4]Herman Witkin and Carole Moore, "Cognitive Style and the Teaching-Learning Process," paper presented at the annual meeting of the American Educational Research Association, Chicago, April 15-20, 1974, pp. 2-3.

Figure 1. The Teaching-Learning Process



Purpose of the Study

Research into the situational and individual variables in the teaching-learning process and their influence on learning outcome is in the beginning stages. The teacher exhibits a wide variety of behaviors in the learning environment. The relationship of teacher characteristics, teaching behavior, and instructional strategy is unclear.

The purpose of the study was to investigate the relationship between teacher characteristics and teaching behavior in the classroom so that the teaching-learning process could be better understood. Specifically, the study looked at the possible relationship between the field-dependence-independence dimension of cognitive style and teaching behavior in the classroom in order to determine if teacher cognitive style and teaching behavior in the classroom were related.

The Research Questions

The research questions investigated in the study were: Does teacher cognitive style correlate with teaching behavior in the classroom? Are there significant differences in the cognitive style and teaching behavior of teachers? And, if there are, what is the nature of the differences?

The overriding research question of the study was whether or not there was a relationship between teacher cognitive style, as measured on the field-dependence-independence dimension, and teaching behavior in the classroom, as measured by interaction analysis. Because measurement of cognitive style using the field-dependence-independence is sensitive to gender and teaching area, a series of corollary questions were asked.

In the area of gender, the question was asked as to whether or not there would be a difference in the cognitive style of female and male teachers as measured by the Group Embedded Figures Test. According to researchers in the area of field-dependence-independence cognitive style, there are small, but consistent, differences in the performance of females and males. The question was asked as to whether or not there would be differences in the teaching behavior of female and male teachers as measured with Flanders Interaction Analysis System. The researcher expected there to be differences in teaching behavior since behavior is related to cognitive style, where differences do exist between females and males.

In the teaching area category, the question was asked as to whether or not there would be differences in the cognitive style of natural science and social science teachers as measured by the Group Embedded Figures Test. According to researchers, there are differences in the cognitive style of individuals at the time of major and entry into the job market. It was expected that differences would be present now. The question was asked as to whether or not there would be differences in the teaching behavior of natural science and social science teachers as measured with Flanders Interaction Analysis System. The researcher expected to find differences in the behavior of individuals in different vocational areas because choice of college major and vocational specialty are a reflection of cognitive style which affects behavior.

In researching the relationship of teacher cognitive style and teaching behavior, the question was asked as to whether or not there would be any interaction between gender and teaching area on measures

of cognitive style and teaching behavior. There was no information available on this question. In using two factors related with cognitive style, gender and teaching area, the possibility of interaction was considered.

The Significance of the Study

The significance of the study is a better understanding of teaching characteristics and teaching behavior. These key variables in the teaching-learning process contribute to the quality of instruction and learning outcome. Such knowledge can be useful to teacher education programs, in job performance of professional teachers, and to prospective student teachers.

The implication of ability to predict teaching behavior from a specific individual characteristic would be better evaluation of prospective students for selection into teacher education programs. Once into a program, student teachers could be classified for alternative types of teaching preparation that might: increase their awareness of the relationship of teacher characteristics and teaching behavior; develop to the fullest the behaviors congruent with the student's personality and cognitive characteristics; and teach the student to consciously diversify teaching behavior to cope with a variety of teaching-learning settings.

For the new graduate teacher, as well as the practicing professional, the implication is better job placement which may lead to successful performance and realistic performance evaluation.

Further, ability to predict teaching behavior from a teacher characteristic paves the way for research to answer questions about: dimensions of teaching style; effects of match/mismatch of teacher

cognitive style and learner cognitive style; and whether teachers can consciously and successfully use alternative, non-congruent teaching behaviors when the situation demands it.

Limitations of the Study

The study is limited by the characteristics of the population investigated. It is possible to generalize to other populations only to the extent that the study sample and population are homogeneous and representative. The study sample was limited to a selected group of professional teachers in one post-secondary institution in the State of Oklahoma.

A second limitation is one common to any study of human behavior. Any measurement of behavior tends to be subjective whether it is self-reported, researcher reported, or reported by impartial observers.

Behavior of teachers in the classroom setting was studied. Whether the same behaviors are present in other types of learning environments is another research question.

The field-dependence-independence dimension of cognitive style is present in all cultures studied to date. The location of individuals and groups of individuals along that continuum varies with each culture. There would be no validity outside the United States.

Norms available for the Group Embedded Figures Test and Flanders Interaction Analysis System are limited. There were no norms for a population the same as the population from which the study sample was drawn.

Although some believe it possible, there is uncertainty whether

a person can consciously change, modify, or determine their own behavior. The results of the study may tell us something of the relationship of teacher cognitive style and teaching behavior but will not determine modifiability of behavior.

Definitions for the Study

The following operational definitions are pertinent to the study:

Cognitive style - characteristic, self-consistent modes of functioning which individuals show in their perceptual and intellectual activities

Field-dependence - dimension of cognitive style in which perception is guided by the organization of the field(environment) as a whole

Field-independence - dimension of cognitive style in which perception is guided by the parts of the field(environment) as descrete from the surrounding field

Field-dependent cognitive style - cognitive style of an individual scoring in the first or second quartile on the Group Embedded Figures Test

Field-independent cognitive style - cognitive style of an individual scoring in the third or fourth quartile on the Group Embedded Figures Test

Field-dependent teaching behavior - teaching behavior of an individual scoring 0-5 on the Teaching Behavior Score

Field-independent teaching behavior - teaching behavior of an individual scoring 6-10 on the Teaching Behavior Score

Teaching Behavior Score - the number of field-independent teaching behaviors exhibited by an individual as derived from Flanders teaching

patterns

Teaching pattern - a short chain of events occuring frequently enough to be of interest and given a lable for study classification

Interaction analysis - a technique for studying a chain of classroom verbal events in a manner that each event in the chain is taken into consideration

Teacher talk pattern(TT) - a pattern of teacher interaction characterized by teacher talking

Pupil talk pattern(PP) - a pattern of teacher interaction characterized by pupil talking

Teacher response pattern(TRR) - a tendency of the teacher to react to student ideas and feelings in a positive, accepting manner

Teacher question pattern(TQR) - a tendency of the teacher to use questions when guiding the content-oriented part of the class interaction

Pupil initiation ratio(PIR) - the presence of pupil talk judged to be an act of initiation as opposed to an act of response to teacher verbalization

Instantaneous teacher response pattern(TRR89) - a tendency of the teacher to praise or integrate pupil ideas and feelings into the class at the moment the pupil stops talking

Instantaneous teacher question pattern(TQR89) - a tendency of the teacher to respond to pupil talk with questions based on the teacher's ideas as compared to a tendency to lecture

Content cross ratio(CCR) - an area of cells in the interpretative matrix reflecting a focus of the class on subject matter where the teacher is involved and dominant in discussion

Steady state cells(SSR) - cells in the interpretative matrix indicating that the teacher and/or pupil remained in the same category of verbal behavior for over three seconds and reflecting less interchange between teacher and student

CHAPTER II

THEORETICAL FRAMEWORK

Cognitive Style

Cognitive style refers to ways a person organizes and processes information[1] regardless of whether the information originates from within the individual or from experiences in the environment.[2] Cognitive style represents consistent, individual differences in processing. There are four basic characteristics of cognitive style. Cognitive style is concerned with individual differences in process rather than content. Cognitive style is pervasive in that it cuts across all areas of personality including how an individual perceives, thinks, problem solves, learns, and relates to others. It is a characteristic of personality and may be more appropriately termed personal style.[3] Cognitive style is stable over time. This does not mean that it is unchanging, only that an individual tends to be consistent in use of cognitive style over a lifetime. Cognitive style is generally a bipolar,

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[1]Messick, Individuality, p. 4.

[2]Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," p. 2.

[3]Herman Witkin and Donald Goodenough, Field Independence Revisited (Princeton: Educational Testing Service, 1977), p. 30; and Witkin et al., "Educational Implications," pp. 15-16.

[4]Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," p. 2.

value-free, neutral dimension of personality with adaptive characteristics at either end of the continuum.[1]

Cognitive style has its origins in life experiences. It appears to be primarily the result of socialization. Child rearing practices are especially influential. The norms of the dominant culture and the degree of conformity demanded will effect development of cognitive style.[2] Therefore, although cognitive style is not culture specific, there will be variations in the dimension across cultures.

Cognitive style may also originate from biological determinants. This idea grew out of the observation of sex differences in cognitive style. Although no clear relationship has been found, ongoing research is investigating the possibility of genetic, endocrinological, and neurological influences.[3]

A variety of types of cognitive style have been identified and investigated. Table 1(p. 4) lists some types and their characteristics. Of the cognitive style dimensions, Witkin and associates' field-dependence-independence dimension has been the most widely investigated and shows the most promise as a stable factor of personality.[4]

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[1]Donald Goodenough et al., Cognitive Styles in the Development of Medical Careers (Princeton: Educational Testing Service, 1977), p. 4.

[2]Donald Goodenough and Herman Witkin, Origins of Field-Dependence and Field-Independence Cognitive Styles (Princeton: Educational Testing Service, 1977), pp. 26-29 and p. 37.

[3]Deborah Waber, "Biological Substrates of Field Dependence: Implications for the Sex Difference," Psychological Bulletin 84 (1977): 1076.

[4]Orville Brim; Richard Crutchfield; and Wayne Holtzman, Intelligence: Perspectives 1965 (New York: Harcourt, Brace and World), p. 12.

The Field-Dependence-Independence Dimension Of Cognitive Style

Witkin and associates' field-dependence-independence dimension of cognitive style is the result of many years of research and brings together findings on individual differences in perceptual and intellectual functioning, personality, and social behavior.

In the early 1940's, Witkin and associates posed the question: "How do individuals know which way is up?" Using conflicting visual and kinesthetic cues, they found that individuals varied considerably in their ability to perceive true upright.[1] Witkin and associates primarily used two tests to investigate upright, or space orientation. The tests were the rod-and-frame test(RFT) and the body adjustment test (BAT). Both tests measure the extent to which an individual is influenced by the surrounding field in perceiving true upright.[2] The individual is required to determine upright and adjust an item in the field or their body to the perceived upright position. Witkin and associates found that individual mode of perception was either based on the environment or on feelings from the body. Orientation in space involves more than perception. For some it involves the body which is closely related to the self and other aspects of personality.[3]

The rod-and-frame test(RFT) involves seating the individual in a dark room with a tilted luminous rod centered within a tilted luminous

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[1]Brim, Crutchfield, and Holtzman, Intelligence, p. 9; and Herman Witkin et al., Personality Through Perception (New York: Harper, 1954), p. 60.

[2]Cross, Accent, p. 117.

[3]Witkin et al., Personality, pp. 13-14.

frame. The task involves adjusting the rod to the upright position while the frame remains in its original position.[1] There were individual differences in the way the rod and frame were perceived. Some individuals adjusted the rod to the tilt of the frame perceiving that as true upright; others adjusted the rod to true upright.[2]

In the body adjustment test(BAT) the individual is seated in a tilted chair in a tilted room. The task is to adjust the chair, and thus the body, to true upright while the room remains in the original position.[3] There were individual differences in the mode of perception of the body in the surrounding environment. Some individuals adjusted the chair to true upright relying on sensations from the body while others aligned the chair to the tilt of the room perceiving themselves to be upright when in fact the body was tilted thirty degrees.[4]

Witkin and associates found individuals were consistent in their mode of perception in both the RFT and BAT and some other less widely used tests. There was a substantial correlation between the RFT and BAT tests.[5] Individuals showed consistency over time when tested at one week, one year, and three year intervals after original testing.[6]

Those individuals who relied consistently on the environment

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[1]Herman Witkin et al., A Manual for the Embedded Figures Tests (Palo Alto: Consulting Psychologists Press, 1971), p. 4.

[2]Cross, Accent, p. 117.

[3]Witkin et al., Manual, p. 4.

[4]Cross, Accent, p. 117.

[5]Ibid.

[6]Witkin et al., Personality, p. 76.

or field for perception were termed 'field-dependent'; those who consistently ignored the environment and relied on body sensations were termed 'field-independent'.[1]

From the original investigations, which spanned a decade or more, Witkin and associates determined that space orientation is an expression of the individual's preference in mode of perception and represents one of many areas of psychological functioning.[2] The other areas of functioning are intellect, emotions, defenses, and social behavior. They are linked together in the hypothesis of psychological differentiation.

The Hypothesis of Psychological Differentiation

Witkin and associates' hypothesis of psychological differentiation is the result of newer data from their investigations of the field-dependence-independence dimension of cognitive style. The data suggests the dimension is a lower order factor of a hierarchical structure of cognitive functioning. Differentiation is a characteristic of living systems. A high level of differentiation results in system heterogeneity; a low level in homogeneity. With psychological differentiation, the living system achieves greater self-nonself segregation, increasing separation of psychological functions, and more complex interrelationships between these functions resulting in a hierarchical psychological structure.[3]

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[1]Cross, Accent, p. 117.

[2]Herman Witkin et al., Psychological Differentiation (New York: Wiley, 1962), p. 1.

[3]Herman Witkin; Donald Goodenough; and Philip Oltman, Psychological Differentiation: Current Status (Princeton: Educational Testing Service, 1977), pp. 1-2.

Witkin and associates' studies suggest there are four separate indicators of psychological differentiation. These are: articulation of cognitive functioning; sense of separate identity; articulated body concept; and control of impulse expression and use of defenses.[1] The relationship of psychological differentiation as defined by the four indicator areas with field-dependence-independence is shown in Figure 2.

Development of Field-Dependence-Independence

Field-dependence-independence is associated with development of the individual. Development of cognitive style is expressed through increasing articulation of experiences. This is exhibited through the four indicator areas: articulation of experience and cognitive functioning; definition of body concept; sense of separate identity; and impulse regulation and use of defenses.[2]

Articulation of experience and cognitive functioning refer to self-consistency in the organization of everyday experiences. After initial investigation of individual differences on the RFT and BAT, Witkin and associates used the term 'field-dependence-independence' to describe those differences. Later, further research indicated these self-consistent differences crossed over into other areas of psychological functioning. Witkin and associates felt the term too narrow to describe a cluster of characteristics and started using the term 'global-articulated field approach.' The global field approach is similar to field-dependence. The individual is unable to structure the environ-

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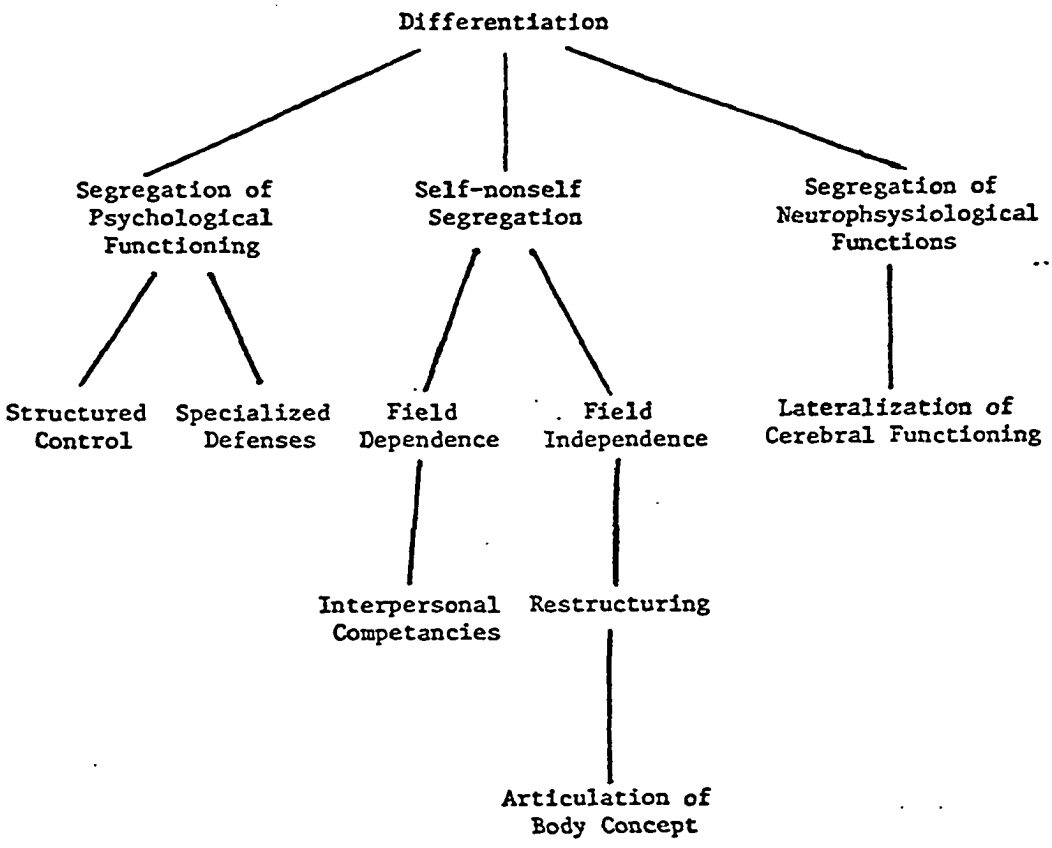
[1] Witkin, Goodenough, and Oltman, Differentiation: Current Status, pp. 3-3.

[2] Witkin et al., Psychological Differentiation, p. 15; and Witkin, Goodenough, and Oltman, Differentiation: Current Status, p. 4.

Figure 2. Psychological Differentiation



SOURCE: Witkin et al., Manual, p. 14; and Witkin et al., Psychological Differentiation, pp. 24-27.

ment. Cognitive functioning is guided by the prevailing organization of the field. The articulated field approach is similar to field-independence. The individual is able to structure experience and therefore may experience parts of the field separate from the surrounding field.[1]

Definition of body concept refers to ability of the individual to experience parts of the body as separate from the environment and from each other. It also refers to ability to perceive the body as joined together to form a whole.[2]

Sense of separate identity is the result of the individual's awareness of self needs, feelings, and attributes and their distinction from those of other individuals. Behavior of an individual with a sense of separate identity is made on the basis of internal referents. The individual with a less developed sense of identity relies more on the external environment.[3]

Impulse regulation refers to use of controls to regulate attention and to analyze and structure experiences from the environment. Less developed impulse regulation, as in field-dependence or global field approach, is manifested in higher levels of anxiety especially in new experiences. The individual makes greater use of stimulus generalization. The more differentiated, or field-independence and articulated field approach, individual is able to contain, control, or channel ideas and feelings.[4] The individual is likely to attach specific re-

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[1]Witkin et al., Psychological Differentiation, p. 93; and Witkin, Goodenough, and Oltman, Differentiation: Current Status, p. 6.

[2]Witkin et al., Psychological Differentiation, p. 115; and Witkin, Goodenough, and Oltman, Differentiation: Current Status, p. 8.

[3]Witkin et al., Psychological Differentiation, p. 132.

[4]Ibid., p. 115.

sponses to one stimulus avoiding stimulus generalization. In the use of defense mechanisms, the less differentiated individual is more likely to use generalized defenses; the highly differentiated individual, specialized defenses.[1]

Origins of Field-Dependence-Independence

The exact orgin of the field-dependence-independence dimension of cognitive style is not known. It is believed to evolve out of the social environment, but biological factors may be contributory. There is support for an interactional origin of cognitive style in lieu of any positive data to support either the sociological or biological determinations alone.[2]

The mother-child relationship appears to be the one most critical experience of the social environment in development of cognitive style.[3] Childrearing affects self-nonself segregation. Studies of mothers and children reveal that the manner in which the mother interacts with her child is significantly related to the cognitive style developed by the child. Mothers who are self-assured and self-realized, non-indulging, and non-coercing but who provide some direction while allowing for the child's autonomy tend to have field-independent children. Mothers who are strict, exert control of any sort, or encourage dependency tend to inhibit differentiation in their children contributing to the development of field-dependent children.[4]

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[1]Witkin et al., Psychological Differentiation, p. 232.

[2]Cross, Accent, p. 118.

[3]Witkin et al., Psychological Differentiation, p. 30.

[4]Goodenough and Witkin, Origins, pp. 26-27; and Witkin et al., Psychological Differentiation, pp. 297-313.

Different cultures are characterized by differing modes of perception although the field-dependence-independence dimension of cognitive style develops similarily across cultures.[1] Primitive, developing cultures with rudimentary social controls tend to be more field-independent. As a culture develops and becomes more modern there is a shift toward field-dependence.[2] Cultures which emphasize self-control to achieve social organization are more field-independent; those emphasizing conformity to group norms, more field-dependent.[3] Within any culture, minority populations will exhibit field-dependence-independence characteristics that vary widely from each of the other subgroups and from the majority culture.[4]

Related to both sociological and biological determinants of cognitive style is gender. Sex role differences do not consistently appear across cultures. Gender is a biological determinant; but roles assigned to females and males vary greatly. Western women tend toward field-dependence.[5]

The possible biological origins of cognitive style are hormonal, maturational, and genetic. The relationship between hormones and maturation and cognitive style is unclear. Women mature earlier than men and tend to be more field-dependent while men, maturing later than

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[1]Cross, Accent, p. 118.

[2]Witkin et al., Psychological Differentiation, p. 37.

[3]Cross, Accent, p. 118.

[4]Messick et al., Individuality, p. 135.

[5]Goodenough and Witkin, Origins, p. 135; Waber, "Biological Substrates," p. 1076.

women, tend to be more field-independent.[1] Investigating early maturers, Waber[2] found they enjoyed social acceptance and prestige among peers. This fits the cluster of characteristics associated with field-dependence. Late maturers were socially isolated, individualistic, and less concerned with social norms. This fits the cluster of characteristics associated with field-independence.

The relationship between genetic factors and cognitive style is unclear. The possibility of cognitive style being linked to the X-chromosome was raised because of the sex differences. This difference is now more readily explained through social determinants. A study of identical twins with different modes of perception works against a genetic determinant of cognitive style.[3]

Sex and Field-Dependence-Independence

Sex differences in the field-dependence-independence dimension of cognitive style do not appear consistently across cultures.[4] The differences are more prevalent in conforming or highly civilized cultures.[5] In western cultures, there is a small but consistent difference. These sex differences are quite small compared to differences within each sex and the total range of individual differences. Sex differences are related to and vary with age.[6]

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[1]Waber, "Biological Substrates," p. 1079.

[2]Ibid., pp. 1079-1081.

[3]Witkin et al., Psychological Differentiation, p. 271.

[4]Waber, "Biological Substrates," p. 1087.

[5]Goodenough and Witkin, Origins, p. 37.

[6]Witkin et al., Psychological Differentiation, pp. 214-218; and Martin Fiebert, "Sex Differences in Cognitive Style," Perceptual and Motor Skills 24 (1967):1277.

In western culture, there is no measureable difference in field-dependence-independence under eight(8) years of age. There are no tests available to measure field-dependence-independence reliably under eight years. Observation and interview of this age group and their mothers indicate there are no significant differences.[1]

From eight(8) to sixty(60) years, sex differences appear becoming more significant during adult years. Women tend to be more field-dependent than men and more variable in their cognitive style.[2] That is, women are more affected by the environment or context within which an experience or item occurs.

After sixty(60) years, sex differences decrease markedly. In geriatric populations there are no significant differences in field-dependence-independence.[3]

Age and Field-Dependence-Independence

With development, there is a distinct trend from field-dependence toward field-independence; followed by a plateau in adult years; and capped with a gradual return toward field-dependence with aging.[4] Below eight(8) years of age, Witkin and associates have been unable to reliably measure field-dependence-independence.

From eight(8) to fifteen(15) years, there is a marked increase in field-independence. Between eight(8) and ten(10) years children are

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[1]Witkin et al., Manual, p. 5.; and Witkin et al., Psychological Differentiation, p. 215.

[2]Witkin et al., Personality, pp. 170-171.

[3]Witkin et al., Manual, p. 5.

[4]Witkin et al., Personality, p. 217.

still strongly field-dependent. By age fifteen(15), there is a considerable degree of independence from the field.[1]

The movement toward increasing field-independence continues at a slowing rate from fifteen(15) to twenty-four(24) years. Between twenty-four(24) and forty(40) years there is a plateau where little change occurs. After age forty(40) and up to around sixty(60) years, there is a slow reverse of earlier trends and the individual becomes more field-dependent. The rate of field-dependence increases between sixty(60) and seventy(70) years and then slows again between seventy(70) and eighty(80) when a plateau is reached that remains fairly stable until death(see Table 2).[2]

With aging there is an increased dependence on the environment and impersonal frames of reference that is related in some way to field-dependence. Possibly this is due to decreasing mobility, narrowing social environments, and different roles for the aged.[3] The question is whether the field-dependence pattern seen in the aged is developmental or the result of selective survival.[4]

Characteristics of Field-Dependence

Field-dependence refers to a preference in mode of perception where the environment is viewed as a whole so that any part is seen as

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[1]Witkin et al., Personality, p. 127.

[2]Witkin et al., Manual, p. 5.; Stephen Karp, "Field Dependence and Occupational Activity in the Aged," Perceptual and Motor Skills 24 (1967):603; and Daniel Schwartz and Stephen Karp, "Field Dependence in Geriatric Populations," Perceptual and Motor Skills 24(1967):495.

[3]Schwartz and Karp, "Geriatric," p. 501.

[4]Karp, "Aged," p. 603.

TABLE 2

RELATIONSHIP OF FIELD-DEPENDENCE-INDEPENDENCE, AGE, AND SEX

Age(in years)	Sex	Field-dependence-independence
0 - 7	no differences	marked field-dependence
8 - 15	slight differences; women more field-dependent	field-dependence; marked increase in field-independence
16 - 23	significant differences women more field-dependent	slow increase in field-independence
24 - 39	significant differences women more field-dependent	plateau in field-dependence-independence
40 - 59	significant, but decreasing differences; women more field-dependent	slow decrease in field-independence
60 - 69	slight differences; women more field-dependent	marked increase in field-dependence
70 - 79	no differences	slow increase in field-dependence
80+	no differences	plateau in field-dependence-independence

continuous with the field. Witkin and associates refer to this mode of perception as the global field approach or field-dependence.[1]

If the field is amorphous, ability to structure it is limited and experiences will be diffuse to the individual. In field-dependence, there is a passive perception of the environment and a tendency to leave it 'as is'.[2] The environment dictates the manner in which the field and its parts are experienced.

The individual who is field-dependent has a social orientation. External sources are relied upon to define the self and there is limited self-nonself segregation from the environment. Identity is less developed as is separateness from others. Reliance on external referants means the individual is more likely to be attentive to social cues in the environment in defining self needs, feelings, and attributes.[3] They are more likely to be influenced by others, especially others in authority positions.[4] Reinforcement, especially negative, has a greater impact on the field-dependent individual. When feedback is not present, field-dependents tend to cease interacting.[5] The field-dependent individual tends to lack insight, be passive in dealing with the environment and yield to impulses. Anxiety is greater because of limited

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[1]Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," p. 2.

[2]Witkin et al, Manual, pp. 2-4; and Witkin et al., Psychological Differentiation, p. 93.

[3]Goodenough and Witkin, Origins, p. 9; Witkin et al., Psychological Differentiation, p. 5 and p. 132; and Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," p. 3.

[4]Messick, Individuality, p. 43.

[5]Norman Konstadt and Elaine Forman, "Field-Dependence and External Directedness, Journal of Personality and Social Psychology 1 (1965):490.

ability to handle impulses and possible consequences of behavior.[1]

When in threatening situations, field-dependent individuals use generalized defenses such as repression or denial. With less effective control of impulses and more liklihood of experiencing anxiety, the field-dependent more often uses defenses.[2]

All this makes field-dependence appear as a negative, value-laden pole of the field-dependence-independence dimension. That is not so. Because of interaction with the environment, the field-dependent individual has highly developed and effective social skills and interpersonal competancies.[3] They are more effective in social interaction and better at getting information from the environment. They look at other's faces, are alert to social meaning of words and actions, and tend to adapt their speech patterns to that of others.[4]

Field-dependent individuals prefer being with people over being alone.[5] They even prefer physical closeness to those with whom they are interacting.[6] They get along better with people, are more popular and extroverted. They more readily tell others about themselves by discussing feelings and thoughts reflecting greater emotional openness.[7]

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[1]Witkin et al., Personality, p. 469.

[2]Witkin et al., Psychological Differentiation, pp. 158-169.

[3]Messick et al., Individuality, p. 44; and Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," p. 3.

[4]Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," p. 5.

[5]Witkin and Goodenough, Revisited, p. 22.

[6]Goodenough and Witkin, Origins, p. 6.

[7]Mallory Wober, "Toward a Theory Linking Ability, Personality, Culture in Education," Journal of Special Education 1 (1967):348.

Because they are drawn to people and interested in them, field-dependent individuals are generally described as friendly, warm, considerate, affectionate, polite, compliant, and accepting.[1]

The field-dependent individual is generally more successful in interpersonal careers such as sales, teaching, and other helping professions. They have more difficulty making career choices.[2]

Field-dependent individuals approach tasks in a global or general manner. They tend to stimulus generalize.[3] Incidental learning is greater in socially relevant situations.[4] They are better at vocabulary, information, and comprehension.[5] Field-dependent individuals group concepts into large and loosely organized categories. In problem solving, they take longer to solve problems where a piece of the field must be taken out of context, the field restructured, and the piece used in a different context.[6] Field-dependents have externally set goals and are externally motivated.[7]

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[1]Herman Witkin and Donald Goodenough, "Field Dependence and Interpersonal Behavior," Psychological Bulletin 84 (1977):678.

[2]Goodenough and Witkin, Origins, p. 6; and Messick et al., Individuality, p. 52.

[3]Witkin, Goodenough, and Oltman, Differentiation: Current Status, p. 18.

[4]David Fitzgibbon; Leo Goldberger; and Morris Eagle, "Field-Dependence and Memory for Incidental Material," Perceptual and Motor Skills 21 (1965):749.

[5]Witkin et al., Psychological Differentiation, p. 2.

[6]Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," p. 2.

[7]Witkin and Goodenough, "Interpersonal Behavior," p. 65.

Characteristics of Field-Independence

Field-independence refers to a preference in mode of perception where the parts of the environment may be experienced separate from the surrounding field even when strongly embedded or hidden.[1] Perception is governed by ability to act on the field through change of structure, restructuring, breaking up structure, or structuring an amorphous field.[2] Witkin and associates refer to this mode of perception as an analytical field approach or field-independence.[3]

Field-independence mode of perception involves overcoming conflicting cues from the environment. There is active, analytical involvement with the environment through disembedding and restructuring competancies.[4]

The individual who is field-independent is task-oriented.[5] Internal referents derived from structuring of previous experiences are used in defining the self. There is a greater self-nonself segregation from the environment.[6] Identity of field-independent individuals is distinct from others. Body concept is more articulated.[7]

The field-independent individual uses his own strategies to

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[1]Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," p. 2.

[2]Witkin and Goodenough, Revisited, p. 3.

[3]Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," p. 2.

[4]Goodenough and Witkin, Origins, pp. 4-10.

[5]Fitzgibbon, Goldberger, and Eagle, "Incidental Material," p. 749.

[6]Goodenough and Witkin, Origins, p. 9.

[7]Witkin et al., Psychological Differentiation, pp. 116-132.

structure experience and functions with little need, or desire, for guidance.[1] They are better at maintaining direction, especially when there is contradiction or opposition. They are personally autonomous. Reinforcement, either positive or negative, has less impact on task achievement.[2] They are aware of their own needs, feelings, and attitudes and able to deal directly with them.[3]

The field-independent individual actively copes with the environment. Defense mechanisms are specialized ones such as intellectualization and isolation.[4] They are effective in the discharge and control of impulses and therefore have lower levels of anxiety over behavior and its consequences.[5]

The field-independent individual is impersonal and analytical and lacks the degree of social skills and interpersonal effectiveness seen in field-dependence.[6] There is more concern with ideas and principles than with people[7] and a lack of awareness of social stimulus value. Social behavior is the result of internal structuring of experience and development of self-strategies.[8]

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[1]Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," p. 2.

[2]Witkin, Goodenough, and Oltman, Differentiation: Curent Status, p. 13.

[3]Witkin et al., Personality, p. 204.

[4]Witkin, Goodenough, and Oltman, Differentiation: Current Status, p. 13.

[5]Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," p. 3.

[6]Ibid., p. 2.

[7]Witkin and Goodenough, Revisited, p. 22.

[8]Witkin et al., "Educational Implications," p. 2.

Field-independent individuals prefer a private, impersonal environment. They even prefer physical distancing from others.[1] In a study of field-dependence and interpersonal behavior, field-independent subjects were either unable or unwilling to contribute to conflict resolution in two person groups with similar or dissimilar cognitive style partners.[2]

Field-independent individuals are performance, or task, oriented. They want to get ahead. They are introverted and inner directed.[3] Field-independents are described as being rude, inconsiderate, demanding, ambitious, power seeking, and manipulative.[4]

Field-independent individuals are generally more successful in analytical, abstract career areas such as science and engineering. They more easily make career choices.[5]

The field-independent individual approaches tasks in an analytical manner.[6] They have specific responses to specific stimuli.[7] Incidental learning is greater if the situation is task relevant.[8] Problems involving use of an element of the problem in a unique way

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[1]Wober, "Toward a Theory," p. 352; and Witkin and Goodenough, "Interpersonal Behavior,", p. 673.

[2]Witkin and Goodenough, "Interpersonal Behavior," p. 664.

[3]Wober, "Toward a Theory," pp. 348-352.

[4]Witkin and Goodenough, "Interpersonal Behavior," p. 678.

[5]Goodenough and Witkin, Origins, p. 6.; and Messick et al., Individuality, p. 52.

[6] Cross, Accent, p. 117.

[7]Witkin, Goodenough, and Oltman, Differentiation: Current Status, p. 18.

[8]Fitzgibbon, Goldberger, and Eagle, "Incidental Material," p. 249.

are more easily solved. They tend to cluster concepts into tight groups with little overlap.[1] Field-independents have internally set goals and are internally motivated.[2]

Career Choice and Field-Dependence-Independence

Field-dependence-independence is clearly related with choice of major in college and choice of career. Major areas of study in college differ in the amount of social-interpersonal or restructuring skills required. Individuals tend to select a major that is congruent with their cognitive style. Field-dependent students tend to select majors in such areas as education, clinical psychology, social sciences, and the ministry. These majors prepare the individual for careers requiring interpersonal competancies. Field-independent students tend to choose majors and careers associated with impersonal or restructuring competancies such as mathematics, natural sciences, art and music, architecture, and engineering.[3]

Cognitive style contributes to effective practice in that career choice reflects an attempt at congruence of job and cognitive style. Once in a career, specialty may be related to mode of field approach. This explains the individual who majors in science(a field-independent major) and takes a job teaching(a field-dependent career), reflecting an attempt to be congruent with chracteristics of both di-

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[1]Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," pp. 3-11.

[2]Witkin et al., "Educational Implications," p. 11.

[3]Goodenough et al., Cognitive Style and Medical Careers, pp. 2-5; and Jerome Pierson, "Cognitive Style and Measured Vocational Interests of College Men," (Doctoral Dissertation, University of Texas, 1965), Dissertation Abstracts International, 1965, 26/02-A, p. 875.

mensions that are found among many individuals, especially those at the mid-range of the continuum.[1]

Teaching Behavior and Field-Dependence-Independence

Few studies on teaching behavior and teacher cognitive style were found. Most research in this area was on the social-interpersonal orientation of the teaching-learning process. Information available on teaching behavior and teacher cognitive style frequently was extrapolated from findings of other studies. Witkin and Moore,[2] writing on cognitive style and the teaching-learning process, discuss ways in which cognitive style affects the process. The four ways were discussed in terms of student cognitive style: ability to deal with organization of material presented; effectiveness of learning in specific tasks; effects of social reinforcement; and dealing with match/mismatch of teacher and student cognitive styles. Witkin and Moore continue, saying field-dependent teachers prefer situations which allow for interaction with students while field-independent teachers prefer situations where they direct the learning experience. Reference to empirical studies to support the statements is lacking.

In a study of social science student teachers, Wu[3] found cognitive style was related to task performance. He concluded that field-

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[1]Samuel Osipow, "Cognitive Styles and Educational-Vocational Preferences and Selection," Journal of Counseling Psychology 16 (1969): 534.

[2]Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," p. 6-13.

[3]Jing Jyi Wu, "Cognitive Style and Task Performance - A Study of Student Teachers," (Doctoral Dissertation, University of Minnesota, 1967), Dissertation Abstracts International, 1967, 29/01-A, p. 176.

dependent student teachers preferred discussion involving student-teacher interaction while field-independent student teachers preferred discovery or lecture with minimal student-teacher interaction. This conclusion was based on evaluation of lesson plans.

Englehardt[1] found there was no relationship between flexibility of closure, a dimension of cognitive style, and various aspects of teaching behavior of prospective elementary teachers in a mathematics lesson. The teaching behaviors measured were student-centered versus teacher-centered teaching styles.

Heil et al.[2] found that warm, democratic teachers were superior to cold, autocratic teachers with a variety of types of learners. Orderly teachers seemed to get the best overall results.

Weisenburg and Gruenfield[3] studied leadership and cognitive style. They found that field-dependent supervisors were more considerate and had more esteem for least preferred workers. Field-independent supervisors were more structured.

Clinical therapists were found to choose supportive therapy for field-dependent clients and modifying therapy for field-independent clients.[4] Field-dependent therapists preferred an interpersonal coun-

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[1]J. M. Englehardt, "The Relationship Between A Dimension of Cognitive Style and the Teaching Behavior of Prospective Elementary Teachers of Mathematics," (Doctoral Dissertation, University of Texas, 1972), Dissertation Abstracts International, 1972, 33/09-A, p. 4934.

[2]Louis Heil et al., Characteristics of Teacher Behavior Related to the Achievement of Children in Several Elementary Grades (Brooklyn: City University of New York, 1963), pp. 56-66.

[3]P. Weisenberg and L. W. Gruenfield, "Relationship Among Leadership Dimensions and Cognitive Style," Journal of Applied Psychology 50 (1966):292-295.

seling environment and field-independent therapists preferred a directive counseling environment.[1]

Ryans[2] conducted the most extensive study of teaching behavior, but did not relate his work to cognitive style. He investigated a variety of interpersonal teaching behaviors of teachers in the public schools. Ryans determined that teaching behavior is social, unique to the individual, observable, and understood only through empirical study.

Cross[3] comments teachers have a cognitive style and tend to teach by methods most comfortable for them unless they consciously are trying to use a method to accommodate a learner's cognitive style. She summarizes by saying "in general, people probably do better if they are...teaching via a method compatible with their style."

Riseman[4] identified two major dimensions of teaching behavior: didactic and evocative. In the didactic style, the teacher has greater knowledge and authority and sets the terms of the learning environment. This is similar to field-independence. In the evocative style, the teacher is less concerned with covering material and more with getting the learner to connect ideas and experiences. This is more similar to field-dependence.

Grimes and Allensmith[5] studied learning environments for defen-

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[1]Messick et al., Individuality, p. 59-61.

[2]David Ryans, "A Theory of Instruction with Special Reference to the Teacher: An Information System Approach," Journal of Experiemental Education 32 (1963):197-202.

[3]Cross, Accent, p. 128-130.

[4]David Riseman et al., Academic Values and Mass Education (Garden City: Doubleday, 1970), pp. 121-124.

[5]Jesse Grimes and Wesley Allensmith, "Compulsivity, Anxiety, and School Achievement," Merrill-Palmer Quarterly 7 (1961):247-271.

sive and constructive learners and found the defensive student learned most when teaching behavior was didactic: short-term goals defined by the teacher; maximum explanation and guidance; and feedback at short intervals. Constructive students learned best under what could be termed as a discovery environment: moderately hard tasks; intermediate goals somewhat ill-defined; feedback at intervals to measure progress.

Witkin et al.[1] discuss the role of cognitive style in teaching behavior. They say the field-dependent teacher prefers discussion to lecture or discovery and encourages a democratic learning environment. The field-independent teacher prefers lecture or discovery where they can be responsible for organization of the learning environment. Witkin et al., continue, saying that it is

> "...well documented that field-dependent and field-independent individuals have different learning approaches. Whether one or the other leads to better learning outcomes depends on the specific characteristics of the learning tasks and the circumstances of learning."

Field-dependent teachers are identified with the following behaviors: ask questions to check on learning; encourage students to set learning standards; less likely to give negative feedback; and teach facts. Field-independent teachers are characterized by: impersonal classroom behavior; use of questions as an instructional tool; sets own standards for learning; more likely to give negative feedback; and teach principles.

Summary on Field-Dependence-Independence

Cognitive style of individuals is related to behavior. To explain possible differences in teaching behavior more research is needed

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[1]Witkin et al., "Educational Implications," p. 27.

on the effect of cognitive style in dictating behavior. Much of the reported research deals with the interaction of teacher and student behavior and the outcomes of that interaction. There is some data on learner cognitive style and learner behavior. Interest is growing in the area of cognitive style and teaching behavior. There does not appear to be published empirical data on teaching behavior and teacher cognitive style. To understand the teaching-learning process it seems all of its variables must be investigated.

CHAPTER III

RESEARCH DESIGN

The Study Sample

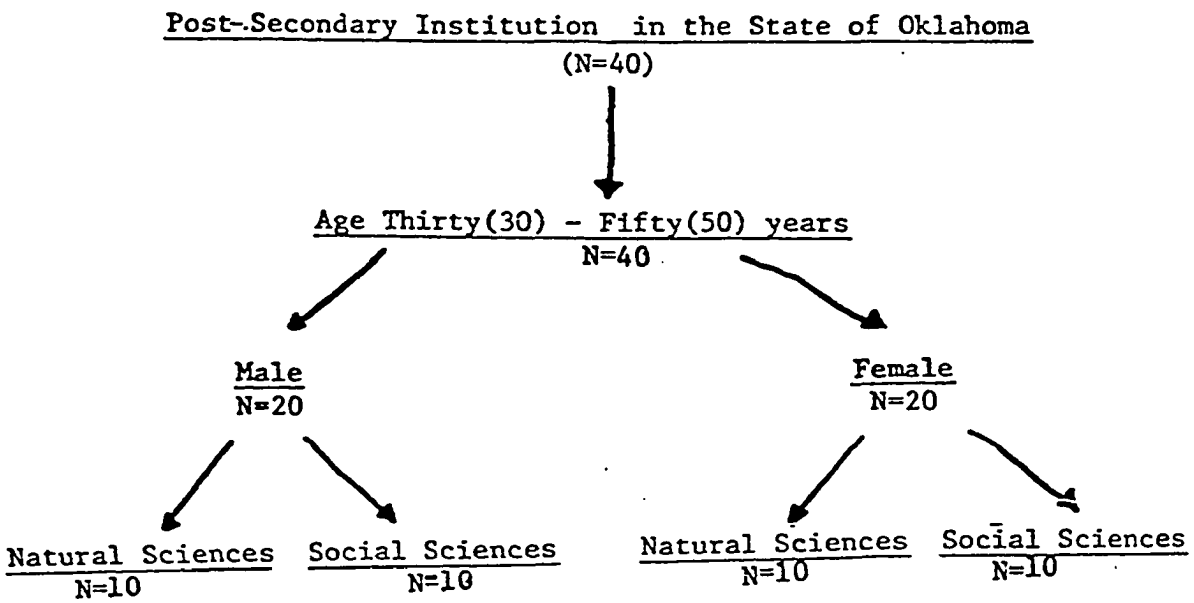
The study sample consisted of forty(40) subjects drawn from the tenure-track faculty of one post-secondary institution in the State of Oklahoma. The subjects were involved in undergraduate teaching during the semester in which the study data was collected. Subjects were evenly selected from the natural and social sciences and equally divided between females and males. This was done to obtain a relatively even distribution of subjects in the field-dependent and field-independent cognitive styles. The ages of subjects were held at thirty(30) to fifty(50) years in order to avoid the effects of age changes that occur in field-dependence-independence below and above that range(see Figure 3).

The Study Measurements

The study subjects were asked to complete an information sheet. Each was administered the Group Embedded Figures Test. Data on teaching behavior was collected by using Flanders Interaction Analysis System.

The Group Embedded Figures Test(GEFT) is a reliable test of ability to break up an organized field in order to keep a part of it separate from the field. Performance on the GEFT has previously been compared to performance on the Embedded Figures Test, the Rod-and-Frame

Figure 3. Sampling Procedure for Study Subjects(N=40)



Test, and the Portable Rod-and-Frame Test. A high degree of consistency in performance was found.[1]

Use of the GEFT reduces administration time to twenty minutes, compared to length of testing time for the Embedded Figures Test, without affecting reliability or validity of results. This reduction in time to administer is accomplished by using only eighteen(18) complex figures and imposing a time limit.[2]

The GEFT consists of eighteen(18) complex figures shaded to embed a simple figure. The test booklet is divided into three sections: Section 1, consisting of seven(7) easy complex figures and used for practice; Section 2, consisting of nine(9) complex figures; and Section 3, consisting of nine(9) complex figures.[3]

The subject is given a test booklet. After instructions are given, the subject is allowed two(2) minutes to complete Section 1. Five minutes are allowed for each of the two remaining sections. The booklet is designed so the subject is unable to view both simple and complex figures simultaneously. The subject looks at the complex figure, at the simple figure, and back at the complex figure. He attempts to locate and trace the outline of the simple figure. The score is the total number of figures traced correctly in Sections 2 and 3.[4]

There are small but consistent sex differences in performance on the GEFT from ages nine(9) to sixty-five(65). Females tend to have

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[1] Witkin et al., Manual, p. 4.

[2] Ibid., p. 6.

[3] Ibid.

[4] Ibid., pp. 27-28.

slightly lower scores than males.[1] There are also clear age differences in performance. There is a marked increase in scores from age eight(8) to twenty-four(24). Performance remains fairly consistent from ages twenty-five(25) through forty(40) when slight changes start to occur. Marked changes in performance occur again about age sixty(60).[2]

Norming studies for the GEFT are limited. Table 3 shows preliminary norms based on females and males at an eastern liberal arts college. These norms are only generalizable to other populations to the extent that they are homogeneous with the norming group.[3]

Reliability for the GEFT is estimated by determining the correlation between Section 2 and Section 3 since they are parallel forms. The correlation was determined and corrected by the Spearman-Brown prophecy formula. The reliability estimate was .82 for both females and males.[4]

Validity of the GEFT is determined by comparing performance on this test with the Embedded Figures Test, the Rod-and-Frame Test, and the Articulation of Body Concept, a measure of psychological differentiation. Correlations between the GEFT and the Embedded Figures Test are high, especially for males. Correlations between the GEFT and the Rod-and-Frame Test are at the lower end of the range of correlation found for the Embedded Figures Test and the Rod-and-Frame Test. Correlations between the GEFT and the Articulation of Body Concept are sub-

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[1] Witkin et al., Manual, p. 5.

[2] Ibid..

[3] Ibid., p. 28.

[4] Ibid..

TABLE 3

NORMS FOR THE GROUP EMBEDDED FIGURES TEST

Quartiles	Men	Women
1	0-9	0-8
2	10-12	9-11
3	13-15	12-14
4	16-18	15-18
N	155	242
Mean	12.0	10.8
S.D.	4.1	4.2

SOURCE: Witkin et al., Manual, p. 28.

stantial especially for males.[1] Validity coefficients are found in Table 4.

The information sheet was used to obatin data on individual characteristics of subjects that might affect their eligibility to participate or subgroup classification on such items as age, gender, college major, and teaching area.

Flanders Interaction Analysis System(FIAS) is a system for observing and coding verbal behavior between the teacher and learner in the classroom. It is based on the assumption that behavior in the teaching-learning process is mainly verbal. Interaction analysis is used to study spontaneous teaching behavior.[2] Since the behavior is coded as observed, there is no loss of data if analysis is delayed. Events are identified, coded in sequence, tabulated, and placed into a matrix for analysis.[3]

The FIAS is composed of ten categories(see Appendix A). All verbal statements of both teacher and learner are categorized at least every three(3) seconds by a trained observer. The observed events are coded from one(1) to ten(10) and recorded so as to preserve their original sequence. The coded data is placed into a ten(10) row by ten(10) column matrix two at a time. The first number indicates the matrix row; the second, the matrix column. Each pair of coded events is overlapping.

Observing and coding behavior at the rate of once each three(3) seconds will require twenty(20) minutes to obtain four hundred(400)

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[1]Witkin et al., Manual, p. 28.

[2]Ned Flanders, Interaction Analysis and Inservice Training, Bethesda: ERIC Document Reproduction Service, ED 088 854, 1974), p. 3.

[3]Ibid., p. 2.

TABLE 4

VALIDITY COEFFICIENTS FOR THE GROUP EMBEDDED FIGURES TEST

Population	N	Criterion Variable	r with GEFT*
Male undergraduates	73	Individual EFT, solution time	-.82
Female undergraduates	68	Individual EFT, solution time	-.63
Male undergraduates	55	PRFT, error	-.39
Female undergraduates	68	PRFT, error	-.34
Male undergraduates	55	ABC, degree body articulation	.71
Female undergraduate	68	ABC, degree body articulation	.55

*r's with EFT and PRFT are negative because the tests are scored in reverse fashion.

SOURCE: Witkin et al., Manual, p. 29.

observations. Flanders states four-hundred(400) tallies are necessary to provide the matrix with sufficient data for inferences.[1] The matrix data can be interpreted by calculating certain ratios based on the number of observation tallies in certain rows, columns, or cells(see Tables 5 and 6).

Reliability and validity of the FIAS depends on the observers. It is directly related to observer training. Observers must be trained to produce an acceptable level of reliability prior to and during data collection. Maintenance was no problem since data collection time was short.

Potential observers need a minimum of four to six hours of training. The training involves memorizing the categories, practice in observation and coding with simulated teaching episodes, and practice in observation and coding in real teaching situations. Reliable observation is dependent on the total social situation being observed to understand the specific behavior being observed and coded.[2]

After some practice, reliability can be estimated between two observers by using Scott's coefficient. Scott's coefficient is the amount of observer agreement exceeding chance divided by the amount that perfect agreement exceeds chance. Scott's coefficient is unaffected by low frequencies, can be adapted to per cent figures, and is more sensitive at higher levels of reliability.[3]

The procedure for finding Scott's coefficient involves having two observers observe and code teaching behavior at the same time. The

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[1]Flanders, Interaction Analysis, p. 4.

[2]Edmund Amidon and John Hough, Interaction Analysis: Theory, Research, and Application (Reading: Addison-Wesley, 1967), pp. 158-159.

[3]Ibid., p. 161.

TABLE 5

INTERPRETING 10 x 10 INTERACTION MATRIX

Behavior Pattern	Ratio	Formula	Norm
Teacher Talk	TT	$\frac{(C1+C2+C3+C4+C5+C6)}{N}$	68%
Pupil Talk	PP	$\frac{(C8+C9)}{N}$	20%
Silence or Confusion	SC	$\frac{(C10)}{N}$	12%
Teacher Response Ratio	TRR	$\frac{(C1+C2+C3)(100)}{(C1+C2+C3+C4+C5+C6+C7)}$	42
Teacher Question Ratio	TQR	$\frac{(C4)(100)}{(C4+C5)}$	26
Pupil Initiation Ratio	PIR	$\frac{(C9)(100)}{(C8+C9)}$	34
Instantaneous Teacher Response Ratio	TRR89	$\frac{(R8+R9+C1+C2+C3)(100)}{(R8+R9+C1+C2+C3+C6+C7)}$	60
Instantaneous Teacher Question Ratio	TQR89	$\frac{f(8-4)+f(9-4)(100)}{f(8-4)+f(8-5)+f(9-4)+f(9-5)}$	44
Content Cross Ratio	CCR	$\frac{(R4+R5+C4+C5)}{N}$	55%
Steady State Ratio	SSR	$\frac{f(1-1)+f(2-2)+f(3-3)+.....f(10-10)}{N}$	50%

Where: N=Total number of tallies of behaviors
C=Total number of tallies in a category column
R=Total number of tallies in a category row
f=Total number of tallies in a cell

SOURCE: Ned Flanders, Analyzing Teaching Behavior (Reading: Addison-Wesley, 1970), pp. 100-111.

TABLE 6

FIELD-DEPENDENCE-INDEPENDENCE AND FLANDERS BEHAVIOR PATTERN.

Field-dependence-independence	Flanders Behavior Pattern
Field-independence	Teacher Talk Ratio(TT)
Field-dependence	Pupil Talk Ratio(PP)
Field-dependence	Silence or Confusion(SC)
Field-dependence	Teacher Response Ratio(TRR)
Field-independence	Teacher Question Ratio(TQR)
Field-dependence	Pupil Initiation Ratio(PIR)
Field-dependence	Instantaneous Teacher Response Ratio (TRR89)
Field-independence	Instantaneous Teacher Question Ratio (TQR89)
Field-independence	Content Cross Ratio(CCR)
Field-independence	Steady State Ratio(SSR)

two formulas used to determine Scott's coefficient are:

$$\pi = \frac{P_o - P_e}{1 - P_e}$$

where P_o is the proportion of agreement and P_e is the proportion of agreement expected by chance; and

$$P_e = \sum_{i=1}^{k} P_i^2$$

where P_i is the proportion of tallies in each category. A Scott's coefficient of 0.85 or higher is an acceptable level for observer reliability.[1]

The Statistical Hypotheses

The major study hypothesis is:

H_o There is no relationship between teacher cognitive style, as measured on the field-dependence-independence dimension, and teaching behavior, as measured by interaction analysis in the classroom.

The corollary study hypotheses are:

H_{oA} There is no difference between female and male teachers in field-dependence-independence as measured by the Group Embedded Figures Test;

H_{oB} There is no difference between female and male teachers in teaching behavior as measured by Flanders Interaction Analysis System;

H_{oC} There is no difference between natural and social science teachers in field-dependence-independence as measured by the Group

[1] Amidon and Hough, Interaction Analysis, pp. 161-166.

Embedded Figures Test;

H_{oD} There is no difference between natural and social science teachers in teaching behavior as measured by Flanders Interaction Analysis System;

H_{oE} There is no interaction between gender and teaching area on field-dependence-independence as measured by the Group Embedded Figures Test;

H_{oF} There is no interaction between gender and teaching area on teaching behavior as measured by Flanders Interaction Analysis System.

The Study Procedure

The subjects were randomly selected from those individuals at the post-secondary institution who met the study criteria. Each was asked to complete the information sheet to determine eligibility to participate. An informed consent was signed by each participant. Each subject was administered the Group Embedded Figures Test. An observer recorded teaching behavior in the classroom of the subject using Flanders Interaction Analysis System. Information sheets, GEFT booklets, and interaction data were coded to assure anonymity of participants.

Observers were recruited from the graduate student population in the post-secondary institution. Training in observing and coding of teaching behavior was conducted until observer reliability was at an acceptable level or higher(0.85+) as measured by Scott's coefficient.

The Design for Statistical Analysis

Analysis of data was performed in three stages. In the first stage, individual scores were computed from the Group Embedded Figures

Test. Codings of teaching behavior using Flanders Interaction Analysis System were tabulated into matrices and the ten teaching patterns were calculated. A teaching behavior score(see Table 8) was computed from the ten teaching patterns. Each subject was classified as field-dependent or field-independent for both cognitive style and teaching behavior. Raw data and computed scores were placed into a table. Means were calculated for the total group and for subgroups on both cognitive style and teaching behavior.

In the second stage of data analysis, strength of relationship between scores on the Group Embedded Figures Test and teaching behavior scores was determined by correlational analysis using the Pearson Product-Moment Correlation Coefficient. Significance was set at the 0.05 level.

In the third stage of data analysis, multivariate analysis of variance was carried out between the study subgroups with scores on the Group Embedded Figures Test and teaching behavior score. Significance was set at the 0.05 level.

TABLE 7

TEACHING BEHAVIOR SCORE

Flanders Teaching Pattern	Ratio of Subject
Teacher Talk (TT)	Above the norm(68%)
Pupil Talk(Pp)	Below the norm(20%)
Silence or Confusion(SC)	Below the norm(12%)
Teacher Response Ratio(TRR)	Below the norm(42)
Teacher Question Ratio(TQR)	Above the norm(26)
Pupil Initiation Ratio(PIR)	Below the norm(34)
Instantaneous Teacher Response Ratio(TRR89)	Below the norm(60)
Instantaneous Teacher Question Ratio(TQR89)	Above the norm(44)
Content Cross Ratio(CCR)	Above the norm(55%)
Steady State Ratio(SSR)	Above the norm(50%)

Teaching Behavior Score(tbs)	Teaching Behavior
0 - 5	Field dependent
6 - 10	Field independent

CHAPTER IV

ANALYSIS OF DATA

Stages of Analysis

The analysis of data was accomplished in three stages: computation of scores from raw data; correlational analysis of scores for cognitive style and teaching behavior; and multivariate analysis of variance between subgroups with cognitive style and teaching behavior.

In the first stage of data analysis, individual scores were computed from the Group Embedded Figures Test. Flanders teaching patterns were calculated from the behavior codings. A teaching behavior score(tbs) was derived from the ten teaching patterns. Subjects were classified as field-dependent or field-independent for both cognitive style and teaching behavior. The data are depicted in a table(see Appendix B).

In the second stage of data analysis, strength of relationship between teacher cognitive style and teaching behavior was determined. Correlational analysis of scores on cognitive style and teaching behavior was conducted using the Pearson Product-Moment Correlation Coefficient. A scattergram was made for visual representation.[1] The scattergram graphically showed no relationship between the scores(see Table 8).

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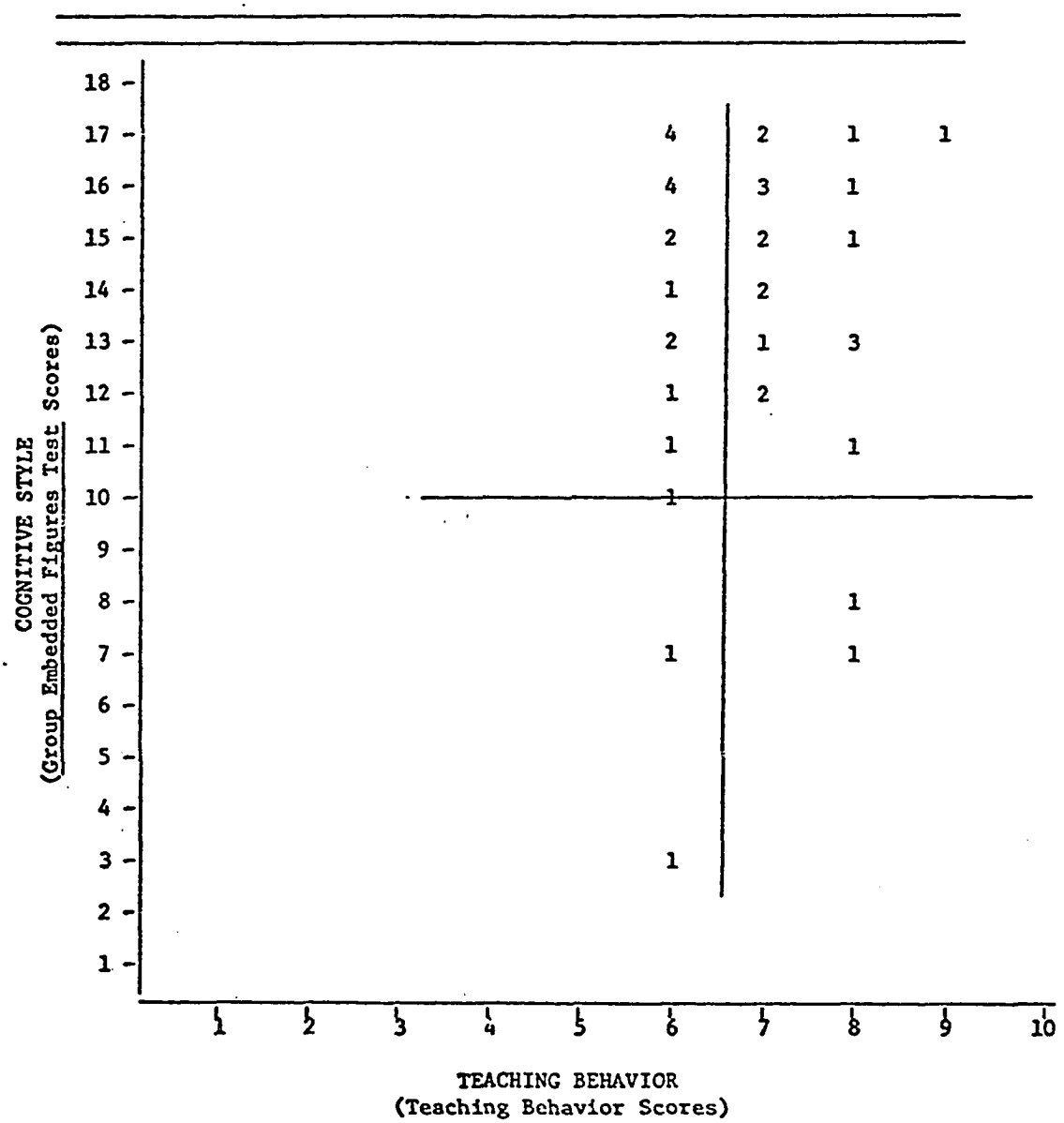
[1]Norman Nie et al., SPSS - Statistical Package for the Social Sciences, 2nd ed. (New York: McGraw-Hill, 1975), pp. 280-287 and pp. 293-300.

TABLE 8

SCATTERGRAM OF COGNITIVE STYLE AND TEACHING BEHAVIOR
FOR ALL SUBJECTS (N=40)



The correlation coefficient($r=-0.012$, $p=0.938$) was not significant at the 0.05 level indicating no significant relationship existed between cognitive style and teaching behavior.

In the third stage of data analysis, a multivariate analysis of variance[1] was carried out between the gender and teaching area subgroups with cognitive style and teaching behavior. Significance was set at the 0.05 level. Cognitive style was found to differ significantly with gender($F=5.85$, $p=0.02$) and teaching area($F=3.99$, $p=0.05$). There was no interaction between gender and teaching area with cognitive style($F=0.00$, $p=1.0$)(see Tables 9, 10, and 11). Teaching behavior was found to differ significantly only with teaching area($F=4.20$, $p=0.05$). There was no significant difference between gender and teaching behavior ($F=0.31$, $p=0.58$). There was no interaction between gender and teaching area with teaching behavior($F=0.87$, $p=0.36$)(see Tables 12, 13, and 14).

Testing of Major Hypothesis

The major study hypothesis was stated as:

H_o There is no relationship between cognitive style, as measured on the field-dependence-independence dimension, and teaching behavior, as measured by interaction analysis.

The major study hypothesis H_o was tested by correlational analysis using the Pearson Product-Moment Correlation Coefficient to determine strength of relationship between cognitive style and teaching behavior. The result of correlational analysis($r=-0.012$) was not statistically significant at the 0.05 level. The hypothesis is not rejected.

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[1]Anthony Barr et al., A User's Guide to the SAS-76 (Raleigh: SAS Institute, 1976), pp. 59-60.

TABLE 9

ANALYSIS OF VARIANCE COMPARING SUBJECTS ON GENDER AND TEACHING AREA WITH COGNITIVE STYLE

Group	Degrees of Freedom	Mean Square	F	p
Gender	1	52.9	5.85	0.02*
Teaching Area	1	36.1	3.99	0.05*
Gender-Teaching Area	1	00.0	0.00	1.00

*Significant at the 0.05 level

TABLE 10

CELL MEANS AND STANDARD DEVIATIONS FOR COGNITIVE STYLE

GENDER TEACHING AREA	FEMALE NATURAL SCI	FEMALE SOCIAL SCI	MALE NATURAL SCI	MALE SOCIAL SCI
Mean	13.60	11.70	15.90	14.00
SD	3.06	4.52	1.29	2.61

TABLE 11

RELATIONSHIP BETWEEN GENDER AND TEACHING AREA WITH COGNITIVE STYLE

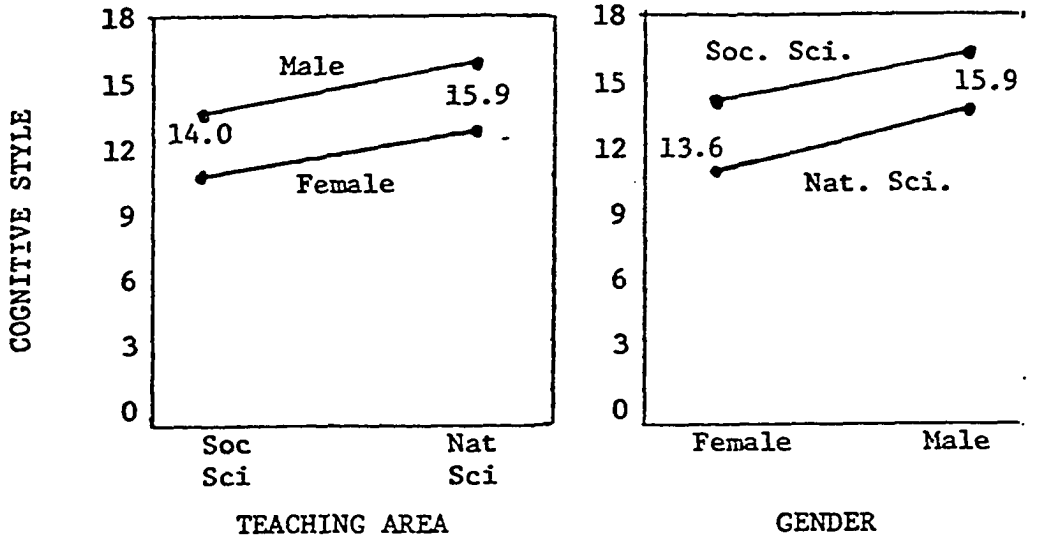


TABLE 12

ANALYSIS OF VARIANCE COMPARING SUBJECTS ON GENDER AND TEACHING AREA WITH TEACHING BEHAVIOR

Group	Degrees of Freedom	Mean Square	F	p
Gender	1	0.25	0.31	0.58
Teaching Area	1	3.03	4.20	0.05*
Gender-Teaching Area	1	0.63	0.87	0.36

*Significant at the 0.05 level

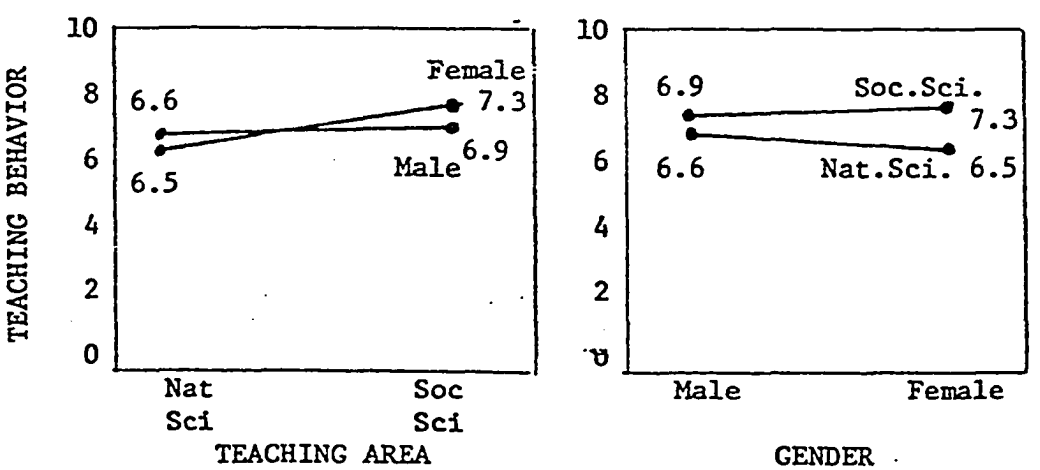
TABLE 13

CELL MEANS AND STANDARD DEVIATIONS FOR TEACHING BEHAVIOR

GENDER TEACHING AREA	FEMALE NATURAL SCI	FEMALE SOCIAL SCI	MALE NATURAL SCI	MALE SOCIAL SCI
Mean	6.50	7.30	6.60	6.90
SD	0.85	0.94	0.70	0.86

TABLE 14

RELATIONSHIP BETWEEN GENDER AND TEACHING AREA ON TEACHING BEHAVIOR



Testing of Corollary Hypotheses H_{oA} Through H_{oF}

Corollary hypotheses H_{oA} through H_{oF} examined the relationships between and among subgroups of the study on cognitive style and teaching behavior. The two study subgroups are gender(female and male) and teaching area(natural science and social science). A multivariate analysis of variance was performed on the data.

H_{oA} There is no difference between female and male teachers in field-dependence-independence as measured by the Group Embedded Figures Test

In hypothesis H_{oA}, the relationship between gender of teachers with cognitive style was examined. Results of analysis(see Tables 9, 10, and 11) indicate there is a significant difference between female and male teachers on cognitive style. Male teachers were significantly more field-independent($\bar{X}_{GEFT}$=14.95) than female teachers($\bar{X}_{GEFT}$=12.65). The hypothesis is rejected.

H_{oB} There is no difference between female and male teachers in teaching behavior as measured by Flanders Interaction Analysis System

In hypothesis H_{oB}, the relationship between gender of teachers with teaching behavior was examined. Results of analysis(see Tables 12, 13, and 14) indicate there is no significant difference between female($\bar{X}_{tbs}$=6.9) and male($\bar{X}_{tbs}$=6.8) teachers with teaching behavior. The hypothesis is not rejected.

H_{oC} There is no difference between natural and social science teachers in field-dependence-independence as measured by the Group Embedded Figures Test

In hypothesis H_{oC}, the relationship between teaching area with cognitive style was examined. Results of analysis(see Tables 9, 10,

and 11) indicate there is a significant difference between natural science and social science teachers with cognitive style. Natural science teachers were significantly more field-independent($\bar{X}_{GEFT}$=14.3) than social science teachers($\bar{X}_{GEFT}$=12.9). The hypothesis is rejected.

H_{oD} There is no difference between natural and social science teachers in teaching behavior as measured by Flanders Interaction Analysis System

In hypothesis H_{oD}, the relationship between teaching area of teachers with teaching behavior was examined. Results of analysis (see Tables 12, 13, and 14) indicate there is a significant difference between natural and social science teachers on teaching behavior. The social science teachers were significantly more field-independent on teaching behavior($\bar{X}_{tbs}$=7.2) than the natural science teachers($\bar{X}_{tbs}$=6.8). The hypothesis is rejected.

H_{oE} There is no interaction between gender and teaching area on field-dependence-independence as measured by the Group Embedded Figures Test

In hypothesis H_{oE}, the possibility of interaction between gender and teaching area with cognitive style was examined. Results of analysis(see Tables 9, 10, and 11) indicate there is no interaction present between gender and teaching area with cognitive style. The hypothesis is not rejected.

H_{oF} There is no interaction between gender and teaching area on teaching behavior as measured by Flanders Interaction Analysis System

In hypothesis H_{oF}, the possibility of interaction between gender and teaching area with teaching behavior was examined. Results of analysis(see Tables 12, 13, and 14) indicate there is no interaction between gender and teaching area with teaching behavior. The hypo-

thesis is not rejected.

Summary

The study postulated seven hypotheses: one major study hypothesis and six corollary study hypotheses. Four of the seven hypotheses were accepted; three, rejected. Results of analysis found that there were no significant differences in gender with teaching area. No interaction was found between gender and teaching area with either cognitive style or teaching behavior. No significant relationship was found between cognitive style and teaching behavior in the classroom. There were significant differences in gender with cognitive style, in teaching area with cognitive style, and in teaching area with teaching behavior.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of the study was to investigate the relationship between teacher cognitive style and teaching behavior in the classroom so that the teaching-learning process might be better understood. Teacher cognitive style was investigated using the field-dependent-independent dimension of cognitive style. Teaching behavior was documented through a system of interaction analysis.

The study sample consisted of forty tenure-track faculty at a post-secondary institution in the State of Oklahoma. Subjects were evenly selected from the natural sciences(N=20) and social sciences (N=20) and equally divided between females(N=20) and males(N=20). Age of subjects was held at thirty to fifty years. Observation of teaching behavior was made at the undergraduate level.

To verify eligibility for participation in the study, subjects completed an information sheet(see Appendix C). They were administered the Group Embedded Figures Test, a measure of field-dependence-independence. Teaching behavior was documented by coding of verbal interaction in the classroom using Flanders Interaction Analysis System.

Data was analyzed in three stages. In the first stage of data analysis, individual scores were computed from the Group Embedded Figures Test and from the behavior codings for Flanders teaching patterns. A

teaching behavior score was derived from the teaching patterns. Subjects were classified as field-dependent or field-independent for both cognitive style and teaching behavior based on their Group Embedded Figures Test and teaching behavior scores.

In the second stage of data analysis, a scattergram was constructed to graphically show the relationship between scores from the Group Embedded Figures Test and teaching behavior scores. A correlational analysis was carried out on the scores using the Pearson Product-Moment Correlation Coefficient. There was no significant relationship between cognitive style and teaching behavior.

In the third stage of data analysis, a multivariate analysis of variance was conducted between the gender and teaching area subgroups with cognitive style and teaching behavior. Cognitive style was found to differ significantly with gender and teaching area. Teaching behavior was found to differ significantly with teaching area. There was no significant difference in gender with teaching area. Gender and teaching area did not interact with either cognitive style or teaching behavior.

Discussion and Conclusions

Based on Witkin and associates[1] theory of psychological differentiation and research on cognitive style, it was expected that there would be sex-related differences in the cognitive style of female and male subjects. Results of the study supported this expectation. Male teachers were more field-independent ($\bar{X}_{GEFT}$=14.95) than female teachers ($\bar{X}_{GEFT}$=12.65). The difference was significant at the 0.05 level.

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[1]Witkin et al., Psychological Differentiation, pp. 214-218; Fiebert, "Sex Differences," p. 1277; and Witkin et al., Personality, pp. 170-171.

Based on research on cognitive style and vocational choices[1] it was expected that there would be differences in the cognitive style of natural science and social science teachers. The study results supported previous research. Teachers in the natural sciences were more field-independent ($\bar{X}_{GEFT}$=14.3) than teachers in the social sciences ($\bar{X}_{GEFT}$=12.9). The difference was significant at the 0.05 level.

Both the gender and teaching area subgroups were heavily field-independent. 70% of females(N=14) and 90% of males(N=18) were field-independent. 90% of teachers in the natural sciences(N=18) area and 70% of social science teachers(N=14) were field-independent. Overall, 88% of all subjects(N=32) were field-independent.

The sampling procedure was designed to obtain an even distribution of subjects between field-dependence and field-independence by selecting evenly from both the natural and social sciences and among females and males. This was not accomplished. Since there were no norms on the Group Embedded Figures Test for college faculty, the researcher could not anticipate the range of scores on the Group Embedded Figures Test. The study raises questions about the need for normative data for college faculty and other populations on the Group Embedded Figures Test. There is a need for more information on the nature of the relationship between cognitive style and intelligence and cognitive style and level of education.

It was expected that there would be a relationship between cognitive style and teaching behavior in the classroom. This expecta-

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[1]Goodenough et al., Cognitive Styles and Medical Careers, pp. 2-5; Pierson, "Vocational Interests," p. 875; and Osipow, "Educational-Vocational Preference," p. 534.

tion was based on Witkin and associates[1] findings on cognitive style and behavior. The results of the study did not support that relationship. The correlation coefficient between cognitive style and teaching behavior was nnsignificant(r=-0.012) at the 0.05 level. This finding raises a question as to how teaching behavior in the classroom relates to behavior associated with field-dependence-independence in the four indicator areas identified by Witkin and associates in their hypothesis of psychological differentiation. Flanders Interaction Analysis System is questioned as an instrument that discriminates teaching behavior in the classroom at a level appropriate for this type of study. Based on Witkin and associates and Flanders descriptive categories of behavior for cognitive style and teaching behavior, there are strong similarities.

There was insufficient information available prior to the study for the researcher to assume a position on the possibility of interaction between gender and teaching area with cognitive style and teaching behavior. Study results showed no interaction was present.

Witkin and associates[2] state there are certain behaviors associated with the field-dependent-independent dimension of cognitive style. It was expected that there would be differences in the teaching behaviors of study subgroups since it was anticipated that cognitive style of subgroups would be different. Teaching behavior and cognitive style were not found to be related. It was expected that there would

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[1]Witkin and Moore, "Cognitive Style and the Teaching-Learning Process," pp. 6-13; Wu, "Task Performance," p. 176; Englehardt, "Cognitive Style and Teaching Behavior," p. 4924; and Witkin et al., "Educational Implicationa," p. 24.

[2]See discussion of Characteristics of Field-Dependence-Independence, pp. 28-34; and Teaching Behavior and Field-Dependence-Independence, pp. 34-39.

be differences between females and males. There was no significant difference between the teaching behavior of females($\bar{X}_{tbs}$=6.9) and males ($\bar{X}_{tbs}$=6.8). There was a difference in teaching behavior in the teaching area subgroup. Social science teachers were significantly more field-independent($\bar{X}_{tbs}$=7.2) in teaching behavior than natural science teachers ($\bar{X}_{tbs}$=6.6). This is the exact opposite of what was expected. It was expected that social science teachers, being more field-dependent in cognitive style, would also be more field-dependent in teaching behavior.

Of interest is the finding that 100% of the study subjects(N=40) were field-independent in teaching behavior. Also notable is Flanders prediction that the proportion of teacher talk(TT) increases as grade level gets higher. The available norm for TT was 68%. In this study, for all subjects, TT was 88%, with a range of 70% to 99%. This is considerably higher and indicates a high degree of teacher dominance in the classroom which might contribute to the lack of variability in teaching behavior. Flanders system may also be measuring for another factor, such as dominance.

Limitations

The study sample consisted of forty tenure-track faculty. Of the original forty, one refused to participate and nine were ineligible for participation because they were not teaching regular classes in the semester data was gathered. It became necessary to use alternate subjects to maintain N=40 who met study criteria, especially the female su

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[1]Flanders, Analysis, pp. 100-111.

group. Two female subjects were below the age thirty limit. They were above the age twenty-five point were performance on the Group Embedded Figures Test plateaus. A large number of faculty were not in the thirty to fifty age span and were not teaching regular undergraduate classes appropriate for the study.

There were many questions associated with selection of appropriate classes for observation. Class size ranged from one student to over two hundred students. Class format ranged from television studio transmission, to laboratory settings, to large lecture hall. Extremes of class size and format were not used in the study. Even so, much variability in classes existed. The researcher believes that greater control of the classroom variable is necessary in studies of cognitive style and teaching behavior before the nature of their relationship may be understood.

Participants felt upper division undergraduate students were more interactive than lower division undergraduates. They felt level of interaction increased during the course of the semester as teacher and student became better acquainted. Participants felt that classes made up of major students(students majoring in the teachers area) were more interactive than non-major classes. These comments may have merit. It is interesting that few, if any, subjects expressed an awareness of the teacher as an influential variable in determining level of interaction.

Several participants expressed a belief that their teaching behavior differed in different classes. This view is of interest since to the best of the researchers knowledge it has not been documented empirically. The believed difference was partly attributed to class

'personality' and composition.

Recommendations

There is a need for more normative data on the Group Embedded Figures Test and Flanders Interaction Analysis System. There was no normative data available for the population used in this study. The researcher had to assume a normal distribution in planning the sampling procedure. It is recommended that another instrument be located or developed and used to document and analyze teaching behavior in the classroom to verify the existence of any relationship between cognitive style and teaching behavior.

The cognitive styles of the study subjects were skewed toward field-independence. It is suggested that there be investigation into the nature of the relationship between cognitive style and intelligence and cognitive style and level of educational preparation.

Suggestions for replication of this study with slightly different approaches include: a larger sample and more closely controlling the classroom variable; a smaller sample observed in a variety of classroom settings; and observing subjects in other than the classroom situation. The first suggestion would require several institutions and involve controlling for the institutional variable. All three would provide valuable information on the teaching-learning process and how teachers control their interaction into the learning environment.

A final recommendation for further research is to investigate the extent to which the cognitive style of the teacher or the impact of the learner's cognitive style affects the style of interaction and teaching behavior, i.e., which element is most critical in control of

classroom interaction.

There is inadequate research on teacher characteristics and teaching behavior, a critical variable in the teaching-learning process. This study, which contributed to that research base, did reveal something of the relationship of teacher cognitive style and teaching behavior in the university. It pointed to the difficulty in quantifying human behavior and the need to persist in researching behavior so that human behavior may be better understood.

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APPENDIX A

TABLE 15

TEN CATEGORIES OF FLANDERS INTERACTION ANALYSIS SYSTEM

TEACHER TALK	INDIRECT INFLUENCE (Response)	1. ACCEPTS FEELINGS: accepts and clarifies the feeling tone of the students in a nonthreatening manner; feelins may be positive or negative; predicting or recalling feeling is included. 2. PRAISES OR ENCOURAGES: praises or encourages student action or behavior; jokes that relieve tension, but not at the expense of another; nodding head or saying 'um hm?' and 'go on' are included. 3. ACCEPTS OR USES IDEAS OF STUDENTS: clarifying, building, or developing ideas suggested by student; as teacher brings more of his own ides into play, shift to Category 5. 4. ASKS QUESTIONS: asking a question about content or procedure with intent that a student answer.
	DIRECT INFLUENCE (Initiation)	5. LECTURING: giving gacts or opinions about content or procedure; expressing his own ideas; asking rhetorical questions. 6. GIVING DIRECTIONS: directs, commands, or otherwise orders and student is expected to comply. 7. CRITICIZING OR JUSTIFYING AUTHORITY: statements intended to change student behavior from nonacceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing; extreme self-reference.
STUDENT TALK		8. STUDENT TALK - RESPONSE: talk by students in response to teacher; teacher initiates the contact or solicits student statement. 9. STUDENT TALK - INITIATION: talk by student which they imitiate; if 'calling on' student is only to indicate who may talk, observer must decide whether student wanted to talk.
		10. SILENCE OR CONFUSION: pauses, short periods of silence, and periods of confusion in which communication cannot be understood by observer.

SOURCE: Flanders, Interaction Analysis, p. 5.

TABLE 16

FIELD-DEPENDENT TEACHING BEHAVIORS AND FLANDERS INTERACTION CATEGORIES

Field-dependent Behavior	Flanders Category
Friendly, kind, courteous, involved Helps students with personal problems Anticipates needs of students and attempts to resolve Gives help willingly Fair, impartial, patient, accepting	1. Accepts feelings (field dependent)
Puts student on own to solve problems Understands and sympathizes Values class discussions for effective learning Commends effort Less likely to express negative or corrective comments	2. Praises or encourages (field dependent)
Shares responsibility for directing the teaching-learning interaction with students	3. Accepts of uses ideas of students(field dependent)
Evocative, discussion, interactive Uses questions to check student learning following instruction	4. Asks questions
Uses discussion	5. Lecturing
Nondirective Puts student on own to solve problems Shares responsibility for directing the teaching-learning interaction Unstructured	6. Giving Directions
Social role not as defined Less likely to express negative or corrective comment Student evaluates progress	7. Criticizing or justifying authority
Asks questions to check student learning following instruction	8. Student talk - response

TABLE 16 - Continued

Field-dependent Behavior	Flanders Cateogry
Student-centered High level of student interaction	9. Student talk - initiation (field dependent)
Flexible, unstructured Confusion Responsive, involved Values class discussion Student problem solving	10. Silence or Confusion (field dependent)

TABLE 17

FIELD-INDEPENDENT TEACHING BEHAVIOR AND
FLANDERS INTERACTION CATEGORIES

Field-Independent Bahavior	Flanders Category
Aloof, removed, cold, uninterested Unaware of students personal needs Fails to provide for individual differences Partial, impatient, inflexible	1. Accepts feelings
Controls student activity Business-like Organized class plan Hypercritical, criticises Corrective feedback - negative evaluation seen as effective teaching technique	2. Praises or encourages
Assumes responsibility for directing the teaching-learning interaction	3. Accepts or uses ideas of students
Didactic, lecture, noninteractive Uses questions as a teaching tool to introduce content and following student responses	4. Asks questions (field independent)
Lectures	5. Lecturing (field independent)
Directive Assumes responsibility for directing the teaching-learning interaction Controls student activity Structures and systematic	6. Giving directions (field independent)
Hypercritical; criticizes Corrective feedback with a 'why' Teacher evaluates student progress Well defined social role	7. Criticizing or justifying authority(field independent)
Uses questions as a teaching tool to introduce content and following student response	8. Student talk - response (field independent)

TABLE 17 - Continued

Field-independent Behavior	Flanders Category
Teacher centered Lower level of student interaction Classes organized toward cognitive aspects	9. Student talk - initiation
Silence Rigidity of procedure Lower level of interaction	10. Silence or confusion

APPENDIX B

FLANDERS TEACHING PATTERN RATIOS

S	GENDER	T.AREA	TT	PP	SC	TRR	TQR	PIR	TRR89	TQR89	CCR	SSR	tbs	TB	GEFT	CS
01	F	NS	92	8	0	16	4	100	87	25	81	75	6	FI	13	FI
02	F	NS	94	5	2	2	7	57	84	14	95	90	6	FI	10	FD
03	F	NS	80	10	11	14	3	50	98	25	75	76	6	FI	14	FI
04	F	NS	88	7	1	10	6	71	66	0	78	81	6	FI	17	FI
05	F	NS	95	2	3	6	5	0	100	40	94	88	8	FI	13	FI
06	F	NS	70	23	7	27	58	7	95	1	65	49	6	FI	7	FD
07	F	NS	97	1	2	1	1	50	100	0	98	95	6	FI	16	FI
08	F	NS	86	9	2	18	3	76	76	100	68	76	7	FI	15	FI
09	F	NS	84	12	4	11	16	26	94	72	83	71	8	FI	15	FI
10	F	NS	79	17	4	36	7	100	88	78	51	52	6	FI	16	FI
11	M	NS	94	2	5	9	2	43	91	0	89	87	6	FI	16	FI
12	M	NS	82	10	8	8	4	95	100	50	85	82	6	FI	17	FI
13	M	NS	90	4	6	12	5	7	83	0	88	84	7	FI	17	FI
14	M	NS	90	7	3	16	13	26	100	62	83	78	7	FI	16	FI
15	M	NS	87	7	5	2	8	69	89	36	90	83	6	FI	15	FI
16	M	NS	89	7	3	12	7	28	89	25	80	78	7	FI	16	FI
17	M	NS	87	9	1	12	33	84	97	33	79	85	7	FI	17	FI

FLANDERS TEACHING PATTERN RATIOS

S	GENDER	T.AREA	TT	PP	SC	TRR	TQR	PIR	TRR89	TQR89	CCR	SSR	tbs	TB	GEFT	CS
18	M	NS	85	8	7	18	10	51	97	33	80	64	6	FI	17	FI
19	M	NS	94	2	4	11	2	63	94	0	87	88	6	FI	15	FI
20	M	NS	91	6	3	11	3	75	85	67	83	84	8	FI	13	FI
21	F	SS	75	6	1	52	38	77	94	100	39	56	6	FI	12	FD
22	F	SS	86	14	0	19	6	77	92	0	71	78	6	FI	16	FI
23	F	SS	92	7	2	4	2	74	64	33	86	88	8	FI	7	FD
24	F	SS	97	2	2	5	8	14	44	0	94	85	8	FI	11	FD
25	F	SS	99	0	1	0	26	0	20	0	99	97	8	FI	8	FD
26	F	SS	86	8	6	9	2	90	94	0	81	88	6	FI	3	FD
27	F	SS	91	8	1	20	20	34	27	80	79	64	8	FI	16	FI
28	F	SS	88	6	5	18	16	0	99	0	81	70	8	FI	17	FI
29	F	SS	88	9	3	20	14	68	76	72	85	87	7	FI	14	FI
30	F	SS	87	4	8	19	10	35	67	0	72	71	6	FI	13	FI
31	M	SS	79	9	11	22	17	81	84	100	63	76	7	FI	16	FI
32	M	SS	76	22	2	10	2	89	99	67	71	91	7	FI	12	FD
33	M	SS	77	7	13	28	9	50	84	100	58	71	6	FI	13	FI
34	M	SS	72	24	3	18	7	20	84	86	60	65	7	FI	13	FI

FLANDERS TEACHING PATTERN RATIOS

S	GENDER	T.AREA	TT	PP	SC	TRR	TQR	PIR	TRR89	TQR89	CCR	SSR	tbs	TB	GEFT	CS
35	M	SS	79	15	5	30	24	25	90	100	65	51	9	FI	17	FI
36	M	SS	77	20	3	38	44	43	97	92	55	68	7	FI	15	FI
37	M	SS	76	10	11	13	2	77	79	0	12	76	6	FI	17	FI
38	M	SS	92	7	1	6	0	100	100	0	89	92	6	FI	11	FD
39	M	SS	93	6	1	6	8	63	80	78	88	86	7	FI	14	FI
40	M	SS	98	0	1	4	3	0	74	0	94	91	7	FI	12	FD

APPENDIX C

CONSENT TO PARTICIPATE IN RESEARCH

The purpose of the research is to investigate the relationship between teacher cognitive style and teaching behavior in the classroom so that the teaching-learning process may be better understood. The dimension of cognitive style used in the study is Witkin's field-dependence-independence dimension. Flanders Interaction Analysis System is used to identify teaching behavior in the classroom.

There is no known social, personal, physical or other risk to study participants.

There is no known social, personal, physical or other benefit to study participants.

To assure anonymity of study participants, information is collected on coded forms that only identify gender and teaching area. The information collected becomes group data and is not capable of being traced back to any one participant. The original list of participants is kept locked and will be destroyed upon completion of the study and approval of the dissertation.

Information collected from study participants is to be used for doctoral research at the University of Oklahoma. The results of the research will be disseminated through the disseration, a paper presented at a professional meeting, and an article in a professional journal.

The research investigator will answer any questions participants may have prior to consenting and during the study.

The participant may withdraw consent and discontinue participation any time prior to termination of the study without prejudice.

Participants will be asked to take the Group Embedded Figures Test, a measure of field-dependence-independence cognitive style, and have an observer in one classroom for one twenty-minute observation.

I have read the above information and consent to participate in the research.

_____ _____

Name Date

TEACHER COGNITIVE STYLE AND TEACHING BEHAVIOR

CODE_____

AGE_____

COLLEGE MAJOR: Bachelors_____

Masters_____

Doctorate_____

TEACHING AREA_____

SEX_____

GROUP EMBEDDED FIGURES TEST

The Group Embedded Figures Test by Philip Oltman, Evelyn Raskin, and Herman Witkin, is a copyrighted publication available from:

Consulting Psychologists Press
577 College Avenue
Palo Alto, California 94306

CODE #_____

CLASSROOM INTERACTION TALLY SHEET

1_____	29_____	57_____	85_____	113_____
2_____	30_____	58_____	86_____	114_____
3_____	31_____	59_____	87_____	115_____
4_____	32_____	60_____	88_____	116_____
5_____	33_____	61_____	89_____	117_____
6_____	34_____	62_____	90_____	118_____
7_____	35_____	63_____	91_____	119_____
8_____	36_____	64_____	92_____	120_____
9_____	37_____	65_____	93_____	121_____
10_____	38_____	66_____	94_____	122_____
11_____	39_____	67_____	95_____	123_____
12_____	40_____	68_____	96_____	124_____
13_____	41_____	69_____	97_____	125_____
14_____	42_____	70_____	98_____	126_____
15_____	43_____	71_____	99_____	127_____
16_____	44_____	72_____	100_____	128_____
17_____	45_____	73_____	101_____	129_____
18_____	46_____	74_____	102_____	130_____
19_____	47_____	75_____	103_____	131_____
20_____	48_____	76_____	104_____	132_____
21_____	49_____	77_____	105_____	133_____
22_____	50_____	78_____	106_____	134_____
23_____	51_____	79_____	107_____	135_____
24_____	52_____	80_____	108_____	136_____
25_____	53_____	81_____	109_____	137_____
26_____	54_____	82_____	110_____	138_____
27_____	55_____	83_____	111_____	139_____
28_____	56_____	84_____	112_____	140_____

141_____ 169_____ 197_____ 225_____ 253_____

142_____ 170_____ 198_____ 226_____ 254_____

143_____ 171_____ 199_____ 227_____ 255_____

144_____ 172_____ 200_____ 228_____ 256_____

145_____ 173_____ 201_____ 229_____ 257_____

146_____ 174_____ 202_____ 230_____ 258_____

147_____ 175_____ 203_____ 231_____ 259_____

148_____ 176_____ 204_____ 232_____ 260_____

149_____ 177_____ 205_____ 233_____ 261_____

150_____ 178_____ 206_____ 234_____ 262_____

151_____ 179_____ 207_____ 235_____ 263_____

152_____ 180_____ 208_____ 236_____ 264_____

153_____ 181_____ 209_____ 237_____ 265_____

154_____ 182_____ 210_____ 238_____ 266_____

155_____ 183_____ 211_____ 239_____ 267_____

156_____ 184_____ 212_____ 240_____ 268_____

157_____ 185_____ 213_____ 241_____ 269_____

158_____ 186_____ 214_____ 242_____ 270_____

159_____ 187_____ 215_____ 243_____ 271_____

160_____ 188_____ 216_____ 244_____ 272_____

161_____ 189_____ 217_____ 245_____ 273_____

162_____ 190_____ 218_____ 246_____ 274_____

163_____ 191_____ 219_____ 247_____ 275_____

164_____ 192_____ 220_____ 248_____ 276_____

165_____ 193_____ 221_____ 249_____ 277_____

166_____ 194_____ 222_____ 250_____ 278_____

167_____ 195_____ 223_____ 251_____ 279_____

168_____ 196_____ 224_____ 252_____ 280_____

CODE #_____

281_____	309_____	337_____	365_____	393_____
282_____	310_____	338_____	366_____	394_____
283_____	311_____	339_____	367_____	395_____
284_____	312_____	340_____	368_____	396_____
285_____	313_____	341_____	369_____	397_____
286_____	314_____	342_____	370_____	398_____
287_____	315_____	343_____	371_____	399_____
288_____	316_____	344_____	372_____	400_____
289_____	317_____	345_____	373_____	401_____
290_____	318_____	346_____	374_____	402_____
291_____	319_____	347_____	375_____	403_____
292_____	320_____	348_____	376_____	404_____
293_____	321_____	349_____	377_____	405_____
294_____	322_____	350_____	378_____	406_____
295_____	323_____	351_____	379_____	407_____
296_____	324_____	352_____	380_____	408_____
297_____	325_____	353_____	381_____	409_____
298_____	326_____	354_____	382_____	410_____
299_____	327_____	355_____	383_____	411_____
300_____	328_____	356_____	384_____	412_____
301_____	329_____	357_____	385_____	413_____
302_____	330_____	358_____	386_____	414_____
303_____	331_____	359_____	387_____	415_____
304_____	332_____	360_____	388_____	416_____
305_____	333_____	361_____	389_____	417_____
306_____	334_____	362_____	390_____	418_____
307_____	335_____	363_____	391_____	419_____
308_____	336_____	364_____	392_____	420_____

CODE_____ Second

First	1	2	3	4	5	6	7	8	9	10	
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											Matrix Total
TOTAL											
%											