THE RELATIONSHIP BETWEEN SCHOOL PRINCIPALS' SELF-PERCEIVED BRAIN HEMISPHERIC PROCESSING MODES AND THEIR SELF-PERCEIVED LEADERSHIP STYLES

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Chapter 1

Introduction

Numerous researchers have studied leadership and its role as an independent variable as a causal factor in various outcomes such as school climate (Bailey, 1988; Hoy & Clover, 1986; Hoy & Henderson, 1983), absenteeism (Bridges, 1980), teacher stress and job satisfaction (Litt & Turk, 1986). There is, however, extensive research (Norris, 1986; Owen, 1986; Reitz, 1986) that indicates that educators need to research leadership as a dependent variable as it relates or correlates to brain hemisphericity and/or brain hemispheric specialization.

Brain hemisphericity, the concept that individual differences exist "between the cerebral hemispheres in the organization of human performance" (Beaumont, 1983, p. 213), is often referred to as brain hemispheric specialization which means that the two hemispheres of the brain are specialized for different styles of mental processing (McCallum & Glynn, 1979, p. 263). Simply stated, individuals "employ two different kinds of intelligence or...two different sets of information-processing rules" when synthesizing information (Bogen, 1975, p. 24). Brain hemispheric specialization has

clear implications for determining persons' learning styles (Dalili, 1982; Guild & Garger, 1985; Herrmann, 1982; McCarthy, 1986; Vitale, 1982). According to some research, learning styles are powerful predictors of individuals' behavior patterns and leadership styles (Cameron, 1984; Herrmann, 1982; Leino, 1984; McCarthy, 1986). The foregoing logic causes the investigator to speculate about brain hemispheric specialization as an independent variable and its possible relationship to perceived leadership style. The implications for those who fill leadership positions, and for those who train leaders to do so, are profound. Educational administration implications that relate to this phenomenon include: decision making (Herron, Jacobs, & Kjeiner, 1985; Taggart, Robey, & Kroeck, 1985), recruiting, hiring, job assignments (Piatt, 1983; Agor, 1984), interpersonal skills (Agor, 1984; Albrecht, 1983), and organizational change (Levy, 1985; Piatt, 1983). This study attempted to determine the relationship between an individual's preferred brain hemispheric processing and an individual's leadership style.

Metacognition, the function defined as a person's "thinking about thinking" (Yussen, 1985, p. 253) has been of interest to scholars for several centuries.

However, investigations of brain hemispheric specialization and its relationship to human behavior and cognition was considered relatively esoteric until the work of Sperry (1964, 1968) and his students of the 1950s.

Sperry (1964, 1968) and his colleagues determined that the brain is divided into two hemispheres which are connected by the corpus-callosum commissure. For 99 percent of right-handed individuals, the right hemisphere controls the left side of the body and the left hemisphere controls the right side of the body. Contrastingly, these findings have not been determined to apply for left-handed individuals (Webb, 1983). One hemisphere tends to function more effectively than the other hemisphere when the brain is presented with certain types of stimuli (Blakeslee, 1984; Galyean, 1981; Herrmann, 1982; Kane, 1979; Straham & Toepfer, 1985; Yellin, 1983).

One of Sperry's students, Ornstein (1978), explained the distinction between the right brain and left brain hemispheric functions by stating that the human brain is divided into two hemispheres, each with different modes for mental processing or thinking. The left brain hemisphere operates rationally while the right brain hemisphere operates intuitively. Each

hemisphere has its own memory and learns independently.

A different way of conceptualizing brain hemispheric processing skills was proposed by Levy (1985). She concluded that each of the brain hemispheres reason, but they do it by using different cognitive strategies. The right brain hemisphere is holistic in its approach to thinking, decision making, and reasoning. It decides how things are assembled by taking the whole and deducing from it to arrive at a solution. Contrastingly, the left brain hemisphere is analytic and puts parts into wholes. It finds patterns in words and uses language to express what it comprehends.

Edwards (1979) condensed much of the information concerning left and right brain hemispheric functioning into a comprehensive comparison of the various characteristics of each. She suggested that the left hemisphere is: verbal, analytic, symbolic, abstract, rational, digital, logical, and linear; and that the right brain hemisphere is: nonverbal, synthetic, concrete, analogic, nonrational, spatial, intuitive, and holistic.

The research of Sperry (1964, 1968) and his colleagues (e.g., Bogen, Gazzaniga, 1985; Levy, 1985; Myers, 1982) has generated widespread interest in the

area of brain hemispheric specialization, also referred to as cerebral asymmetry, cerebral laterality (Beaumont, 1983; Hellige, 1980), and right brain/left brain information or mental processing modes (Gazzaniga, 1985; Geschwind & Galaburda, 1987; Levy, 1985; Myers, 1982; Norris, 1984; Reitz, 1986).

Researchers have utilized several methods for determining brain hemispheric functioning. One such means of investigation is the electroencephalogram (EEG) pattern analysis to measure activity in the left and right brain hemispheres when each is presented with various types of stimuli (Myers, 1982; Taggart, Robey, & Kroeck, 1985; Schkade & Potvin, 1981). Proponents of EEG pattern analysis state that an individual's brain-wave activity reacts differently according to the diversity of the applied stimuli. Verbal or left brain stimuli produce more brain-wave activity in the left hemisphere while nonverbal or right brain stimuli result in more brainwave activity in the right brain (Myers, 1983; Rubenzer, 1979).

Another method of investigation is the dichotic listening test which involves applying two different verbal messages or sounds to both ears simultaneously to determine which brain hemisphere more efficiently processes the information (Harriman, 1974; Rubenzer,

1978). Results indicate that words presented to the right ear are more effectively processed than words presented to the left ear (Harriman, 1974). This would seem to concur with findings which indicate that the left brain hemisphere is specialized for verbal language.

Eye directionality studies (left or right movement of the eyes) have also been conducted by several researchers (Bakan, 1969; Day, 1967; Gur, Gur, & Marshalek, 1975). These investigations involve observing an individual's predominant eye movement during certain tasks or while that individual is answering specific questions. The researchers postulated that an individual who relies mostly on his right brain information processing mode would move his eyes to the left when answering questions, and a person who utilizes left brain thinking skills would shift his eyes to the right when responding to questions.

One of the more frequently used instruments for determining individual brain hemispheric processing modes was devised by Herrmann (1982, 1986, 1988). This paper and pencil inventory yields an analysis of person's preferred brain hemispheric processing modes by generating data which can be plotted in quadrants and correlated with one or more of the two frontal or lower

brain regions.

There is an abundance of literature with summaries of right brain versus left brain hemispheric characteristics and comparisons of cognitive modes of information processing (Bernhoft, 1986; Cassel, 1978; Edwards, 1979; Galyean, 1981; Herrmann, 1982; Norris, 1984; Owen, 1986; Restak, 1984; Straham & Toepfer, 1985). The literature is also replete with information indicating that an individual's brain hemispheric processing mode, in turn, is directly related to that individual's learning style (Dalili, 1982; Guild & Garger, 1985; Herrmann, 1982; Jenkins, 1981; Matthews, 1982; Rubenzer, 1982; Vitale, 1982; Wittrock, 1978). Some researchers (Torrance, Reynolds, Riegel, & Ball, 1977) make no distinction between the terms brain hemispheric processing and learning style and use them synonymously.

Prominent learning style and brain functioning researchers, as a result of a grant from the MacDonald Corporation, met to exchange their ideas on the subjects of their expertise (McCarthy, 1979). McCarthy utilized the information gleaned from the meetings and other materials concerning learning styles and brain hemisphericity to devise a program entitled The 4Mat System (McCarthy, 1986). McCarthy's work is based on

the premise that brain hemispheric specialization and/or cognitive style is a causal factor in an individual's learning style and behavior patterns. Studies of brain hemisphericity (Herrmann, 1982; Jenkins, 1981; Matthews, 1982; McCarthy, 1986) indicate that an individual's preference for either the right or left hemispheric processing determines that individual's particular learning style and behavior patterns.

Persons who utilize mainly left hemispheric information processes prefer formalized lectures, program learning, behavior modification, lessons that are sequentially ordered, and data based content. Persons who use primarily right hemispheric information processes respond to experiential opportunities, visual displays, group interaction, and discussions (Herrmann, 1988). "The implications are that the dominance of one hemisphere over the other will create a preference of the individual for a certain mode of learning" (Dalili, 1982, pp. 11-12). Hunter (1976) concurred with Dalili (1982) and Matthews (1982) and stated that if schools are to be more effective, educational leaders must acquire an awareness of the different individual hemispheric processing modes and the roles they play as causal factors in an individual's learning style.

According to Luria (1973), the human brain actively

encodes, translates, organizes, and stores information. When people are confronted with new material, they construct their own interpretation of that material utilizing their accumulated knowledge. Wittrock (1977) states, "the reality we perceive, feel, see, and hear is influenced by the constructive processes of the brain, as well as by the cues that impinge upon it" (p.65).

In extending this relationship, several researchers have indicated that individual brain hemispheric processing modes and learning styles, in turn, directly influence that individual's behavior patterns and leadership style (Agor, 1986; Cameron, 1984; Herrmann, 1982; Leino, 1984; McCarthy, 1986). Cameron (1984) commented that differences in a person's hemispheric processing skills lead to differences in that person's leadership and decision making styles. It has been asserted by Leino (1984) that when specific hemispheric and cognitive scales were administered to school principals, data concerning the subjects' leadership conceptions would be generated. Numerous organizational problems occur because of individual differences in hemispheric processing among the organizational members (Piatt, 1983).

Herrmann (1986, 1988), developer of the Herrmann Brain Dominance Instrument (1982), asserted that

information generated from administration of his instrument could be directly related to individual learning and leadership styles. He presented descriptions for leaders who prefer mainly right or left hemispheric processing techniques. Persons who use predominantly left hemispheric processing: (1) are solution oriented, (2) think logically when making decisions, (3) set specific goals, (4) develop plans, and (5) measure results. Leaders who generally use right hemispheric processing: (1) conceptualize, (2) rely on intuition when making decisions, (3) are strategic planners, (4) bend or challenge established policies, and (5) integrate ideas and concepts.

Additionally, Glenn (1987) asserted that leaders who utilize mostly left hemispheric processing techniques would have the following behavioral characteristics: (1) determine and record goals; (2) make detailed lists, charts and or graphs; (3) base solutions on existing models or current authorities; (4) analyze environment and subordinates' behavior within the environment; (5) strive to maintain status quo; (6) work within the system; (6) gather, interpret, and extrapolate from facts; (7) need tasks that are perceived to be related to desired outcomes, and (8) evaluate progress. Those leaders with preferences

gfor right hemispheric processing would display the following characteristics: (1) be process oriented; (2) view problems as opportunities; (3) consider feelings first; (4) possibly have difficulty with follow through; (5) need quiet time and personal space; (6) promote brainstorming and group decision making; (7) take risks; and (8) fear fixed environments.

Private sector managerial theorists became interested in brain hemispheric research much sooner than did those in education. In 1976, Mintzberg suggested that brain hemisphericity had significant implications for business management. He indicated that business leaders must utilize right hemispheric processing skills as well as left hemispheric processing modes. Other business oriented individuals (Agor, 1985; McKean, 1985; Piatt, 1985; Raudsepp, 1980) have concurred with Mintzberg. Indeed an administrator's awareness and knowledge of brain hemispheric processing can have applications and implications for decision making (Herron, Jacobs, & Kjeiner, 1985); screening, hiring, job assignments (Agor, 1984; Piatt, 1983); interpersonal relationships (Agor, 1984; Albrecht, 1983); pre-service and in service training (Coulson & Strickland, 1983; Rehder & Porter, 1985); and organizational change (Levy, 1982; Piatt, 1983).

Despite the research findings cited in foregoing sections of this chapter, there are questions raised by researchers of other articles and studies, (Hardyck & Haapaen, 1979; Hines, 1987; Katz, 1983; Levy 1982) that justify further research in the area of brain hemispheric specialization utilizing different subjects. The concerns related to the field of inquiry can be classified within three broad categories.

The first category of concerns revolves around the issue of generalizability of the findings of studies conducted in the field to date (Hardyck & Haapaen, 1979; Hines, 1987; Katz, 1983). Critics assert that most of the assumptions relative to discrete functioning of separate parts of the brain are based on data gathered from patients who did not exhibit normal brain activity. Accordingly, these subjects form selective samples that disallow generalization to the much broader populations that have been considered appropriate in most of the literature. The discussion to date seems to clearly justify the need for further research with normal samples. This study conducted an investigation of school principals, who would meet the definition of a normal sample.

A second category of concerns has been expressed by several writers and relates to the issue that, although

the parts of the brain do function discretely, the differences are overestimated by many individuals (Hardyck & Haapanen, 1979; Hines, 1987; Katz, 1983; Levy, 1982). These writers have claimed that both sides of the brain engage in functions that numerous researchers consider to be exclusively the function of one side or the other. The present study provides data that allows insight into the validity of these assertions and concomitantly extends educational administration theory relative to this phenomenon.

A third category of concerns about the hemispheric phenomenon are related to the lack of empirical data relating to left-handed individuals, females, diverse cultural populations, and subjects in educational professions (Hardyck & Haapanen, 1979; Katz, 1983). Some of these concerns are addressed in the present study by generating additional data relative to the relationship between hemispheric preference and educational administration leadership.

The determination of causal factors of school leader behavior is considered to be a crucial need because the principal's role as an educational leader is vital to the effectiveness of a school (Clark, Lotto & Astuto, 1984; Fairman & Clark, 1985; Manasse, 1985; Roeuche & Baker, 1986). Leadership has been defined as,

"a process through which an individual (the leader) secures the cooperation of others (followers) toward goal achievement in a particular setting" (Campbell, Corbally, Nystrand, 1983, p. 125). Various researchers (Barnard, 1938; Halpin, 1957; Getzels & Guba, 1957; Stogdill, 1957, 1974) have sought to describe leadership and have delineated specific taxonomies of the phenomena. Many of these leadership descriptions are multidimensional in that they are divided into at least two distinct leadership styles. Leadership style is "the action disposition, or set or pattern of behaviors, displayed by a leader in a leadership situation" (Boyan, 1988, p. 262).

Barnard (1938) proposed that leaders could be categorized as effective and/or efficient. The effective leadership dimension described leaders whose main concern is for organizational tasks. Leaders whose primary interest is for individual relationships were labeled as efficient. Halpin (1957) and Stogdill (1957, 1974), operating on the same premise as Barnard, divided leadership styles into two groupings, initiating structure and consideration. Initiating structure referred to task oriented leaders and consideration designated a leadership style that expressed concern for individual relationships. The terms have been

explained more clearly by Campbell, et. al (1983, p. 134): "Initiating structure refers to establishing goals, procedures, timetables, and other routines." These characteristics are related to the left brain hemispheric processing mode. "Consideration involves demonstrating warmth toward and concern for the interest of subordinates" (p. 134). These characteristics are related to the right brain hemispheric processing mode.

The foregoing leadership styles have been further described as those of task leaders and social leaders (Hoy & Miskel, 1987). The principal, as a task leader, effectuates the organizational goals, and, as a social leader, strives for group unity, encourages organizational members, and reminds them of their importance and value. Hoy and Miskel (1987) stressed the value of both dimensions for effective group operation but they also stated that very few individuals actually succeed in maintaining both roles.

Leadership style has been extensively researched and found to be an important independent variable as it relates to several school related outcomes. Some of these outcomes are school climate (Bailey, 1988; Hoy & Clover, 1986; West, 1985), teacher job dissatisfaction (Litt & Turk, 1986), teacher job satisfaction (Klawitter, 1985), change (Heichberger, 1975), teacher

absenteeism (Bridges, 1980), decision making (Vroom & Yetton, 1973), and instructional management (Clark, Lotto, & Astuto, 1984). The plethora of research clearly indicates that the most powerful predictor of effectiveness, however defined, is the quality of administrative leadership (Manasse, 1985; Reitz, 1986). Effective schools appear to be ones that have principals who display strong leadership (Manasse, 1985; Weller, 1985), have strong positive school climates, and have well defined goals (Bossert, Dwyer, Rowan, & Lee, 1982; Cohen, 1982; Evans, 1983; Norton, 1984; West 1985).

The many aspects of the school principal's role and the complex problems which confront today's educational administrators require leaders who are capable of making effective decisions that will have positive outcomes for that leader's school. Schkade and Potvin (1981, p. 329) asserted that "there is a tendency for many people to develop dominance in one hemisphere as their basic style of approach to problem-solving and decision-making. Bramson (1982) states that many individuals rely on only one style of thinking and they utilize their individual processing mode in every capacity in which they function (e.g., problem solving, interpersonal relationships).

It is crucial in West Virginia to know more about

the causes of leadership styles given the widely recognized need for school reform and creative solutions to school problems. The relationship between principals' brain hemispheric processing and principals' leadership styles were examined in this study.

Statement of the Problem, Definitions, Objectives, and Hypotheses

Problem

The problem of the study had to do with whether or not, brain hemispheric information processing of West Virginia public school principals had any explicit relationship to leadership styles. Specifically, what is the relationship between preferred brain hemispheric processing (as established by the HBDI) of West Virginia public school principals and their preferred leadership styles (as measured by the LBDQ)?

Operational Definitions

For the purposes of this study, the following operational definitions were utilized:

1. Preferred Brain Hemispheric Processing was defined as respondents' scores derived from administration of the Herrmann Brain Dominance Instrument (1982). The self-perceived preferred hemisphere was determined by the dimension (e.g., Left or Right) in which the

greatest number of responses fell.

2. Preferred Leadership Style was defined as the participants' responses on the Leader Behavior Description Questionnaire - Self (1957) yielding self-perceived Initiating Structure and Consideration scores.
3. West Virginia Principals were defined as all of the 1,004 public school principals whose names appear in the West Virginia School Directory (1988).

Objectives

The overall objective of this study was to determine the relationship between the self-perceived preferred brain hemispheric processing of West Virginia principals and their self-perceived leadership style. Specific objectives included determination of the following:

1. The relationship between predominantly left hemispheric processing of principals and predominantly Initiating Structure leadership style.
2. The relationship between predominantly left hemispheric processing of principals and predominantly Consideration leadership style.
3. The relationship between predominantly right hemispheric processing of principals and

predominantly Initiating Structure leadership style.

4. The relationship between predominantly right hemispheric processing of principals and predominantly Consideration leadership style.

Hypotheses

The following hypotheses were formulated for this study:

1. West Virginia public school principals who perceive themselves as preferring predominantly left hemispheric processing will manifest significantly higher Initiating Structure scores than principals who perceive that their mental processing is predominantly right hemispheric.
2. West Virginia public school principals who perceive themselves as preferring predominantly right hemispheric processing will manifest significantly higher Consideration scores than principals who perceive that their mental processing is predominantly left hemispheric.

Significance of the Study

The literature reviewed indicated that brain hemisphericity is a determinant in the behavior of individuals as it controls their information processing

skills, directs their patterns of thought, influences their problem solving techniques, and decision making abilities. Much research has suggested that the school principal plays a vital role in the success or failure of schools. In general, it has been established that there is a relationship between a principal's effectiveness and that principal's leadership style. Little research has been conducted which directly relates brain hemisphericity as an independent variable or a predictor of the dependent variable of leadership style.

Given the current circumstances of education in West Virginia, it would seem that educational administrators need to avail themselves of any and all research that has potential for effectuating school improvement. This information includes needed knowledge of the brain hemispheric processing of the principal and its prediction of leadership behavior. Awareness of such a theory is an important first step for principals who desire to improve the effectiveness of their schools.

Awareness of the concept of hemisphericity would have implications for screening, recruitment, assignment, and hiring of teachers. A principal or a personnel director could assure that newly hired persons

would have certain hemispheric preferences which met the needs of that particular school. It is widely recognized that most public school curricula have a definite left brain bias, and the screening and subsequent hiring of persons with a right brain preference could create a more balanced school in terms of methodology used and materials presented.

Secondly, because education is such a broad and diverse social phenomenon, it has been characterized by the existence of ad hoc and long standing committees, work groups, task forces and other deliberative bodies. The functioning of these groups could be greatly enhanced by assuring that persons with each hemispheric preference are represented in the group, thereby assuring a broader perspective for decision-making (Herron, Jacobs, & Kjeiner, 1985; Taggart, Robey, Kroeck, 1985).

Additionally, when persons are assigned to jobs with specific duties, the educational administrator making the assignment could consider individual hemispheric preference as it relates to a proclivity for a certain type of information processing (Agor, 1984; Piatt, 1983). Persons who are predominantly left brain processors are sequential, analytical, and logical. They could be assigned to tasks that stress such skills.

Conversely, individuals who utilize right brain processing techniques are creative, intuitive, and conceptual and could be assigned to tasks accordingly.

In addition to the foregoing, interpersonal relationships could be greatly enhanced given an awareness of the hemispheric phenomenon (Albrecht, 1983; Agor, 1984). Tensions between hierarchical levels in an organization could be reduced simply by assuring that everyone understood that people behave differently according to their hemispheric preference.

Programs for the pre-service and in-service training of educational administrators could be altered based on the findings of this study (Agor, 1984, Coulson & Strickland, 1983; Rehder & Porter, 1985). Curricula and methods of teaching could be designed to enhance the development of both sides of the brain, thereby producing a more effective administrator.

Furthermore, supraordinates as well as subordinates who are aware of each others hemispheric processing, could structure common tasks and duties in such a manner as to take advantage of each other's abilities Agor, 1984; Coulson & Strickland, 1983). This common understanding could greatly reduce time and effort necessary for task completion.

The implementation of organizational change, a most

crucial organizational prerogative, could be greatly enhanced if educational administrators were aware of hemispheric preferences of organizational members (Anderson, 1982; Piatt, 1983). Those persons with right hemispheric processing modes seem to be substantially more amenable to change and could spearhead movement toward innovation. Individuals utilizing left hemispheric processes could be greatly involved in the planning for change given their logical and sequential propensities.

Modern school systems have been held to higher standards and are continually urged to be accountable for their activities. Given this trend, there is a pressing need for educational systems to focus on purpose. Focusing on purpose is the essence of planning, and planning requires both left (logical and sequential) and right (conceptual and holistic) thought processes. School systems could identify persons who possess these modes of information processing and properly assign them to these important duties.

Lastly, the establishment of policy for the managing of modern school systems is an increasingly important function. Policy formation requires a balance of logic and creativity of the highest order. A knowledge of the hemispheric phenomenon would assure

that this most important function was the amalgam of both.

Limitations of the Study

1. This study resulted in findings from West Virginia principals and may restrict generalizing these findings to other populations.
2. This investigation was limited to principals' perceptions of their leadership styles and their perceptions of their brain hemispheric modes of mental processing. It did not address principals' leadership styles as perceived by their students, parents, subordinates, or other educational administrators.
3. The accuracy of the respondents reported perceptions was another limiting factor in this study.
4. The results of this investigation were limited to the reliability and validity of the Herrmann Brain Dominance Profile and Leader Description Behavior Questionnaire-Self measuring instruments utilized by the researcher.
5. The study was further limited by the utilization of only one method (mental processing questionnaire) to ascertain principals' brain hemispheric processing.

6. This study only addressed right handed respondents, thereby further limiting generalizability.

Chapter 2

Review of Related Literature

A review of the literature relative to brain hemispheric specialization and its relationship to learning style preference and subsequent leader behavior documented the need for further inquiry in the area. Proponents of brain hemispheric specialization as a predictor of numerous individual outcomes established theory that was sound yet justified further empirical inquiry. Critics who questioned certain features of the literature raised issues that needed clarification. Educational administration, as a field of inquiry as it relates to brain hemispheric specialization, is in its infancy. Findings have indicated that hemispheric specialization is a phenomenon that relates to educational leadership, but that substantially more needs to be known about the phenomenon in different settings and utilizing varied samples and populations for study. Given the foregoing, the literature reviewed in this chapter is related to: (1) an introduction to brain hemispheric specialization; (2) brain hemispheric specialization as it relates to individual learning styles, individual leadership styles, and business

administration; and (3) leadership as an independent variable and as a dependent variable.

Brain Hemispheric Specialization

Interest in brain functioning is not a twentieth century phenomenon. Literature is replete with information pertaining to the evolution of brain research. The ancient Greek philosophers considered the possibility that the human brain was divided into two segments (Diagram Group, 1984). In the second century A. D., the Greek physician, Galen, observed gladiators with brain injuries and noted the effects of the injuries on the gladiators' functioning abilities. From his observations, Galen refuted Aristotle's belief that the heart was the center for human thought by hypothesizing that the human brain was the center of man's thinking processes (Restak, 1984). To confirm his tenets, he conducted simple experiments on animals to demonstrate that "pressure applied to the brain can paralyze an animal while similar pressure on the animal's heart had no such effect" (Restak, 1984, p. 21).

During the seventeenth century, Descartes related geometry and dioptrics to the study of the brain (Thomas, 1963). He stated that for the brain to produce complete thought, it must function as a whole unit

(Levy, 1985; Thomas, 1963).

In 1861, Broca, a French surgeon and scientist, was the first individual "to attract widespread attention to cerebral dominance" (Geschwind & Galaburda, 1987, p.5). An individual's preference for use of the right hand had been established by observations, but the origin for the individual's manual preference had seldom been considered (Geschwind & Galaburda, 1987). Broca conducted studies with both left and right cerebral hemisphere-damaged patients (Levy, 1985; Myers, 1982) by comparing their performances on the same tasks (Myers, 1982). He reported aphasia in patients with specific left cerebral hemisphere damage. He noted that individuals with comparable right cerebral hemisphere damage suffered no language disturbances. He concluded that the left brain hemisphere is specialized for language (Levy, 1985; Webb, 1983) and that a patient's speech loss is the result of damage in a specific area within that hemisphere (Geschwind & Galaburda, 1987; Levy, 1985; Norris, 1984; Restak, 1984).

In 1864, Fritsch, a German physician, noted that touching one side of a patient's cerebral hemisphere generated twitching on the opposite side of the individual's body. Fritsch and a colleague, Hitzig, conducted experiments to test Fritsch's observations

(Restak, 1984). The administration of electrical stimulation to one side of the cortical surface in dogs produced movement in the muscles on the opposite side of the dog's body. This finding was the first scientific demonstration of cerebral localization (Restak, 1984).

During the 1870s, two brain research pioneers reported significant brain research findings. First, Wernicke, a German neurologist, after locating a speech center within the left brain hemisphere, concurred with Broca's conclusions that the left brain hemisphere is specialized for language (Levy, 1985; Webb, 1983). He determined that the speech area in the left hemisphere relates to an individual's association of word meanings as well as speech loss. Given the foregoing, Wernicke postulated that all areas of the brain are connected (Norris, 1984) and that it was reasonable to assume that other individual functions could be localized within specific brain areas (Restak, 1984). A second scholar, Dejerine, a French neurologist, stated that the corpus callosum is a mechanism that connects both brain hemispheres by transmitting to one hemisphere the stimuli received in the other hemisphere (Norris, 1984).

In the 1880s, after studying brain-damaged patients, an English neurologist named Jackson observed that patients with right brain hemisphere damage seemed

to act more normally than patients with damaged left brain hemispheres (Diagram Group, 1984). "He suggested that the cerebral cortex is organized into different sectors, which provide the motor power for different body parts" (Restak, 1984, p. 76). Jackson also noted that persons with specific localized right brain hemisphere damage display losses in particular aspects of visual perception. Accordingly, Jackson concluded that the right hemisphere is specialized for visual perception (Levy, 1985).

Research relative to the phenomenon continued in the 1930s, when brain surgery was performed upon severely epileptic patients to relieve their observed abnormal brain activity. During the patients' surgery, the medical team utilized electrical stimulation of the patients' brains to identify and avoid specific language areas located in the patients' left hemispheres (Webb, 1983). Numerous early investigations of brain functions indicated that, for most of the right handed population, the lateralization of speech is in the left brain hemisphere and the lateralization of nonverbal activities is in the right brain hemisphere (Edwards, 1982; Herrmann, 1982; Sperry, 1975; Webb, 1983).

Blakeslee (1984) has noted that the actual beginnings of our modern understanding of brain

functioning was developed in the 1950s at the California Institute of Technology and was spurred by the research of Sperry (1964) who received a Nobel prize for his brain investigations. Sperry's Nobel Prize lent credibility to the investigation of hemisphericity as a legitimate academic concern. Prior to Sperry's inquiry, many researchers operated on the premise that "the corpus callosum served no function" (Restak, 1984, p. 246). Contrary to the foregoing proposition, Sperry (1964) and his associates demonstrated that the corpus callosum is the most prominent commissure that contains millions of nerve fibers that "form reciprocal connections between parallel centers in the two hemispheres" (p.42). This structure (corpus callosum) permits the left and right brain hemispheres to share learning and memory (Edwards, 1979; Gazzaniga, 1985; Norris, 1984).

Sperry (1964, 1968) and his colleagues severed the connections between the left and right brain hemispheres of cats and monkeys. After surgery, the animals displayed little disturbances in ordinary behavior. In addition, the researchers "could train the two hemispheres to respond in opposite ways to the same task" (Blakeslee, 1984, p. 117). The animal could be taught to use its right paw to push a specific lever in

response to an X symbol in its right visual field while using its left paw to push a lever in response to an O symbol in the animal's left visual field. The animal's left paw would not react to an X nor would its right paw react to an O (Blakeslee, 1984; Gazzaniga, 1985; Sperry, 1964).

After several experiments using oats and monkeys, as subjects, Sperry (1964) and his student, Gazzaniga (1985), studied nine epileptic patients. One of the observed individuals was a forty-eight-year-old epileptic male. The patient's epileptic seizures were so severe and frequent that all known medical treatment failed to control his symptoms (Restak, 1984; Sperry, 1964; Webb, 1983). Aware of the fact that epileptic seizures resulted in a type of electrical chain reaction throughout the brain, the patient's medical doctors performed a radical surgical procedure by cutting the corpus callosum and other commissures to localize the epileptic attack to one side of the individual's body (Gazzaniga, 1985; Sperry, 1964; Webb, 1983). The operation was successful because it eliminated the epileptic seizures while leaving the patient without any major personality or intellectual changes. With the person's permission and his physician's agreement, Gazzaniga (1985), under Sperry's supervision, conducted

a series of performance tests upon the split brained individual.

For these experiments, an apparatus was constructed that permitted separate communication with either the patient's left or right hemispheres. Pictures or words were projected on the left side or right side of a large screen. Beneath the screen was an opening for the individual's hands so that he could feel objects with either hand. While the patient was handling an item in his left hand, the object would be concealed from his right visual field; and, an object in his right hand would be hidden from his left visual field (Blakeslee, 1984; Gazzaniga, 1985). Testing the patient's separate brain hemispheres was tedious and demanded close scrutiny to experimental details. The subject's eyes had to remain on the screen while the visual stimulus flashed for only a tenth of a second. Gazzaniga conducted this study for over a year and reported several interesting findings (Gazzaniga, 1975, 1985; Restak, 1984; Sperry, 1964).

Prior to the split-brain surgery, the subject could identify visual objects presented to either the right or to the left of a fixed point (Gazzaniga, 1985). After the operation, his ability to identify visual objects was clearly altered. The individual's capacity to

perform activities involving the left brain hemisphere and right side of the body was perceived to be normal; however, he experienced difficulty performing activities involving the right brain hemisphere and its concomitant control of the left side of his body (Sperry, 1964; 1968).

Additional results of the experiments indicated that the subject had no difficulty: (1) reading material in the right half of his visual field, (2) naming and locating objects in the right half of his visual field, and (3) executing instructions with his right hand or right foot. However, the subject did have difficulty with certain activities utilizing the left side of his body. For example, he could not write anything with his left hand, and in general, could not execute verbal commands with his left hand or left leg (Gazzaniga, 1985; Sperry, 1964).

It is helpful to consider some examples of the tests used in, and pertinent results generated by, the split-brained experiments conducted as part of Sperry's study. For example, after the word pencil was flashed on the left side of the experimental screen, the patient used his left hand to select the pencil from among several objects. However, he verbally denied seeing any word or words on the testing screen. In other words, he

could react appropriately, but could not describe or name the object (Blakeslee, 1984; Sperry, 1964). After the subject viewed a slide of an apple in his right visual field, verbal identification of the fruit was rapid. The same slide presented to the left visual field failed to elicit an identification, for the patient denied having seen any object (Gazzaniga, 1985; Restak, 1984; Sperry, 1964).

Another test revealed that when the name of an object was flashed on the right side of the experimental screen, the patient correctly named the word and with his right hand, selected the corresponding item from among several objects. When two different words were presented simultaneously in the patient's right and left visual fields, the subject would select with his left hand the item to accompany the word in his left visual field. Without displaying any confusion, he would then name the word that he saw in his right visual field. If he was questioned about why he chose a different item from that which he had named, he would comment that he must have unconsciously picked the item (Blakeslee, 1984; Gazzaniga, 1985).

Yet another test illustrated that when light was flashed on the testing screen in the subject's left visual field, he could point only to the light with his

left hand. The patient could use only his right hand to point to light presented to his right visual field. When the subject's skin on the right side of his body was lightly touched with the end of a pencil, he could locate the area touched only with his right hand. When he was touched on the left side of his body, he could locate the point of contact with only his left hand (Sperry, 1964).

Findings of Sperry's (1975, 1964) split-brain experiments with the aforementioned nine split-brain individuals resulted in the following conclusions: (1) The left brain hemisphere analyzes and sequentially processes all incoming information, (2) Feeling with the left hand and hearing the sounds of objects became the main modes through which the right hemisphere could communicate, and (3) The right brain hemisphere can understand concrete language such as nouns but cannot comprehend the more complex grammatical structure of verbs.

The third finding was challenged by Zaidel (1976), who stated that the right brain hemisphere has the ability to perform as well with verbs as the left brain hemisphere when given sufficient time to process the verbs. One could question all the findings of the split-brain research by stressing the fact that the nine

individuals participating in all the studies did not have healthy brains prior to the split-brain surgery. Still, one must consider, and lend credibility to, the results when reading the conclusions of other brain researchers who confirmed the findings of Sperry's experiments (Taggart, Robey, & Kroech, 1985).

Ornstein (1978), a student who observed Sperry's split-brain studies, explained the distinction between the right and left brain hemispheric functions by stating that the human brain is divided into two hemispheres, each one with a different mode of mental processing or thinking. The left brain hemisphere operates rationally, and the right brain hemisphere operates intuitively in most right-handed individuals. Both hemispheres control motor behavior, but the left brain hemisphere controls more than the right brain hemisphere. Each hemisphere has its own memory and learns independently.

Other researchers have proposed characteristics for each of the brain hemispheres. For example, Levy (1985) suggested that the right brain hemisphere utilizes a holistic approach to decision making and reasoning by taking the whole and deducing from it to reach a solution. The analytic left brain hemisphere places parts into wholes and searches for patterns in words to

express what is being comprehended.

A comprehensive comparison of the various brain hemispheric characteristics was provided by Edwards (1979). She contended that the left brain hemisphere is: (1) Verbal: Using words to name, describe, define; (2) Analytic: Figuring things out step-by-step and part-by-part; (3) Symbolic: Using a symbol to stand for something; (4) Abstract: Taking out a small bit of information and using it to represent the whole thing; (5) Rational: Drawing conclusions based on reason and facts; (6) Digital: Using numbers as in counting; (7) Logical: Drawing conclusions based on logic, one thing following another; and (8) Linear: Thinking in terms of linked ideas, one thought following another, often leading to a convergent conclusion (p. 40).

Additionally, Edwards (1979) asserted that the right brain hemisphere is: (1) Nonverbal: Awareness of things, but minimal connection with words; (2) Concrete: Relating to things as they are, at the present moment; (3) Synthetic: Putting things together to form wholes; (4) Analogic: understanding metaphoric relationships, seeing likenesses between things; (5) Nonrational: Not requiring a basis of reason or facts; (6) Spatial: Seeing where things are in relation to other things, how

parts go together to form a whole; (7) Intuitive: Insight, often based on incomplete patterns, feelings or visual images; and (8) Holistic: Seeing whole things all at once, perceiving the overall patterns and structures, often leading to divergent conclusions (p.40).

Since the famous split-brain experiments, there have been several studies that utilized the same methodology to confirm Sperry's findings (Gainotti, 1972; Gazzaniga, 1985; Myers, 1982; Taggart, et. al, 1985) and to further investigate the characteristics relating to the various functions attributed to the left and right brain hemispheres. Other investigations to support Sperry's findings relative to brain hemispheric specialization have involved electroencephalogram pattern analysis (Butler & Glass, 1974), dichotic listening tests (Myers, 1982), and eye directionality studies (Day, 1967).

One such study (Gainotti, 1972) was designed to determine the effects of brain damage on the emotional behavior of eighty right brain injured and eighty left brain injured patients. Results indicated that the right brain characteristics such as uncooperativeness, swearing, and crying were mainly exhibited in individuals with left brain hemispheric damage. This finding suggested that patients experienced right brain

hemispheric frustration resulting from difficulties experienced with communication due to left brain damage. Indifference, joking, denial and/or minimization of illness were primarily found in right brain injured patients. It was hypothesized that these reactions in right brain injured patients indicated a lack of normal emotional responses in those individuals.

Other proponents of brain hemispheric specialization have utilized electroencephalogram (EEG) pattern analysis to measure left and right brain hemispheres when each was activated by verbal or nonverbal stimuli (Butler & Glass, 1974; Myers, 1982; Schkade & Potvin, 1981). The EEG patterns are divided into four frequency ranges: (1) Delta, state of deep sleep; (2) Theta, state between waking and dreaming; (3) Alpha, relaxed wakefulness state, rhythmic activity at rest; and (4) Beta, state characterized by externally focused attention (Myers, 1983). The Alpha pattern is generally used as a baseline for brain activity.

The hypothesis of electroencephalogram pattern analyses is that the brain hemisphere which is focused on an activity will display more Beta than a brain hemisphere which is inactive. Galin and Ellis (1975) found that subjects stimulated by mental mathematics or verbal tasks exhibited brain-wave activity on the Beta

level in the left brain hemisphere but not in the right brain hemisphere. When engaged in spatial tasks, subjects experienced brainwave activity on the Beta level in the right brain hemisphere and not in the left brain hemisphere (Myers, 1982).

Dichotic listening tests also have been used as a method for determining an individual's brain hemispheric preference (Harriman, 1974; Rubenzer, 1978). Procedures for this test involve transmitting simultaneously two different verbal messages and/or sounds to both ears to determine which brain hemisphere more efficiently processes the data. Findings indicated that words presented to the right ear are more effectively processed than words presented to the left ear (Harriman, 1974). These results were in agreement with findings (Sperry, 1964) which indicated that the left brain hemispheric mode is specialized for verbal language.

Another method of investigation concerns eye directionality studies (Bakan, 1969; Day, 1967; Gur, Gur, & Marshalke, 1975; Levy, 1982; Sackeim, Packer, & Gur, 1977). These experiments involve observing a subject's predominant eye movement during specific tasks or while that subject is answering certain questions. Theorists postulate that an individual who utilizes

mostly right brain information processing techniques will move his eyes to the left when answering questions, and a subject who relies on left brain information processing skills will shift his eyes to the right when responding to questions.

Sackeim, et. al (1977) asserted that individuals who generally move their eyes to the left (left movers) or who are "right-hemisphericity people" (p.625) are found to be more intuitive, emotional, holistic, and synthetic in cognitive styles than those persons who move their eyes to the right (right movers) or who are "left-hemisphericity people" (p. 625). These results are congruent with aforementioned characteristics (Edwards, 1979; Levy, 1985) of the left and right brain hemispheres.

Other hemispheric research involving eye directionality studies has been related by Gur, Gur, and Marshalke (1975). Ninety undergraduate students participated in a study to determine the relationship between brain asymmetry and classroom seating (Gur, Gur, Marshalke, 1975). The researchers predicted that left movers would prefer to sit on the right side of the classroom and that right movers would prefer to sit on the left side of the classroom "in order to enable stimulation of the more easily activated hemisphere for

each group" (p. 151). Results determined that left movers selected seats on the right side of the classroom and right movers preferred to sit on the left side of the classroom. These findings concurred with earlier results of eye directionality measures.

As research relative to the duality of brain functioning continued, a parallel set of empirical observations began to develop. The basic tenets of this field of inquiry were that the brain was triune in nature and consisted of three separate parts which controlled several discrete physical and cognitive functions. Although the observations and hypotheses developed in this period (1950s) seem contradictory to previously mentioned findings, they are significant because they were being conducted concurrently with the studies cited to this point and have been incorporated and synthesized by more current researchers (Herrmann, 1982; Norris, 1986) into brain hemispheric theory.

MacLean (1978), former chief of the Laboratory of Brain Evolution and Behavior at the National Institute of Mental Health, proposed the "Triune Brain", interrelated brain system in the 1950s (p.308). According to MacLean, the human brain followed an evolutionary process and could be divided into three separate, but interconnected layers (Cone, 1982; Hart,

1981; MacLean, 1978; Reifschneider, 1982).

The first part of the triune brain, an expansion of the upper brainstem, was the Mesozoic Reptilian brain (Hart, 1981) or the R-Complex (MacLean, 1978). This segment of the brain system which developed during the age of reptiles (Cone, 1982; Hart, 1981; MacLean, 1978) was responsible for behavior related to self-preservation (MacLean, 1978). The second layer of the human brain, the Limbic System, developed about 70 million years ago. It completely enveloped the Reptilian portion and was the area which controlled the human emotional activity (MacLean, 1978). The third and most recently developed part of the brain, the Neo-cortex (Cone, 1982; Norris, 1984) or cerebrum (Hart, 1981), evolved approximately two million years ago. This brain area completely enclosed the Limbic System (MacLean, 1978) and was divided into two hemispheres which are the seat of an individual's most human qualities, that is language ability to deal with symbols, and ability to reason (Restak, 1984). The cerebral cortex was a type of problem-solving and memorizing mechanism which aided the R-complex and Limbic System in their functioning (MacLean, 1978; Restak, 1984). MacLean (1978) proposed that the first two brain layers provided the neural foundation for the

human's basic personality and behavioral characteristics.

Given the foregoing observations, and in an attempt to empirically test these hypotheses, Herrmann (1982, 1986, 1988) devised an instrument which purported to measure and determine individual brain hemispheric processing modes. When developing his method for testing brain hemispheric specialization, Herrmann incorporated both findings from right and left brain hemispheric studies (Sperry, 1964, 1968) and information relative to the triune brain theory postulated by MacLean (1978). The instrument, which he developed, is comprised of a paper and pencil inventory that yields an analysis of brain hemisphericity in four modes generating data that can be correlated with left or right hemispheric processing modes. The dimensions in the instrument are:

Left Hemisphere

1. Upper or Cerebral Left Mode: logical, analytical, technical, mathematical
2. Lower or Limbic Left Mode: controlled, conservative, organizational, planner

Right Hemisphere

1. Upper or Cerebral Right Mode: imaginative, artistic, holistic, synthesizer

2. Lower or Limbic Right Mode: emotional, spiritual, interpersonal, and talker characteristics.

The development of this instrument allowed Herrmann and others to determine that there was a relationship between hemispheric preferences and the several styles by which individuals could process information and learn concepts. The next section of this review will address these issues.

Brain Hemispheric Specialization and Individual Learning Styles

Literature is replete with summaries of findings relating to individual brain hemispheric characteristics and information processing skills (Bernhoft, 1986; Cassel, 1978; Edwards, 1979; Galyean, 1981; Herrmann, 1982; Norris, 1984; Owen, 1986; Straham & Toepfer, 1985). There is also an abundance of literature which indicates that there is a direct relationship between an individual's brain hemispheric processing (cognitive or mental processing skills) and that individual's learning style (Dalili, 1982; Guild & Garger, 1985; Herrmann, 1982; Jenkins, 1981; Matthews, 1982; Rubenzer, 1982; Vitale, 1982; Wittrock, 1978). Indeed, hemispheric processing and learning styles are referred to synonymously by some researchers (Dunn, DeBello, Brennan, Krimsky, & Murrain, 1981; Torrance, Reynolds,

Riegel, & Ball, 1977).

Herrmann (1982) asserted that an individual's mental, physical, and emotional abilities, personality traits, problem solving skills, and learning styles are strongly influenced by the individual's preference toward the use of one brain hemisphere. Learning style has been defined as, "the way people process information and the way they solve problems...a person's typical mode--receiving, storing, thinking, as well as problem solving" (Jenkins, 1981, p. 2). Learning styles research has determined that individuals have "preferred ways of perception, organization, and retention that are distinctive and consistent" (Keefe, 1982, p. 45).

In an attempt to synthesize earlier findings, several prominent learning style and brain functioning researchers (e.g., Bogen, Edwards, Gregoric, Kolb) met for several days in 1979 to share information concerning their fields of inquiry (McCarthy, 1979). As a result of those deliberations, McCarthy incorporated much of the information presented during the meetings as well as additional materials concerning learning styles and brain hemispheric specialization into the development of the 4MAT System (McCarthy, 1983).

The 4MAT System is primarily based on the work of Kolb (1971) who proposed four different learning styles

for individuals. Type One learners perceive information through concrete experience and process information through reflective observation. Type Two learners perceive information through abstract conceptualization and process information through reflective observation. Type Three learners perceive information through abstract conceptualization and process information through active experimentation. Type Four learners perceive information through concrete experience and process information through active experimentation. Additionally, the 4MAT System is based on the premise that brain hemisphericity and/or cognitive style is a causal factor in a person's learning style.

Numerous researchers (Herrmann, 1982; Jenkins, 1981; Matthews, 1982; McCarthy, 1986; Rubenzer, 1982) of brain hemispheric specialization have indicated that individuals' hemispheric processing preferences are determinant factors in their particular learning styles and behavior patterns. Persons who utilize primarily right brain mental processing techniques will learn by: (1) taking initiative; (2) relying on intuition; (3) exploring hidden possibilities; (4) self-discovery; (5) constructing concepts; (6) synthesizing content; (7) integrating experiences with self; (8) listening and sharing ideas; (9) moving and feeling; (10) emotional

involvement; and (11) participating in group interaction, people-oriented case discussions, and experimentation (Herrmann, 1986, p. 6). Furthermore, individuals who mainly use left brain information processing techniques will prefer to learn by: (1) acquiring and quantifying facts; (2) applying analysis and logic; (3) thinking through ideas; (4) forming, evaluating, and testing theories; (5) organizing, sequencing, and structuring content; (6) acquiring skills through practice; (7) using text books and listening to lectures; (8) behavior modification; and (9) planning program learning (Herrmann, 1986, p. 6).

Additionally, McCarthy (1986) postulated that individuals who prefer left hemispheric processing skills will succeed in time and sequence-oriented learning assignments, will succeed in learning activities involving logic, will organize and plan material to be learned, and will be punctual for appointments. Persons who utilize right brain information processes will learn by participating in activities which involve exploration, imagination, interaction, and creativity and he or she will prefer to solve problems by developing unconventional means to arrive at solutions.

According to Wittrock, (1978) "the reality we perceive, feel, see, and hear is influenced by the constructive processes of the brain, as well as by the cues that impinge upon it" (p. 65). The human brain actively, encodes, translates, organizes, and stores information. Persons utilize their accumulated knowledge to construct their own interpretation of any new material presented to them (Luria, 1973). "The implications are that the dominance of one hemisphere over the other will create an individual's preference for a certain mode of learning" (Dalili, 1982, pp. 11-12). "Learning styles emanate from the processing capabilities of both brain hemispheres" (Sinatra, 1982). If educational systems are to be more effective, educational leaders must become aware of the different individual hemispheric processing modes and their relationship to an individual's learning style (Hunter, 1976).

Inquiry in the area of the relationship between hemispheric preferences and learning styles continued throughout the seventies and early eighties. The apparent relationship between these variables led researchers to wonder if the mode of mental processing or the style of learning had a concomitant effect upon behavior, specifically the behavior of leaders in

organizations. Leader behavior is a strong predictor of numerous organizational outcomes, and inquiry ensued to examine the predictors of this most important organizational variable. The next section will review the literature that links individual brain hemispheric specialization and individual learning style to individual leadership style.

Brain Hemispheric Specialization and Individual Leadership Styles

Several researchers asserted that individual brain hemispheric specialization or processing mode and learning style, in turn, directly influence that individual's leadership style (Agor, 1986; Cameron, 1984; Herrmann, 1982; Leino, 1984; McCarthy, 1986; Piatt, 1983). Differences in individual hemispheric processing result in differences in individual behavioral styles, leadership styles, and decision making styles (Cameron, 1984), "which, in turn, lead to differences in the patterns of behaviors reinforced in institutions" (p. 7). Leino (1984) asserted that data concerning school principals' leadership conceptions could be generated by the administration of specific hemispheric and cognitive scales to the subjects. Differences in hemispheric processing "can account for many problems that organizations have, especially in the

day-to-day operational areas" (Piatt, 1983, p. 64). Knowledge of the advantages and disadvantages of each hemispheric processing mode can provide valuable information for educational leaders desiring to accomplish tasks within their organizations.

According to Piatt (1983), the leader who prefers right hemispheric processing is effective in: (1) creative problem solving, planning, and decision making; (2) brainstorming sessions; (3) initial program design; (4) interpersonal relations and people centered roles; (5) motivating people; (6) dealing with whole concepts; and (7) interpreting non-verbal communication. The same leader will usually have difficulty in: (1) using logic; (2) following through with details of tasks; (3) controlling subordinates' freedom of action; (4) completing tasks in ways which are compatible with directives, procedures, etc.; (5) following up the assignments given to subordinates; and (6) controlling a strong desire to alter original designs and programs to fit his or her way of doing them (Piatt, 1983).

Contrastingly, Piatt (1983) notes that an individual who utilizes mostly left hemispheric processing will be an effective leader in: (1) daily implementation of programs; (2) seeing that plans and procedures are followed; (3) maintaining unemotional,

logical, and rational behavior when working in a crisis situation; (4) following through with reports and paperwork; (5) being consistent with intellectual reasoning; (6) dealing with details; and (7) manifesting precise oral and written communication. The same leader will have deficits in: (1) difficulty in seeing the total picture; (2) adhering to rules of the day and is not creative in planning, organizing, or program design; (3) wanting the status quo and opposes change; (4) wanting simple answers to complex questions; and (5) not being flexible in decision making, therefore upsetting other organizational members due to an unemotional approach to human relations.

The relationship of the variables of brain hemispheric specialization, learning styles, and leadership behavior continued to be investigated. Indeed, Herrmann (1982) proposed that data resulting from administration of Herrmann's Brain Dominance Instrument (1982) could be directly related to leadership styles in organizations. Behavioral characteristics of leadership are proposed by Herrmann (1986, 1988) for each of the four quadrants that are measured in Herrmann's Brain Dominance Instrument (1982). The behavioral characteristics represented by the Upper Left Cerebral Quadrant in this instrument are:

(1) solution oriented; (2) engages in direct examination and analysis of the problem; (3) gathers facts, interprets facts, extrapolates from facts; (4) focuses on establishing priorities and criteria for decisions; (5) sets goals; (6) weighs pros and cons, options, alternatives; (7) needs tasks which seem to be connected to desired outcomes; (8) checks for progress; (9) fears being too dependent upon others; (10) has difficulty expressing feelings; and (11) thinks logically.

The behavioral characteristics represented by the Lower Left Limbic Quadrant in the instrument are: (1) determines exact goals; (2) thinks logically; (3) strives to maintain status quo; (4) solution oriented; (5) uses established procedures; (6) bases solutions on existing models, current authorities; (7) makes detailed check lists, flow charts; (8) fears criticism; (9) needs tasks which promote a sense of self-control and progress; (10) needs feedback from experts; and (11) works within the system.

The behavioral characteristics represented by the Upper Right Cerebral Quadrant in the instrument are: (1) process oriented; (2) thinks metaphorically, holistically; (3) reframes the problem, changes perspective; (4) takes risks; (5) uses many modalities for exploration, often simultaneously; (6) generates

feedback from processes; (7) may have difficulty with follow-through; (8) fears a fixed environment; (9) needs adequate quiet time and personal space; (10) is comfortable with dreams, visualization, meditation; (11) will often sleep on it; and (12) may see problems as opportunities.

The behavioral characteristics represented by the Lower Right Limbic Quadrant in the instrument are: (1) considers feelings first; (2) personal contact important; (3) may consult role models; (4) comfortable with brainstorming, team problem solving; (5) concerned with effect solutions will have on others; (6) fears confrontation and conflict; (7) effectively uses anecdotes; (8) needs to learn to consider personal needs; (9) needs to have adequate support systems; (10) needs to learn to communicate directly, to say "NO"; and (11) may have difficulty completing tasks, especially if individual is isolated. The next section will discuss literature regarding the relationship between brain hemisphericity and business administration.

Business Administration

Herrmann's observations relative to leadership are parallel with several theorists in the area of private sector management. Private sector administrative

theorists acknowledged the hemispheric phenomenon much sooner than those in education, and a substantial body of literature exists relative to this phenomenon.

Business administration recognized the findings of split brain research when Mintzberg (1976) suggested that brain hemispheric specialization had significant implications for business management. Mintzberg noted that a manager's responsibilities are extremely complex and, as individuals function in that position, they must rely frequently on obscure information for decision making. After observing several business leaders, Mintzberg noticed that their mental processes seemed to be more holistic, relational, and intuitive than ordered, sequential, and intellectual. He concluded that outstanding business leaders need well developed right brain hemispheric abilities as well as left brain hemispheric skills for effective job performances. Other business leaders (Agor, 1985; Herron, Jacobs, & Kleiner, 1985; Goldstein, Scholthauer, & Kleiner, 1985; Lau, 1986; Rafferty, 1987) have concurred with Mintzberg.

Additionally, Agor (1985), McKean (1985), Piatt, (1983), Rehder and Porter (1983), Sonnier (1983), and Taggart, et. al (1985) have noted that the best leaders are those individuals who utilize both of their

brain hemispheres while performing the functions of their position. The degree to which administrators can integrate their two hemispheres in diverse situations is the degree to which those executives will be superior in their job performances (Herrmann, 1982). When Barnard (1938) noted the importance of the leader's logical cognitive process (left brain hemispheric processing), he also emphasized the importance of the individual's mental process which, "transcends the capacity of merely intellectual methods, and the techniques of discriminating the factors of the situation" (right brain hemispheric processing) (p. 235). He stated that this thinking mode was not a matter of science, but a matter of art.

Mintzberg (1976) contended that abilities related with right brain hemispheric processing are important in the upper levels of management where organizational policy making strategies occur whereas left brain hemispheric processing is necessary for managers of functional departments that sequentially implement the organizational policies. He stated that "organizational effectiveness does not lie in that narrow minded concept called 'rationality'; it lies in a blend of clear-headed logic and powerful intuition" (p. 12).

According to Raudsepp (1980), organizational

leaders must utilize "creativity, imagination, and resourcefulness (p. 32) to cope with major problems confronting them today" (e.g., new technologies, scarcity of resources, changing environment, and socio-economic problems). Individuals can increase their productivity and creativity by utilizing their right hemispheric processing functions (Lau, 1986).

Agor (1986) indicated that a productive method for organizational problem solving is to "group personnel on the basis of brain skills" (p.865). He stated that the traditional method to solve a particular problem within specific areas in organizations is to form a group of people from that specific sector. These people are responsible for solving problems pertinent to their areas. Agor proposed assigning personnel to groups according to their brain hemispheric processing modes rather than their hierarchical placement within organizations. A team composed of individuals who use both brain hemispheres provides an organization with a holistic approach to problem solving which leads to more effective solutions (Agor, 1986; Herrmann, 1982; McKean, 1985).

Several corporations have employed brain hemispheric specialization measurements to ascertain the hemispheric preferences of the members of their

organizations (e.g., Shell, Boston Globe). The chief administrative leaders of these corporations have operated on the premise that administrators are better leaders if they are aware of their own hemispheric processes and the hemispheric thinking modes used by their subordinates. Other corporate leaders (e.g., GE, IBM, Polaroid) attended brain hemispheric specialization seminars to learn how to better facilitate the mental processing of both hemispheres while performing their leadership functions (McKean, 1985).

Agor (1985) contended that many persons are ill-suited to the positions that they hold. He asserted that, by utilizing brain skill assessments, organizations can identify individual thinking modes and potential leaders for various positions within those organizations. This process could facilitate employee job satisfaction, organizational restructuring, and organizational productivity.

Additionally, it is postulated that many interpersonal conflicts and communication problems are the result of differences in hemispheric processing (Albrecht, 1983). These differences "have profound effects on relationships between salespeople and customers, bosses and employees, co-workers, husbands

and wives, colleagues..." (p.71). Albrecht further suggested that knowledge of co-workers' and subordinates' hemispheric processing would facilitate better communication within organizations.

Leadership

All observations from the management literature and the educational literature that relate to brain hemispheric specialization ultimately lead to a discussion of the hemispheric phenomenon as it relates to leadership. The literature that relates to leadership, its various definitions and the evolution of inquiry into the phenomenon will be reviewed first. Following that, leadership as an independent variable will be reviewed. More importantly, and more directly related to the present study, the literature in which leadership is viewed as a dependent variable will be discussed. The section will end with those studies in educational administration that investigate leadership as an outcome of brain hemispheric specialization.

There is copious literature with definitive statements relative to leadership. It has been defined as, "a process through which an individual (the leader) secures the cooperation of others (followers) toward goal achievement in a particular setting" (Campbell, Corbally, & Nystrand, 1983, p. 125). Bennis (1985,

p. 21) referred to leadership as "Influencing, guiding in direction, course, action, opinion." Leaders have been described as individuals who:

> challenge followers to higher self-expectations; they inspire a moral commitment to excellence where previously their followers had been content with mediocrity; they develop a sense of responsibility, autonomy, and pride in achievement that motivates their followers to be productive without external controls and close supervision (Williams, 1985, p. 1).

The concept of leadership (Hoy & Miskel, 1982) is comprised of a set of behavior patterns utilized by individuals, to assure that organizational tasks, climate, and individual satisfaction are congruent with the organizational objectives. Therefore, according to Hoy and Miskel (1982), leader effectiveness is viewed in relation to organizational goal achievement. Boyan (1988) defined leadership style as "the action disposition, or set or pattern of behaviors, displayed by a leader in a leadership situation" (p. 262). For the purposes of this study, leadership style and leadership behavior will be used synonymously.

Research (Barnard, 1938; Getzels & Guba, 1957; Stogdill, 1957) is replete with various taxonomies that

seek to explain the leadership phenomena. The Great Man Theory which dominated the study of leadership until the 1950s, attempted to explain leadership on the basis of distinctive physical and psychological characteristics of individuals that related to leader behavior (Bennis, 1985; Hoy & Miskel, 1987; Stogdill, 1957). Emerging leadership research (Getzels & Guba, 1957; Halpin, 1957) described the concept as multidimensional in that it is divided into at least two distinct leadership categories.

In The Functions of the Executive, Barnard (1938) divided leadership styles into either effectiveness or efficiency dimensions. Leaders whose main interest is for organizational tasks are placed into the efficiency category, while leaders whose primary concern is for individual relationships are represented by the effectiveness dimension. Barnard (1938, p. 60) explained that: "Effectiveness relates to the accomplishment of the cooperative purpose, which is social and nonpersonal in character...Efficiency relates to the satisfaction of individual motives, and is personal in character." The two categories correspond to Getzels and Guba's (1957) Nomothetic (concern for tasks) and Idiographic (concern for individuals) dimensions in their social systems model.

The Ohio State Leadership Studies (Stogdill, 1974) which began in the 1940s led to the development of the Leader Behavior Description Questionnaire (LBDQ) which measures the two fundamental dimensions of leader behavior that correspond to Barnard's (1938) and Getzels and Guba's (1957) dimensions. The two categories in the LBDQ are: (1) Initiating Structure which refers to task-oriented leaders who seek to establish goals and (2) Consideration which represents leaders who are concerned with individual relationships and demonstrate warmth toward their subordinates.

> Initiating structure leadership includes any leader behavior that delineates the relationship between the leader and the subordinates and, at the same time, establishes defined patterns of organization, channels of communication, and methods of procedure. Consideration includes leader behavior that indicates friendship, trust, warmth, interest, and respect in the relationship between the leader and members of the work group (Hoy & Miskel, 1987, p. 277).

After much research and experimentation, Stogdill (1974) determined that the two basic leadership dimensions can be divided into concerns for the organization and concerns for the individual. Concerns

for the organization include the following behavior patterns:

1. Representation: speaks and acts as the representative of the group
2. Persuasiveness: uses persuasion and argument effectively; exhibits strong convictions
3. Initiation of structure: clearly defines own role, and lets subordinates know what is expected
4. Role retention: actively exercises leadership role rather than surrendering leadership to others
5. Production emphasis: applies pressure for productive output
6. Influence with superiors: maintains cordial relations with superiors; has influence with them; is striving for higher status

Concerns for the individual include the following behavior patterns:

1. Demand reconciliation: reconciles conflicting organizational demands and reduces disorder to system
2. Tolerance of uncertainty: is able to tolerate uncertainty and postponement without anxiety or upset

3. Tolerance of freedom: allows followers scope for initiative, decision, and action
4. Consideration: regards the comfort, well-being, status, and contributions of followers
5. Predictive accuracy: exhibits foresight and ability to predict outcomes accurately
6. Integration: resolves intermember conflicts, maintains a closely knit organization (Hoy & Miskel, 1987; Stogdill, 1974).

Hoy and Miskel (1987) described the two fundamental leadership styles as task leaders and social leaders. As a task leader, the individual effectuates the organizational goals; and as a social leader, the individual promotes group unity, encourages organizational members, and reminds them of their value and importance.

Leadership style has been researched extensively as an independent variable as it relates to numerous school related outcomes. School climate (Bailey, 1988; Finlayson, 1987; Hoy & Clover, 1986; Hoy & Henderson, 1983; Norton, 1984; West, 1985), teacher job dissatisfaction (Litt & Turk, 1986), teacher job satisfaction (Blase, Dedrick, & Strathe, 1986; Klawitter, 1985), change (Firestone & Corbett, 1988), teacher absenteeism (Bridges, 1980), decision making

(Vroom & Yetton, 1973), and instructional management, (Clark, Lotto, & Astuto, 1984) are some of the areas researched as dependent variables relating to leadership style.

A great deal of research has indicated that the most powerful predictor of organizational effectiveness is the quality of administrative leadership (Manasse, 1985; Reitz, 1986; Wiles & Bondi, 1986; Williams, 1985). Weller (1985) asserted that "through leadership efforts which are dynamic in scope, change is designed and initiated at the building level, educational priorities are reassessed and essential components are bound together to achieve effective schooling" (p. 7). Indeed, effective schools appear to be ones that have principals who display strong leadership characteristics, promote organizational change, encourage participative management (Kroeze, 1983; Manasse, 1985; Tanner & Tanner, 1987; Wiles & Bondi, 1986), have positive school climates (Norton, 1984; West, 1985), and have well defined goals (Bossert, Dwyer, Rowan, & Lee, 1982; Evans, 1983). The complex problems that confront today's educational leaders and the many functions of the school principal as a leader (e.g., planning, organizing, innovating, decision making, etc.) require leaders who are capable of making

effective decisions which will have positive outcomes for those leaders' schools.

As research efforts have continued relative to leadership and brain hemispheric specialization, more attention has been given to the antecedents of leadership behavior rather than just outcomes or consequences of it. Schkade and Potvin (1981, p. 329) postulated that "there is a tendency for many people to develop dominance in one brain hemisphere as their basic style of approach to problem-solving and decision making." Differences in individual hemispheric processing modes can account for numerous organizational problems, "especially in the day-to-day operational areas" (Piatt, 1983, p. 64). Piatt (1983) suggested that differences in individual brain hemispheric processing modes of organizational members "may well be the cause of conflicts in meetings, conferences, and problem-solving sessions" (p. 66). He further asserted that promotion of a master teacher who utilizes primarily right hemispheric processing skills into an educational administrative position which requires left hemispheric processing skills for many functions can create ineffective leaders.

Because of the numerous and diverse

responsibilities required of an educational administrator, the ideal leader would be one who utilizes both left and right hemispheric processing and is considered to be an integrated or balanced person (Agor, 1984; Coulson & Strickland, 1983; Piatt, 1983; Schkade & Potvin, 1981; Webb, 1983). Mental processing of both hemispheres is considered to be equally important (Lau, 1986). Current research has indicated that individuals who integrate both brain hemispheric thinking processes are more socially and academically successful than those who have a preference for only one specific brain hemispheric processing mode (Webb, 1983). They are more amenable to change and innovation (Anderson, 1982) and are better able to restore their energy resources and are less susceptible to job burnout than those who prefer utilizing primarily left or right hemispheric processing skills (Lau, 1986).

Educational researchers (Coulson & Strickland, 1983; Norris, 1986; Owens, 1986) began to wonder about the relationship between the preferred brain hemispheric processing modes of role incumbents and their leadership behavior. A study (Coulson & Strickland, 1983) was conducted to compare hemispheric processing of school superintendents and chief executive officers from the private sector. Twenty-three superintendents and 22

chief executive officers were administered the Herrmann Brain Dominance Instrument (1982) to ascertain their preferences for hemispheric processing. Findings indicated that school superintendents utilize left hemispheric processing skills while chief executive officers prefer right hemispheric processing techniques. The researchers stated that, "superintendents tend to be more rational, cognitive, and quantitative...controlled, structured, and conservative," than do chief executive officers. Business executives, "tend to be more creative, innovative, and experimental" than do school superintendents" (p. 22).

Individual brain hemispheric processing was investigated by Norris (1986), to determine the prevalent information processing modes among educational leaders in Tennessee. Subjects were 115 school administrators including principals, superintendents, and supervisors. The Herrmann Brain Dominance Instrument (1982) was utilized as the measuring instrument to determine the brain hemispheric processing preferences of each subject. Findings of the Norris (1984, p. 197) study revealed that "the most prevalent dominance pattern found among educational administrators was characterized by a narrow left-brained focus." Another study was conducted by Owens (1986) to examine

the relationship between brain hemispheric processing preferences of elementary school principals and their leadership styles. Subjects for the investigation consisted of 176 elementary school principals in Texas. The Leader Behavior Description Questionnaire-Self (1957) was used to determine principals' self-perceived leadership styles while principals' self-perceived brain hemispheric processing modes were determined by the administration of Your Style of Learning and Thinking Form B (Torrance, 1976). Findings indicated that there was a significant relationship between initiating structure leadership style and left brain hemispheric processing of principals. It was also determined that there was a significant relationship between consideration leadership style and right brain hemispheric processing of principals.

Chall and Mirsky (1978) asserted that educational administrators must deal with brain hemispheric specialization research and consider options for utilization of the findings. They commented that as educational leaders, "apply brain related knowledge to decision making in education, they are likely to contribute to the improvement of the whole of education" (p.72). With declining resources (e.g., revenues, decrease in student enrollments, and increasing lack of

community support), educational leaders are confronted with serious problems (Raudsepp, 1980). Coulson and Strickland (1983) contended that school superintendents' brain hemispheric processing skills will determine how the educational administrator will respond to pressing problems of the future. Each brain hemisphere is equally important and neither should be neglected by educational leaders during problem solving or decision making functions. The goal for educational administrators is to "become equally familiar, equally proficient in both modes" (Hatcher, 1983, p. 9).

Summary

A review of the literature has indicated that there is a consensus among researchers on findings which propose that for most right handed individuals the left side of the body is controlled by the right brain hemisphere and the right side of the body is controlled by the left brain hemisphere. Additionally, brain investigators determined that controlling centers for certain human behavioral characteristics, (e.g., oral and written speech), are located in specific areas of the brain. Similar conclusions for brain hemispheric specialization research are not applicable to left-handed persons since available data were based only on right-handed subjects.

Research findings resulted in the emergence of theory which proposed that the neo-cortex or cerebrum is divided into two distinct sections referred to as left and right brain hemispheres. Structure and function of each hemisphere is specialized and influences individual thinking and learning styles, and leader styles. Mental processing in the left hemisphere is analytical and sequential while the right hemispheric approach is synthetic and intuitive. Most individuals tend to have a bias toward utilization of one brain hemispheric processing mode rather than depending on integrative processes of both brain hemispheres.

Business executives have taken a keen interest in data that have resulted from brain hemispheric specialization research. A substantial body of literature indicates that numerous corporations are involved in management training skills that provide managers with creative techniques for problem solving.

It is obvious that more inquiry and investigation is necessary before this complex phenomenon and its relationship to educational leadership can be better understood. Understanding brain hemispheric specialization and individual preferences for utilization of one hemisphere to a greater extent is imperative for educational systems in that it has

potential for increasing the effectiveness of leadership within aforementioned systems.

Planning, organizing, innovating, and problem solving are but a few of the daily functions facing educational leaders. If administrators are to creatively, effectively, and heuristically solve problems confronting today's educational systems, they must apply mental processing skills from both brain hemispheres to the decision making process and the other functions mentioned.

The foregoing has outlined the literature of brain hemispheric specialization and its relationship to leader behavior. This study was similar to some of the literature cited because it investigated the relationship of preferred brain hemispheric modes of information processing to the leader style of specific educational role incumbents. It was different, however, in the following ways:

1. The role of school principals was the entire focus of the study.
2. The population and subsequent sample studied were from rural areas, more specifically rural Appalachian school settings.

CHAPTER 3

Methodology

This study examined the relationship between preferred brain hemispheric processing (as established by the HBDI) of West Virginia public school principals and their preferred leadership styles (as measured by the LBDQ). The methodology and research design used to conduct the study are described in this chapter.

Population and Sample

The population for this study consisted of all public elementary and high school (K-12) principals (N = 1,004) employed in West Virginia during the 1988-1989 academic school year as identified in the West Virginia Education Directory (WV Department of Education, 1988). The sample size of 100 subjects was established through the use of a computer program titled EPISTAT which sets appropriate sample sizes based upon assumptions of power and significance. A table of random numbers was used to select a random sample of 100 subjects or ten percent of the population. The sample size of 100 was well above acceptable limits for generalizability as established by sampling theorists (Kerlinger, 1987). Accordingly, a study of this sample allowed generalizability of findings to all public

school principals in the state of West Virginia.

Instrumentation

Two instruments were used in this study to collect brain hemispheric processing data and leadership style data. Brain hemispheric processing modes of principals were identified by utilization of the Herrmann Brain Dominance Instrument (1982) (see Appendix A). The instrument is a paper and pencil self-report inventory comprised of 120 items categorized into six areas. The areas are: (1) educational focus, (2) work (career choice, occupation, and best/worst work elements, (3) the use of discretionary time (hobbies and athletics), (4) inner self-perception (key descriptors of self), (5) values, and (6) inner and outer self (introversion and extroversion scale) (Herrmann, 1988, p. 68). The 120 items consist of adjectives and/or phrases describing persons or types of activities.

The Herrmann Brain Dominance Instrument (HBDI) measures perceived mental processing in the left and right hemispheres in four different quadrants referred to as right and left cerebral and limbic modes. Responses are plotted into quadrants, yielding data in profile scores that represent hemispheric modal preferences. The quadrants are:

1. Upper Left Cerebral Mode: Logical, quantitative, rational, technical, mathematical
2. Lower Left Limbic Mode: Organized, sequential, procedural, conservative, planner
3. Upper Right Cerebral Mode: Visual, conceptual, simultaneous, holistic, synthesizer
4. Lower Right Limbic Mode: Emotional, expressive, interpersonal, talker, spiritual

The cerebral left and the limbic left quadrants combine to yield a score that represents a preferred style of mental processing categorized as, left hemispheric while the cerebral right and the limbic right quadrants combine to yield a score that represents a preferred style of mental processing categorized as right hemispheric. The instrument provides final scores for respondents that indicate their self-perceived preferred hemispheric processing style. Test-retest reliabilities for 78 repeated measures of the HBDI are .96 for the left hemisphere and .96 for the right hemisphere (Herrmann, 1988). These high test-retest reliabilities make a strong case for the construct validity of the instrument to be of acceptable levels. However, specific validity coefficients for this instrument are unavailable at this time. Permission to use the HBDI

was not necessary since a fee was charged for scoring each questionnaire.

Self-perceived leadership styles of principals were determined by utilization of the Leader Behavior Description Questionnaire-Self (LBDQ-S) (see Appendix B), developed originally by Hemphill and Coons (1957) and later revised by Halpin (1957) to measure leader behavior. The instrument is comprised of a forty-item questionnaire consisting of two sub-scales, Consideration and Initiating Structure, that measure different patterns of leader behavior. Consideration refers to leader behavior that indicates friendship, mutual trust, respect, and a warm relationship between leaders and group members. Initiating Structure refers to leader behavior that seeks to establish well-defined patterns of organization, focuses on task completion and describes the relationship between subordinates and themselves (Halpin, 1957).

The LBDQ-S contains short, descriptive statements each of which describe a certain way in which a leader may behave. Respondents indicate how often they engage in the described item by circling one of five frequencies. The scale is as follows: A = always, B = often, C = occasionally, D = seldom, and E = never. Of the 40 items, only 30 are scored (15 for each of the

two dimensions). The ten unscored items are retained in the instrument in order to maintain the conditions of administration utilized in standardizing the questionnaire (Halpin, 1957).

Items in the Leader Behavior Description Questionnaire-Self scale are as follows:

Consideration

1. I do personal favors for group members.
2. I do little things to make it pleasant to be a member of the group.
3. I am easy to understand.
4. I find time to listen to group members.
5. I keep to myself.
6. I look out for the personal welfare of the individual group members.
7. I refuse to explain my actions.
8. I act without consulting the group.
9. I back up the members in their actions.
10. I treat all group members as my equal.
11. I am willing to make changes.
12. I am friendly and approachable.
13. I make group members feel at ease when talking to them.
14. I put the suggestions made by the group into action.

15. I get group approval on important matters before going ahead.

Initiating Structure

1. I make my attitude clear to the group.
2. I try out new ideas with the group.
3. I rule with an iron hand.
4. I criticize poor work.
5. I speak in a manner not to be questioned.
6. I assign group members to particular tasks.
7. I schedule the work to be done.
8. I maintain definite standards of performance.
9. I emphasize the meeting of deadlines.
10. I encourage the use of uniform procedures.
11. I make sure that my part in the organization is understood by all group members.
12. I ask that group members follow standard rules and regulations.
13. I let group members know what is expected of them.
14. I see to it that group members are working up to capacity.
15. I see to it that the work of group members is coordinated.

The estimated reliability by the split-half method for the LBDQ-S is .83 for the Initiating Structure scores,

and .92 for the Consideration scores (Halpin, 1957). The instruments's accepted validity as a measure of leadership style has been long established. Permission to use the LBDQ-S was obtained from The Ohio State University (see Appendix C).

A demographic information sheet (see Appendix D) was utilized to provide ancillary information appropriate for cross-tabulated analyses. The numerical or quantitative data were related to variables such as sex, age, handedness, and years of educational and administrative experience.

Procedures

This study utilized survey research procedures to gather data pertaining to West Virginia public school principals' self-perceptions of their predominant leadership styles and preferential brain hemispheric processing. The two instruments accompanied by a cover letter (see Appendix E), demographic sheet and a self-addressed, stamped return envelope were mailed to each of the 100 randomly selected principals. The cover letter explained the purpose of the survey, assured anonymity of subjects, and solicited participation. Subjects were asked to complete the demographic sheet and respond to the instruments and to return them to the researcher during the summer of 1989. Answer sheets

were numbered upon receipt. A coding system was utilized to identify nonrespondents who were sent a follow-up letter (see Appendix F), another set of questionnaires, and a demographics sheet three weeks after the initial mailing. The first mailing resulted in a 51 percent return rate while the second mailing resulted in an additional 28 percent return rate yielding a final return of 79 percent.

Data Analyses

Frequency distributions and descriptive analyses of the self-perceived preferred leadership styles and self-perceived preferred brain hemispheric processing were utilized to test the hypotheses of this study. Additionally, statistical data were analyzed by utilizing the General Linear Model procedures of the Statistical Analysis Systems (SAS). An alpha level of 0.05 was set as the level of significance for this study. Chi Square analyses at the 0.05 alpha level were used to determine statistically significant differences.

Summary

These procedures were designed to determine the relationship between West Virginia public school principals' self-perceived preferred brain hemispheric processing and their self-perceived predominant

leadership styles. An appropriately sized random sample of one hundred of 1,004 West Virginia public school principals were polled with two instruments which are both reliable and valid measures for the constructs under inquiry. The data generated tested the two hypotheses outlined in Chapter 1 (see p. 18). Appropriate statistical tests were performed to determine confirmation or rejection of the stated hypotheses.

Chapter 4

Presentation and Analysis of Data

The purpose of this study was to examine the relationship between preferred brain hemispheric processing (as established by the HBDI) of West Virginia public school principals and their leadership styles (as measured by the LBDQ). Chapter Four provides a description and an analysis of the data collected in the study. These data are organized and presented under each of the two hypotheses which defined the scope of the study.

The chapter is divided into the following sections: (1) descriptive data, (2) statistical analysis of data, (3) major findings, (4) ancillary findings and (5) summary of the chapter.

Descriptive Data

The population for this study consisted of all public elementary and high school (K-12) principals (N = 1,004) employed in West Virginia during the 1988-1989 academic school year. A random sample of 100 principals was identified. Overall, seventy-nine or 79 percent of the principals responded. Of these, seventy-five or 75 percent were usable. Four returns were rejected because three of the instruments were

incomplete and one respondent indicated a left-handed preference. This study was limited to only right-handed individuals.

Demographic data that were collected from respondents included the following items: (1) gender, (2) age, (3) handedness, (4) level of education, (5) total years in education, (6) number of years as principal, (7) configuration of school, and school size. The first demographic item on the survey required a response regarding gender of each subject. The data indicate that of the 75 subjects, 53 (70.7%) were male and 22 (29.3%) were female (Table I).

The second demographic item on the survey required a response pertaining to the age of each respondent. Data reveal that seven (9.3%) of the principals were between the ages of 25 and 34, 29 (38.7%) of the principals were between the ages of 35 and 44, and 30 (40%) were between 45 and 54 years of age (Table II).

Responses to the third item on the survey were related to handedness (writing) of each respondent. This item was used to disqualify from the study any principals who indicated that they were left-handed. The fourth demographic item on the survey provided data regarding principals' level of education. As shown in Table III, these data indicate that a majority, 67

TABLE I

FREQUENCY DISTRIBUTION OF RESPONDENTS BY GENDER

	Frequency	Percent
Male	53	70.7
Female	22	29.3

TABLE II

FREQUENCY DISTRIBUTION OF RESPONDENTS BY AGE

Age	Frequency	Percent
25-34	7	9.3
35-44	29	38.7
45-54	30	40.0
55-65	9	12.0

TABLE III

FREQUENCY DISTRIBUTION OF RESPONDENTS BY LEVEL OF EDUCATION

Education	Frequency	Percent
Masters	2	2.7
Masters + 15	5	6.7
Masters + 30	67	89.3
Doctorate	1	1.3

(89.3%), of the respondents held a Masters of Art plus 30 hours.

The fifth demographic item on the survey regarded principals' total years in education. The data revealed that four (5.3%) principals had from six to ten years experience, that 13 (17.3%) principals had eleven to 15 years of experience, that 20 (26.7%) principals had 16 to 20 years, that 22 (29.4%) had 21 to 25 years of experience and that 16 (21.3%) had over 25 years of experience in education (Table IV).

The sixth demographic item on the survey pertained to the number of years that respondents had served as principals. Data reveal that the majority (52%) of principals had spent less than ten years as school principals. Of these 21 (28%) had served less than five years as principals while 18 (24%) had served from six to ten years. Only six (8%) principals indicated that they had spent from 11 to 15 years in that capacity, 15 (20%) of them indicated that they had served from 16 to 20 years, 13 (17.4%) had served from 21-25 years, and two (2.6%) had served over 25 years as school principals (Table V).

The seventh demographic item on the survey pertained to the grade configuration of the schools in which the principals were currently serving as building

TABLE IV

FREQUENCY DISTRIBUTION OF RESPONDENTS BY TOTAL YEARS OF EXPERIENCE IN EDUCATION

Years	Frequency	Percent
Less than 5	0	0.0
6-10	4	5.3
11-15	13	17.3
16-20	20	26.7
21-25	22	29.4
Over 25	16	21.3

TABLE V

FREQUENCY DISTRIBUTION OF RESPONDENTS BY YEARS IN PRINCIPAL POSITIONS

Years	Frequency	Percent
Less than 5	21	28.0
6-10	18	24.0
11-15	6	8.0
16-20	15	20.0
21-25	13	17.4
Over 25	2	2.6

administrators. Analyses of the data revealed that over half (53.3%) of the principals served in elementary schools while 14 (18.6%) of the respondents were secondary school principals. Six (8%) of the principals served in middle schools, two (2.7%) of the principals served in junior high schools, 11 (14.7%) of the principals served in what were considered to be combination schools (e.g., K-9, K-12), and two (2.7%) principals served in special education schools (Table VI).

The last demographic item that was on the survey was the size of the schools in which respondents served as principals. Most principals (48%) served in schools that contained from 200 to 400 students while 29.3 percent served in schools that had less than 200 students. Only two principals were building administrators in schools that have a student population of more than 1,000 (Table VII).

Further analyses of demographic data indicated that secondary schools were served entirely by male principals. Female principals served in schools that were comprised of either elementary or middle school configurations. The two special education centers were also served by female administrators.

TABLE VI

FREQUENCY DISTRIBUTION OF SCHOOL CONFIGURATION

School	Frequency	Percent
Elementary	40	53.3
Middle	6	8.0
Jr. High	2	2.7
Secondary	14	18.6
Combination:		
K-12	2	2.7
K-9	9	12.0
SPED	2	2.7

TABLE VII

FREQUENCY DISTRIBUTION OF SCHOOL SIZE

Size	Frequency	Percent
Less than 200	22	29.3
200-400	36	48.0
400-600	6	8.0
600-800	7	9.3
800-1,000	2	2.7
Over 1,000	2	2.7

Statistical Analysis of Data

Data for this study were collected by the use of two questionnaires. Brain hemispheric processing of principals was identified by the use of Herrmann's (1982) Herrmann Brain Dominance Instrument. This instrument measures perceived mental processing in the left and right hemispheres in four different quadrants referred to as right and left cerebral modes and right and left limbic modes. The responses were plotted into quadrants, ultimately yielding profile scores that represented hemispheric modal preferences. Each profile score is converted to a four digit number (e.g., 2213, 1123) that represents an individual's profile code. The first digit denotes the profile code for the upper left cerebral mode. The second digit denotes the profile code for the lower left limbic mode. The third digit denotes the profile code for the lower right limbic mode; and the fourth digit denotes the profile code for the upper right cerebral mode. Ratings for the digits are: PRIMARIES "1" = preference for mental processing in the mode, SECONDARIES "2" = usage of mental processing in the mode but do not prefer it and TERTIARIES "3" = avoidance of mental processing in the mode. In avoiding certain hemispheric modes, the preference of other modes is that much increased.

The second survey instrument, Leader Behavior Description Questionnaire-Self (LBDQ) (Halpin, 1957), is a forty-item questionnaire consisting of two sub-scales, Consideration (person oriented) and Initiating Structure (task oriented), that measure two different dimensions of leader behavior. Subjects responded to each item on a five point Likert scale according to their perceptions of their leadership behavior. The five points on the Likert Scale were as follows: A = always, B = often, C = occasionally, D = seldom, and E = never.

The Statistical Analysis Systems (SAS) was used to analyze the data. A frequency distribution of perceived hemispheric processing and leadership styles was computed to test the two directional hypotheses that guided the study.

Major Findings

Findings from the study are presented under each hypothesis to which the data apply. All statistical analyses were performed using the General Linear Model of the Statistical Analysis Systems (SAS). An alpha level of 0.05 was set as the level of significance for this study. Chi Square analyses at the 0.05 alpha level were used to determine statistically significant differences. Four individuals' responses were eliminated from the data analyses because they received

either an integrated brain hemispheric processing score, or an integrated leadership style score, or both an integrated hemispheric processing score and an integrated leadership score. In calculating their responses, the statistical test was technically difficult because of their ratings of zero. This did not affect the testing of the hypotheses.

Hypothesis 1: West Virginia public school principals who perceive themselves as preferring predominantly left hemispheric processing will manifest significantly higher self-perceived Initiating Structure scores than principals who perceive that their mental processing is predominantly right hemispheric.

The first hypothesis was accepted. As shown in Table VIII, 45 (81.82%) of principals who perceived themselves as preferring predominantly left hemispheric processing perceived themselves as being Initiating Structure leadership style.

Hypothesis 2: West Virginia public school principals who perceive themselves as preferring predominantly right hemispheric processing will manifest significantly higher self-perceived Consideration scores than principals who perceive that their mental processing is predominantly left hemispheric.

TABLE VIII

HEMISPHERIC PROCESSING BY LEADERSHIP STYLE

	Initiating Structure	Consideration	Total
Left	45	10	55
Expected	36.408	18.592	
Percent	63.38	14.08	
Col Pct	81.82	18.18	
Right	2	14	16
Expected	10.592	5.4085	
Percent	2.82	19.72	
Col Pct	12.50	87.50	

P < 0.05
Chisq Value 26.615
P < 0.000000036

The second hypothesis was accepted. As shown in Table VIII, 14 (87.50%) of the principals who perceived themselves as preferring predominantly right hemispheric processing perceived themselves as being Consideration leadership style.

Ancillary Findings

A total of 75 principals were subjects in this study. Table IX shows that 56 principals utilize predominantly left hemispheric processing, 16 principals utilize predominantly right hemispheric processing, and three principals equally utilize both left and right hemispheric processing indicating that they are integrated in their hemispheric processing. As shown in Table IX, of the 56 principals who prefer left hemispheric processing, 47 are males and nine are females. Of the 16 principals who utilize right hemispheric processing, five are males and eleven are females. Of the three principals who are integrated in their hemispheric processing, one is male and two are females.

A chi-square statistical analysis was conducted to analyze these data. With one degree of freedom, a chi-square value of 17.214 was calculated which was statistically significant ($P < .0000033$). Male principals were significantly (level .05) more likely to

TABLE IX

HEMISPHERIC PROCESSING BY GENDER

	Male	Female	Total
Integrated	1	2	3
Percent	1.33	2.67	
Left	47	9	56
Percent	62.66	12.00	
Right	5	11	16
Percent	6.67	14.67	

Left	47	9	56
Expected	40.44	15.556	
Percent	65.28	12.50	
Right	5	11	16
Expected	11.556	4.4444	
Percent	6.94	15.28	

P < 0.05
Chisq Value 17.214
P < 0.0000033

perceive themselves to utilize predominantly left hemispheric processing than female principals.

Data in the four hemispheric modes were analyzed resulting in sixteen different hemispheric profile codes for respondents. A frequency distribution of these codes is presented in Table X. For an explanation of each profile code see Appendix G.

As shown in Table X, the most prevalent profile codes for principals in this study were 1122 with a frequency of 17 (22.67%), 1112 with a frequency of 11 (14.67%), and 1121 with a frequency of ten (13.3%). These profile codes are representative of mental processing that is predominantly left hemispheric (e.g., logical, analytical, controlled, and technical).

Table XI presents the most frequent profile codes by gender. The three most frequent profile codes for males were ones that are predominantly left hemispheric processing (e.g., 1122, 1112, and 1121). As shown in Table XI, 16 (30.19%) of the male principals had a profile code represented by 1122, ten (18.87%) had a profile code represented by 1112 and nine (16.98%) had a profile code represented by 1121. Data for female principals did not indicate a preference for any specific profile code.

TABLE X

FREQUENCY DISTRIBUTION OF PROFILE CODES

Profile Codes	Frequency	Percent
1111	4	5.3
1112	11	14.7
1121	10	13.3
1122	17	22.7
1123	1	1.3
1132	1	1.3
1212	4	5.3
1221	2	2.7
2111	4	5.3
2112	6	8.0
2113	1	1.3
2121	3	4.0
2122	2	2.7
2211	3	4.0
3111	5	6.7
3311	1	1.3
Total	75	100.00

TABLE XI

PROFILE CODES OF RESPONDENTS BY GENDER

Frequency
Percent
Col Pct

Profile Codes	Male	Female	Total
1111	2 2.67 3.77	2 2.67 9.09	4 5.33
1112	10 13.33 18.87	1 1.33 4.55	11 14.67
1121	9 12.00 16.98	1 1.33 10.00	10 13.33
1122	16 21.33 30.19	1 1.33 4.55	17 22.67
1123	0 0.00 0.00	1 1.33 4.55	1 1.33
1132	1 1.33 1.89	0 0.00 0.00	1 1.33
1212	0 0.00 0.00	4 5.33 18.18	4 5.33
1221	2 2.67 3.77	0 0.00 0.00	2 2.67
2111	1 1.33 1.89	3 4.00 13.64	4 5.33

TABLE XI (CONTINUED)

Frequency Percent Col pct Profile Codes	Male	Female	Total
2112	3 4.00 5.66	3 4.00 13.64	6 8.00
2113	1 1.33 1.89	0 0.00 0.00	1 1.33
2121	2 2.67 3.77	1 1.33 4.55	3 4.00
2122	2 2.67 3.77	0 0.00 0.00	2 2.67
2211	0 0.00 0.00	3 4.00 13.64	3 4.00
3111	3 4.00 5.66	2 2.67 9.09	5 6.67
3311	1 1.33 1.89	0 0.00 0.00	1 1.33
Total	53	22	75

Data were analyzed to identify the preferred (Primary "1") hemispheric quadrants (modes) of principals. As shown in Table XII, more principals preferred Quadrant Two (lower left limbic mode). Sixty-five (86.67%) of the principals were represented by a one (prefer) in Quadrant Two (lower left limbic mode), 50 (66.67%) of the principals were represented by a one in Quadrant One (upper left cerebral mode); 39 (52%) of the principals were represented by a one in Quadrant Four (lower right limbic mode); and 32 (42.67%) of the principals were represented by a one in Quadrant Four (upper right cerebral mode).

Further analyses of the hemispheric quadrant data indicated that more male principals preferred Quadrant two (lower left limbic mode) than any other quadrant. As shown in Table XIII, 50 of the 53 (94.34%) male principals were represented by a one (prefer) in Quadrant Two (lower left limbic mode); 40 (75.47%) of the male principals were represented by a one in Quadrant One (upper left cerebral mode); 21 (39.62%) of the male principals were represented by a one in Quadrant Three (lower right limbic mode); and 20 (37.74%) of the male principals were represented by a one in Quadrant Four (upper right cerebral mode).

TABLE XII

PREFERRED HEMISPHERIC QUADRANTS

Frequency Percent	1 Prefer	2 Use	3 Avoid
Upper Left Cerebral	50 66.67	19 25.33	6 8.00
Lower Left Limbic	65 86.67	9 12.00	1 1.33
Lower Right Limbic	39 52.00	35 46.67	1 1.33
Upper Right Cerebral	32 42.67	42 1.33	2 2.67

TABLE XIII

PREFERRED HEMISPHERIC QUADRANTS FOR MALES

Frequency Percent	1 Prefer	2 Use	3 Avoid
Upper Left Cerebral	40 75.47	9 16.98	4 7.55
Lower Left Limbic	50 94.34	2 3.77	1 1.89
Lower Right Limbic	21 39.62	31 58.49	1 1.89
Upper Right Cerebral	20 37.74	32 60.38	1 1.89

Additional analyses of data were conducted to determine which hemispheric modes were preferred (Primary "1") by female respondents. As shown in Table XIV, female principals preferred Quadrant Three (lower right limbic mode) more than the other quadrants. Findings revealed that 18 (81.81%) of the female principals were represented by a one in Quadrant Three (lower right limbic mode); 15 (68.18%) of the female principals were represented by a one in Quadrant Two (lower left limbic mode); 12 (54.54%) of the female principals were represented by a one in Quadrant Four (upper right cerebral mode); and ten (45.45%) of the female principals were represented by a one in Quadrant One (upper left cerebral mode).

Data regarding hemispheric processing, leadership styles, and gender were analyzed. Nine (41.00%) of the ten female principals who preferred right hemispheric processing indicated that they were predominantly Consideration leadership style. Seven (31.81%) of the nine female principals who preferred left hemispheric processing indicated that they were predominantly Initiating Structure leadership style (Table XV).

TABLE XIV

PREFERRED HEMISPHERIC QUADRANTS FOR FEMALES

Frequency Percent	1 Prefer	2 Use	3 Avoid
Upper Left Cerebral	10 45.45	10 45.45	2 9.09
Lower Left Limbic	15 68.18	7 31.81	0 0.00
Lower Right Limbic	18 81.81	4 18.18	0 0.00
Upper Right Cerebral	12 54.54	9 40.90	1 4.54

TABLE XV

FEMALE HEMISPHERIC PROCESSING
AND LEADERSHIP STYLE

	Integrated	Initiating Structure	Consideration	Total
Integrated Percent	1 4.5	0 0.0	1 4.5	2
Left Percent	1 4.5	7 32.00	1 4.5	9
Right Percent	0 0.0	2 9.00	9 41.00	11
Total	2 9.00	9 41.00	11 50.00	22 100

Table XVI indicates that 38 (71.70%) of the 47 male principals who preferred left hemispheric processing indicated that they were Initiating Structure leadership style. Nine (16.98%) of the 47 male principals who preferred left hemispheric processing indicated that they were predominantly Consideration leadership style.

Additional data that were analyzed pertained to the most frequent profile codes and leadership style. As shown in Table XVII, 15 (31.91) of the principals with Initiating Structure (IS) leadership style had a profile code of 1122 (analytical, logical, organized). Fourteen of these were male principals and one was a female principal. Ten (21.28%) of the principals with IS leadership style had a profile code of 1112 (analytical, logical, organized, interpersonal, emotional) and 7 (14.89%) of the principals with IS leadership style had a profile code of 1121 (analytical, logical, organized, conceptual, synthesizer).

The most prevalent profile code for principals with Consideration (C) leadership style was 3111 (conceptual, synthesizer, interpersonal, emotional, controlled and organized with avoidance of logical, analytical, and rational processes) with five (20%) of the principals being represented by this profile code. Additionally, four of the principals with C leadership style had a

TABLE XVI

MALE HEMISPHERIC PROCESSING AND LEADERSHIP STYLE

	Integrated	Initiating Structure	Consideration	Total
Integrated	1	0	0	1
Percent	1.89	0.00	0.00	
Left	0	38	9	47
Percent	0.00	71.70	16.98	
Right	0	0	5	5
Percent	0.00	0.00	9.43	
Total	1	38	14	53
	1.89	71.70	26.41	100

TABLE XVII

PROFILE CODES OF RESPONDENTS
BY LEADERSHIP STYLE

Frequency Percent Col Pct Profile Codes	Integration	Initiating Structure	Consideration	Total
1111	2 2.67 66.67	1 1.33 2.13	1 1.33 4.00	4 5.33
1112	0 0.00 0.00	10 13.33 21.28	1 1.33 4.00	11 14.67
1121	0 0.00 0.00	7 9.33 14.89	3 4.00 12.00	10 13.33
1122	0 0.00 0.00	15 20.00 31.91	2 2.67 8.00	17 22.67
1123	1 1.33 33.33	0 0.00 0.00	0 0.00 0.00	1 1.33
1132	0 0.00 0.00	1 1.33 2.13	0 0.00 0.00	1 1.33
1212	0 0.00 0.00	4 5.33 8.51	0 0.00 0.00	4 5.33 8.51
1221	0 0.00 0.00	1 1.33 2.13	1 1.33 2.13	2 2.67

TABLE XVII (Continued)

Frequency Percent Col Pct Profile Codes Table	Integration	Initiating Structure	Consideration	
2111	0 0.00 0.00	1 1.33 2.13	3 4.00 12.00	4 5.33
2112	0 0.00 0.00	2 2.67 4.26	4 5.33 16.00	6 8.00
2113	0 0.00 0.00	0 0.00 0.00	1 1.33 4.00	1 1.33
2121	0 0.00 0.00	2 2.67 4.26	1 1.33 4.00	3 4.00
2122	0 0.00 0.00	2 2.67 4.26	0 0.00 0.00	2 2.67
2211	0 0.00 0.00	1 1.33 2.13	2 2.67 8.00	3 4.00
3111	0 0.00 0.00	0 0.00 0.00	5 6.67 20.00	5 6.67
3311	0 0.00 0.00	0 0.00 0.00	1 1.33 4.00	1 1.33
Total	3	47	25	75

hemispheric profile code of 2112 (conservative, controlled, interpersonal, emotional).

Only three (4%) of the principals had leadership styles that were neither Initiating Structure or Consideration, therefore they were classified as integrated (IN). Two of these principals had hemispheric profile codes of 1111 (integrated). The third principal had a hemispheric profile code of 1123 (analytical, logical, organized with avoidance of conceptual, synthesis processes).

The Herrmann Brain Dominance Profile data for the four hemispheric quadrants (e.g., 1 upper cerebral left mode, 2 lower limbic left mode, 3 lower limbic right mode, 4 upper right cerebral mode) as they related to preferred leadership style were analyzed using the Kruskall-Wallis One-Way Analysis of Variance. An alpha level of 0.05 was set as the level of significance for this test. The first analysis was the relationship between Quadrant One (upper cerebral left mode) as a predominant mental processing mode and predominant leadership style. Of those respondents who utilized predominantly Quadrant One, there was a significant difference (level 0.05) in leadership styles ($P < .0001$) with more principals utilizing primarily

Initiating Structure than Consideration leadership styles (Table XVIII).

The second analysis was the relationship between Quadrant Two (lower limbic left mode) as a predominant mental processing mode and predominant leadership style. As shown in Table XIX, of those principals who utilized predominantly Quadrant Two, there was no significant difference (0.05 level) in leadership styles (P <:0.7080).

The third analysis was the relationship between Quadrant Three (lower limbic right mode) as a predominant mental processing mode and predominant leadership style. Of those principals who utilized predominantly Quadrant Three (lower limbic right mode), there was a significant difference (0.05 level) in leadership style (P <:0.0261) with significantly more respondents utilizing primarily Consideration than Initiating Structure leadership styles (Table XX).

Table XXI presents an analysis of the relationship between Quadrant Four (upper cerebral right mode) as a predominant information processing mode and predominant leadership style. Of those principals who utilize predominantly Quadrant Four, (upper cerebral right mode) there was a significant difference (0.05 level) in leadership style (P <:0.0105) with significantly more

TABLE XVIII

QUADRANT ONE BY LEADERSHIP STYLE

(Rank Sums)

Stl	N	Sum of Scores	Expected Under HO	Std Dev Under HO	Mean Score
C	25	1299.000	950.00	73.7508589	51.9600000
I	47	1474.500	1786.00	75.6728378	31.3723404
IN	3	76.500	114.00	30.6576563	25.5000000

Average Scores were used for Ties

CHISQ = 22.691
P < 0.0001

TABLE XIX

QUADRANT TWO BY LEADERSHIP STYLE

(Rank Sums)

Stl	N	Sum of Scores	Expected Under HO	Std Dev Under HO	Mean Score
C	25	978.000	950.00	52.4404424	39.1200000
I	47	1773.000	1786.00	53.8070627	37.7234043
IN	3	99.000	114.00	21.7990825	33.0000000

Average Scores Were Used for Ties

CHISQ = 0.66640
P < 0.7166

TABLE XX

QUADRANT THREE BY LEADERSHIP STYLE

(Rank Sums)

Stl	N	Sum of Scores	Expected Under HO	Std Dev Under HO	Mean Score
C	25	759.500	950.000	77.4596669	30.3600000
I	47	1994.000	1786.000	79.4782989	42.4255319
IN	3	197.000	114.000	32.1993789	32.3333333

Average Scores Were Used for Ties

CHISQ = 6.8780
P < 0.0321

TABLE XXI

QUADRANT FOUR BY LEADERSHIP STYLE

(Rank Sums)

Stl	N	Sum of Scores	Expected Under HO	Std Dev Under HO	Mean Score
C	25	726.000	950.000	77.5199771	29.0400000
I	47	2016.500	1786.000	79.5401808	42.9042553
IN	3	107.500	114.500	32.2244493	35.8333333

Average Scores Were Used for Ties

CHISQ = 8.7407
P < 0.0126

respondents utilizing predominantly Consideration than Initiating Structure leadership style.

The Kruskal-Wallis One-Way Analysis of Variance by Ranks Test procedures were used to determine the hemispheric profile codes that best represented principals who were either Initiating Structure, Consideration or integrated leadership styles. Principals who were identified as Initiating Structure leadership style are best represented by a 1122 profile code (e.g., logical, analytical, organized, technical). Principals who were identified as Consideration leadership style are best represented by a 2111 profile code (e.g., creative, interpersonal, holistic and organized). Principals who were identified as integrated leadership style are best represented by a 1112 profile code (e.g., logical, analytical, organized, technical, interpersonal, emotional).

Summary of the Chapter

Seventy-five West Virginia public school principals participated in this study to examine the relationship between the self-perceived preferred brain hemispheric processing mode of West Virginia public school principals and their self-perceived leadership styles. This investigation was accomplished through survey research procedures utilizing two instruments to

ascertain principals' perceptions of their preferred brain hemispheric processing and of their leadership styles.

Data collected in the study related to two specific types of leadership styles (Initiating Structure and Consideration) and to two types of mental processing (right and left hemispheric). Data were analyzed at the 0.05 alpha level of significance using the General Linear Model of the Statistical Analysis Systems (SAS). A frequency distribution of perceived hemispheric processing and leadership style and Chi-Square Approximation were computed to test the hypotheses. Both hypotheses were accepted.

Kruskall-Wallis One-Way Analysis of Variance was used to determine significant differences among and between preferred hemispheric processing and leadership styles. Significant differences were found between predominant hemispheric processing and perceived leadership style. Additionally, significant differences were found between male and female hemispheric preferences.

Chapter 5

Summary, Conclusions and Recommendations

This chapter contains the summary, conclusions and recommendations of the study. This chapter is organized around summaries of seven sections: (1) purpose, (2) procedures, (3) descriptive data, (4) findings, (5) conclusions, (6) recommendations, and (7) implications.

Purpose

This study was designed to examine the relationship between preferred brain hemispheric processing (as established by the HBDI) of West Virginia public school principals and their preferred leadership styles (as measured by the LBDQ). The following two hypotheses guided this study:

1. West Virginia public school principals who perceive themselves as preferring predominantly left hemispheric processing will manifest significantly higher self-perceived Initiating Structure scores than principals who perceive that their mental processing is predominantly right hemispheric.
2. West Virginia public school principals who perceive themselves as preferring predominantly right hemispheric processing will manifest significantly

higher self-perceived Consideration scores than principals who perceive that their mental processing is predominantly left hemispheric.

Both hypotheses were confirmed at the 0.05 alpha level. Results of the investigation were used as the basis for making the recommendations found in other sections in this chapter.

Procedures

A randomly selected sample of 100 public school principals in the state of West Virginia participated in this study. A demographic questionnaire, two survey instruments, and a stamped self-addressed envelope were mailed to each participant. The first instrument, Herrmann's Brain Dominance Instrument (1982), measured self-perceived mental processing in the left and right brain hemispheres. The second instrument, Leader Behavior Description Questionnaire Self (1957), measured two different dimensions of self-perceived leadership behavior. A total of 79 or seventy-nine percent of the principals returned the questionnaires with a usable return rate of seventy-five or 75 percent.

Data generated by the study were assigned response codes, transferred to a computer file, verified for processing and statistically analyzed using the General Linear Model of the Statistical Analysis Systems (SAS).

Chi Square Approximation was used to test both hypotheses. An alpha level of 0.05 was the criterion used to confirm or reject the directional hypotheses.

Descriptive Data

An analysis of the demographic data collected in the study formed the basis for the development of a profile for each of the respondents. Fifty-three (70.7%) of the respondents were male and 22 (29.3%) were female. Fifty-nine (78.7%) of the principals were 35 years of age or older and a majority of the principals, 67 (89.3%), held a Masters of Arts (MA) plus 30 hours.

Data also revealed that 58 (77.4%) principals had over 15 years of experience in education and that 36 (52%) had less than ten years experience in a principal's position. Further analysis determined that over half, 40 (53.3%), of the principals served in elementary schools. Additionally, 58 (77.3%) of the principals served in schools that had less than 400 students.

Findings

Analyses of the survey instrument data generated by this investigation yielded a variety of data. These data provide the findings that follow.

Public school principals in West Virginia who perceived themselves as preferring predominantly left brain hemispheric processing perceived themselves to be predominantly Initiating Structure leadership style. Public school principals in West Virginia who perceived themselves as preferring predominantly right brain hemispheric processing perceived themselves to be predominantly Consideration leadership style.

Fifty-six principals indicated a self-perceived preference for mental processing that was predominantly left hemispheric and 16 principals indicated a self-perceived preference for mental processing that was predominantly right hemispheric. Of the 56 principals who preferred left hemispheric processing, 47 were males and nine were females. Of the 16 principals who preferred right hemispheric processing, five were males and 11 were females. Male principals were significantly (0.05 level) more likely to manifest a preference for left hemispheric processing and female principals were significantly (0.05 level) more likely to prefer right hemispheric processing ($P < .0000033$).

Subjects' responses on the Herrmann Brain Dominance Instrument were plotted into quadrants, yielding profile scores representing left and right hemispheric modal preferences of mental processing. Each profile score

was converted to a four digit number (e.g., 1122, 2111) that represented a person's hemispheric profile code. The first digit denotes the profile code for Quadrant One (upper left cerebral mode). The second digit denotes the profile code for Quadrant Two (lower left limbic mode). The third digit denotes the profile code for Quadrant Three (lower right limbic mode); and the fourth digit denotes the profile code for Quadrant Four (upper right cerebral mode).

An analysis of the data presented in Chapter Four indicated that the three predominant profile codes were 1122 (17 respondents), 1112 (11 respondents), and 1121 (10 respondents) all of which are primarily left hemispheric processing. Of the 38 respondents who had the three prevalent profile codes, 35 were males and only three were females.

Data for female principals did not indicate a predominant profile code. As noted previously, data did determine that 11 (50%) of the female principals had right hemispheric processing while nine (40.9%) had left hemispheric processing.

Conclusions

A number of conclusions may be drawn from the findings yielded by analyses of the data generated by

the demographic sheet and the surveys. They include the following:

1. It may be concluded that there is a significant relationship between West Virginia principals' self-perceived brain hemispheric processing and their self-perceived leadership styles. West Virginia principals who preferred left hemispheric processing (e.g., rational, analytical, logical, controlled, administrative) usually demonstrated a leadership style that was predominantly initiating structure (task oriented). West Virginia principals who preferred right hemispheric processing (e.g, conceptual, synthesizer, interpersonal, holistic) usually demonstrated a leadership style that was predominantly consideration (person oriented). These results concur with findings in the literature (Agor, 1986; Edwards, 1986; Galyean, 1981; Matthews, 1982; Norris, 1984).

2. The literature would seem to indicate that secondary school principals utilize left hemispheric processing more than elementary school principals (Norris, 1986). In this study, all of the 14 secondary school principals utilized predominantly left hemispheric processing. Of the 40 elementary school principals, 27 utilized left hemispheric processing, ten utilized right hemispheric

processing and three were considered to be integrated in their hemispheric processing. There were no statistically significant differences at the 0.05 alpha level.

3. Although some of the literature (Norris, 1986; Owen, 1986; Wessman, 1988) would seem to indicate that descriptive data relating to individuals (e.g. size of school, age of principal, education of principal, years of experience) may be related to their hemispheric processing, this study found no significant relationships between any of these factors and the principals' hemispheric processing.

4. The literature indicates that individuals who prefer left hemispheric brain processing will be task oriented and that individuals who prefer right hemispheric brain processing will be person oriented (Agor, 1986; Hatcher, 1983; Herrmann, 1988; Piatt, 1983). It may be concluded that the findings of this study would support the literature.

Recommendations

An analysis of the descriptive data and findings of this investigation have formed the basis for the following recommendations:

1. It is recommended that similar research be conducted in other states.

2. It is recommended that this study be replicated utilizing the additional roles of supervisors, directors, and superintendents in public school systems.
3. It is recommended that similar research be conducted utilizing perceptions of subordinates, parents, or students to compare their perceptions of the leadership styles with the self-perceived hemispheric preferences of the principals.
4. Given the findings re: the significance of secondary school principals preferences for left hemispheric processing modes, it is recommended that further research be conducted to determine the effect of organizational culture of secondary schools as it relates to brain hemispheric processing of secondary school principals.

Implications

A review of the literature indicated that brain hemispheric processing is a determinant in the behavior of individuals as it controls their mental processing skills, guides their problem solving techniques and decision making abilities. The literature is replete with suggestions that the school principal plays an important role in the success or failure of schools. In general, it has been established that there is a

relationship between a principal's leadership style and that principal's effectiveness. Findings of the present study indicate that there is a relationship between principals' self-perceived brain hemispheric processing and their self-perceived predominant leadership styles. The major finding is that principals who prefer left hemispheric processing demonstrated leadership styles that were predominantly initiating structure and principals who prefer right hemispheric processing demonstrated leadership styles that were predominantly consideration.

Awareness of the concept of hemispheric specialization and its relationship to predominant leadership style has implications for screening, recruitment, assignment, and hiring of teachers (Agor, 1986; Gay, 1988; Piatt, 1986). Principals and or personnel directors could assure that schools have individuals with diverse hemispheric preferences. Schools with such individuals could create a more integrated school curricula in terms of methodology used and materials presented.

Secondly, education has been characterized by the existence of numerous committees, work groups, task forces and other deliberative bodies. The functioning of such groups would be greatly enhanced by assuring

that persons with each hemispheric preference are represented in the various groups. This would provide a broader perspective for decision-making and problem solving (Herron, Jacobs, & Kjeiner, 1985; Taggart, Robey, Kroech, 1985).

Thirdly, when individuals are assigned to tasks with specific duties, the principal making the assignment could consider individual hemispheric preference as it relates to a proclivity for a certain type of mental processing (Agor, 1986; Gay, 1988; Piatt, 1983). Individuals who utilize predominantly left hemispheric processing (e.g., sequential, analytical, and logical) could be assigned to jobs that require such skills. Individuals who prefer right brain processing techniques (e.g., creative, intuitive, conceptual, and synthesis) could be assigned to tasks accordingly.

Additionally, administrators who are aware of each others mental processing, could structure tasks and duties in such a manner as to take advantage of each other's abilities (Agor, 1984; Coulson & Strickland, 1983). This could greatly reduce time and effort necessary for task completion.

An awareness of hemispheric specialization could enhance interpersonal relationships (Albrecht, 1983; Agor, 1986). Tensions between various factions and

individuals could be reduced by assuring that everyone understands that people behave differently according to their hemispheric preference.

Programs for preservice and in-service training of educational administrators could be altered (Agor, 1984; Coulson & Strickland, 1983; Rehder & Porter, 1985). Curricula and teaching methods could be designed to aid persons in developing both sides of the brain. These methods could include activities that help individuals to shift easily from one hemisphere to the other, thereby producing a more effective administrator. The literature contains books and articles with suggestions for such activities (McCarthy, 1987; Raudsepp, 1980; Vitale, 1986; Williams, 1986).

The implementation of organizational change, a necessary organizational prerogative, could be better if educational administrators were aware of hemispheric preferences of organizational members. Individuals with right hemispheric processing preferences seem to be substantially more amenable to organizational change than those individuals who prefer left hemispheric processing (Anderson, 1982; Piatt, 1983). Innovation within schools could be greatly enhanced if educational administrators were aware of the hemispheric preferences of their staff members.

The current educational focus on school restructuring requires organizational change and that in turn requires the need for planning. Planning involves thought processes that are logical, sequential (left processing), and conceptual (right processing) (Herrmann, 1988). School systems need to identify individuals who predominantly utilize these mental processing modes and appropriately assign them to planning tasks.

Lastly, the policy formation for the operation of modern school systems is an increasingly important function. The establishment of policy requires an integration of logical, and conceptual mental processing. A knowledge of hemispheric specialization could assure that this most important function was the amalgam of both.

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APPENDICES

APPENDIX A

HERRMANN BRAIN DOMINANCE INSTRUMENT

BIOGRAPHICAL INFORMATION

1. Name _____ 2. Sex: M ☐ F ☐

3. Educational Focus or Major _____

4. Occupation or Job Title _____

Describe your work _____

HANDEDNESS

5. Which picture most closely resembles the way you hold a pencil? Mark box A, B, C, or D.

A ☐  B ☐  C ☐  D ☐ 

6. What is the strength and direction of your handedness? Mark box A, B, C, D, or E.

A ☐ primary left B ☐ primary left, some right C ☐ both hands equal D ☐ primary right, some left E ☐ primary right

BEST/WORST SUBJECTS

Think back to your best/worst elementary and/or secondary school subjects. Rank all three subjects identified below by entering a 1, 2 or 3 on the basis of how well you did: 1 = best; 2 = second best; 3 = third best.

7. _____ math 8. _____ foreign language 9. _____ native language or mother tongue

Please check: The numbers 1, 2, and 3 used once and only once? Correct if necessary.

WORK ELEMENTS

Rate each of the work elements below according to your strength in that activity, using the following scale: 5 = work I do best; 4 = work I do well; 3 = neutral; 2 = work I do less well; 1 = work I do least well. Enter the appropriate number next to each element. Do not use any number more than four times.

10. _____ analytical
11. _____ administrative
12. _____ conceptualizing
13. _____ expressing ideas
14. _____ integration
15. _____ writing
16. _____ technical aspects
17. _____ implementation
18. _____ planning
19. _____ interpersonal aspects
20. _____ problem solving
21. _____ innovating
22. _____ teaching/training
23. _____ organization
24. _____ creative aspects
25. _____ financial aspects

Please check: No more than four 5's, four 4's etc.? Correct if necessary.

KEY DESCRIPTORS

Select the eight adjectives which best describe the way you see yourself. Enter a 2 next to each of your eight selections. Then change one 2 to a 3 for the adjective which best describes you.

26. _____ logical
27. _____ creative
28. _____ musical
29. _____ sequential
30. _____ systematic
31. _____ verbal
32. _____ conservative
33. _____ analytical
34. _____ detailed
35. _____ emotional
36. _____ global
37. _____ critical
38. _____ artistic
39. _____ spiritual
40. _____ rational
41. _____ disciplined
42. _____ mathematical
43. _____ symbolic
44. _____ dominant
45. _____ holistic
46. _____ intuitive
47. _____ quantitative
48. _____ reader
49. _____ expressive
50. _____ factual

Please check: only seven 2's and one 3? Correct if necessary.

HOBBIES

Indicate a maximum of six hobbies you are actively engaged in. Enter a 3 next to your major hobby, a 2 next to each primary hobby, and a 1 next to each secondary hobby.

51. _____ artcrafts
52. _____ boating
53. _____ camping/hiking
54. _____ cards
55. _____ collecting
56. _____ cooking
57. _____ creative writing
58. _____ fishing
59. _____ gardening/plants
60. _____ golf
61. _____ home improvements
62. _____ music listening
63. _____ music playing
64. _____ photography
65. _____ reading
66. _____ sailing
67. _____ sewing
68. _____ spectator sports
69. _____ [illegible]
70. _____ tennis
71. _____ travel
72. _____ woodworking
_____ other _____
_____

Please check: only one 3 and a total of six hobbies. Correct if necessary.

ENERGY LEVEL

73. Thinking about your energy level or "drive," select the one that best represents you. Check box A, B, or C.

A ☐ day person B ☐ daynight person equally C ☐ night person

MOTION SICKNESS

74. Have you ever experienced motion sickness (nausea, vomiting) in response to vehicular motion (while in a car, boat, plane, bus, train, amusement ride)? Check box A, B, C, or D to indicate the number of times.

A ☐ none B ☐ 1–2 C ☐ 3–10 D ☐ more than 10

75. Check box A or B to indicate whether you can read while traveling in a car without stomach awareness, nausea, or vomiting.

A ☐ yes B ☐ no

ADJECTIVE PAIRS

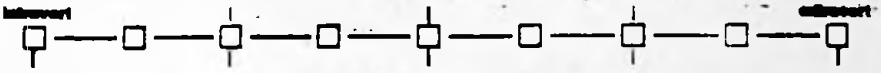
For each paired item below, check the word or phrase which is more descriptive of yourself. Check box A or B in each case, even if the choice is a difficult one. Do not omit any pairs.

	A / B		A / B
76.	conservative ☐ / ☐ empathetic	89.	imaginative ☐ / ☐ [illegible]
77.	analyst ☐ / ☐ synthesizer	90.	original ☐ / ☐ reliable
78.	[illegible] ☐ / ☐ musical	91.	creative ☐ / ☐ logical
79.	problem-solver ☐ / ☐ planner	92.	controlled ☐ / ☐ emotional
80.	controlled ☐ / ☐ creative	93.	musical ☐ / ☐ [illegible]
81.	original ☐ / ☐ emotional	94.	simultaneous ☐ / ☐ empathetic
82.	feeling ☐ / ☐ thinking	95.	communicator ☐ / ☐ conceptualizer
83.	interpersonal ☐ / ☐ organizer	96.	technical things ☐ / ☐ people-oriented
84.	spiritual ☐ / ☐ creative	97.	well-organized ☐ / ☐ logical
85.	detailed ☐ / ☐ holistic	98.	rigorous thinking ☐ / ☐ metaphorical thinking
86.	originate ideas ☐ / ☐ test and prove ideas	99.	like things planned ☐ / ☐ like things mathematical
87.	warm, friendly ☐ / ☐ analytical	100.	technical ☐ / ☐ dominant

Please check: Did you mark one and only one of each pair? Correct if necessary

INTROVERSION/EXTROVERSION

100. Check one box only to place yourself on this introvert–extrovert scale.



TWENTY QUESTIONS

Respond to each statement by checking the box in the appropriate column.

	strongly agree	agree	In between	disagree	strongly disagree
101. I feel that a step by step method is best for solving problems.	☐	☐	☐	☐	☐
102. Daydreaming has provided the impetus for the solution of many of my more important problems.	☐	☐	☐	☐	☐
103. I like people who are most sure of their conclusions.	☐	☐	☐	☐	☐
104. I would rather be known as a reliable than an imaginative person.	☐	☐	☐	☐	☐
105. I often get my best ideas when doing nothing in particular.	☐	☐	☐	☐	☐
106. I rely on hunches and the feeling of "rightness" or "wrongness" when moving toward the solution to a problem.	☐	☐	☐	☐	☐
107. I sometimes get a kick out of breaking the rules and doing things I'm not supposed to do.	☐	☐	☐	☐	☐
108. Much of what is most important in life cannot be expressed in words.	☐	☐	☐	☐	☐
109. I'm basically more competitive with others than self-competitive.	☐	☐	☐	☐	☐
110. I would enjoy spending an entire day "alone with my thoughts."	☐	☐	☐	☐	☐
111. I dislike things being unrealistic and unpredictable.	☐	☐	☐	☐	☐
112. I prefer to work with others in a team effort rather than solo.	☐	☐	☐	☐	☐
113. It is important for me to have a place for everything and everything in its place.	☐	☐	☐	☐	☐
114. Unusual ideas and daring concepts interest and intrigue me.	☐	☐	☐	☐	☐
115. I prefer specific instructions to those which leave many details optional.	☐	☐	☐	☐	☐
116. Know-why is more important than know-how.	☐	☐	☐	☐	☐
117. Thorough planning and organization of time are mandatory for solving difficult problems.	☐	☐	☐	☐	☐
118. I can frequently anticipate the solutions to my problems.	☐	☐	☐	☐	☐
119. I tend to rely more on my first impressions and feelings when making judgements than on a careful analysis of the situation.	☐	☐	☐	☐	☐
120. I feel that laws should be strictly enforced.	☐	☐	☐	☐	☐

PLEASE COMPLETE NEXT PAGE ●

APPENDIX B

LEADER BEHAVIOR DESCRIPTION QUESTIONNAIRE

DIRECTIONS:

a. READ each item carefully.

b. THINK about how frequently you engage in the behavior described by the item.

c. DECIDE whether you (A) Always, (B) Often, (C) Occasionally, (D) Seldom or (E) Never act as described by the item.

d. DRAW A CIRCLE around one of the five letters (A B C D E) following the item to show the answer you have selected.

A = Always
B = Often
C = Occasionally
D = Seldom
E = Never

As a Leader, I:

1. Do personal favors for group members ..... A B C D E
2. Make my attitudes clear to the group ..... A B C D E
3. Do little things to make it pleasant to be a member of the group ..... A B C D E
4. Try out my new ideas with the group ..... A B C D E
5. Act as the real leader of the group ..... A B C D E
6. Am easy to understand ..... A B C D E
7. Rule with an iron hand ..... A B C D E
8. Find time to listen to group members ..... A B C D E
9. Critize poor work ..... A B C D E
10. Give advance notice of changes ..... A B C D E
11. Speak in a manner not to be questioned ..... A B C D E
12. Keep to myself ..... A B C D E
13. Look out for the personal welfare of individual group members ..... A B C D E
14. Assign group members to particular tasks ..... A B C D E
15. Am the spokesman of the group ..... A B C D E
16. Schedule the work to be done ..... A B C D E

17. Maintain definite standards of performance ..... A B C D E

18. Refuse to explain my actions ..... A B C D E

19. Keep the group informed ..... A B C D E

20. Act without consulting the group ..... A B C D E

21. Back up the members in their actions ..... A B C D E

22. Emphasize the meeting of deadlines ..... A B C D E

23. Treat all group members as my equals ..... A B C D E

24. Encourage the use of uniform procedures ..... A B C D E

25. Get what I ask for from my superiors ..... A B C D E

26. Am willing to make changes ..... A B C D E

27. Make sure that my part in the organization is understood by group members ..... A B C D E

28. Am friendly and approachable ..... A B C D E

29. Ask that group members follow standard rules and regulations ..... A B C D E

30. Fail to take necessary action ..... A B C D E

31. Make group members feel at ease when talking with them ..... A B C D E

32. Let group members know what is expected of them ... A B C D E

33. Speak as the representative of the group ..... A B C D E

34. Put suggestions made by the group into operation .. A B C D E

35. See to it that group members are working up to capacity ..... A B C D E

36. Let other people take away my leadership in the group ..... A B C D E

37. Get my superious to act for the welfare of the group members ..... A B C D E

38. Get group approval in important matters before going ahead ..... A B C D E

39. See to it that the work of group members is coordinated ..... A B C D E

40. Keep the group working together as a team ..... A B C D E

APPENDIX C

LBDQ PERMISSION LETTER

STATEMENT OF POLICY

Concerning the Leader Behavior Description Questionnaire and Related Forms

Permission is granted without formal request to use the Leader Behavior Description Questionnaire and other related forms developed at The Ohio State University, subject to the following conditions:

1. Use: The forms may be used in research projects. They may not be used for promotional activities or for producing income on behalf of individuals or organizations other than The Ohio State University.

2. Adaptation and Revision: The directions and the form of the items may be adapted to specific situations when such steps are considered desirable.

3. Duplication: Sufficient copies for a specific research project may be duplicated.

4. Inclusion in dissertations: Copies of the questionnaire may be included in theses and dissertations. Permission is granted for the duplication of such dissertations when filed with the University Microfilms Service at Ann Arbor, Michigan 48106 U.S.A.

5. Copyright: In granting permission to modify or duplicate the questionnaire, we do not surrender our copyright. Duplicated questionnaires and all adaptations should contain the notation "Copyright, 19—, by The Ohio State University."

6. Inquiries: Communications should be addressed to:

Business Research
The Ohio State University
1775 College Road
Columbus, OH 43210

1975

APPENDIX D

DEMOGRAPHIC INFORMATION SHEET

DEMOGRAPHIC INFORMATION SHEET

1. Gender: M_____ F_____

2. Age: Under 25_____ 25-34_____ 35-44_____
45-54_____ 55-65_____ Over 65_____

3. Handedness: Left____ Right____ Ambidextrous____
(Writing)

4. Level of Education (check one):

Bachelors	_____	Masters + 15	_____
Bachelors + 15	_____	Masters + 30	_____
Masters	_____	Doctorate	_____

5. Total years in education:

Less than 5 _____ 6-10 _____ 11-15 _____
16-20 _____ 21-25 _____ Over 25 _____

6. Number of years as principal:

Less than 5 _____ 6-10 _____ 11-15 _____
16-20 _____ 21-25 _____ Over 25 _____

7. Type of school: (circle grade configuration)

K 1 2 3 4 5 6 7 8 9 10 11 12

Other (please specify)_____

8. Size of School:

Less than 200 ____ 200-400 ____ 400-600 ____
600-800 ____ 800-1,000 ____ Over 1,000 ____

APPENDIX E

COVER LETTER

University of West Virginia College of Graduate Studies

Main Office: Institute, WV 25112
Phone: (304) 766-3000
Toll Free 1-800-642-2647

Dear Colleague,

You have been selected as one of the West Virginia school principals to participate in a study to determine the relationship between principals preferred brain hemispheric information processing modes and their preferred leadership styles. Your help in furnishing information about brain hemispheric processing modes and leadership styles of school administrators will make this study valuable to those who work with, employ, or train educational administrators.

You can assist in this study by taking approximately 25 minutes to complete the two instruments and the attached data sheet. Please return the three documents in the enclosed envelope.

Your participation in this study is voluntary and you are under no obligation to answer every question. Your responses will be completely anonymous and your data will be aggregated with all the other responses in such a way that no person will ever be identified as an individual respondent. If you would like to receive the results of the completed study, please provide your name and mailing address with the three documents.

I am conducting this research as part of my Doctoral program in Educational Administration. Your cooperation in completing the data sheet and instrument is greatly appreciated.

Cordially,

Barbara M. Kean

Barbara M. Kean
Doctoral Candidate

APPENDIX F

FOLLOW-UP LETTER

University of West Virginia College of Graduate Studies

Main Office: Institute, WV 25112
Phone: (304) 766-2000
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Dear Colleague,

This is a follow-up letter to the questionnaires and demographics sheet that I recently sent to you. I apologize if I caught you at an inconvenient time or if I did not send complete instructions to you.

I implore you as a fellow educator to please assist me to complete this research study on principals and their brain hemispheric processing modes. Enclosed are additional copies of the two questionnaires and the demographics sheet. If you have not already done so, please take a few minutes to complete them and return them to me.

Your contribution to this study will make it possible for your perceptions to be included in the final results. As I indicated in the original letter, your responses will be completely confidential and no one will know that you have participated. I really need your help and would greatly appreciate your responses. If you have already returned your responses to me, please consider this a thank you.

Cordially,

Barbara M. Kean

Barbara M. Kean
Doctoral Candidate

APPENDIX G

PROFILE CODES

HEMISPHERIC PROFILE CODES
(Herrmann, 1982)

PRIMARIES "1"

In any given quadrant, a primary indicates a preference for mental processing in that mode. It is possible to have two or more primaries.

SECONDARIES "2"

In any given quadrant, a secondary indicates a comfortable usage of mental processing in that mode.

TERTIARIES "3"

In any given quadrant, a tertiary indicates avoidance of mental processing in that mode. Tertiaries in a quadrant strengthen the opposing primaries.

1-1-1-1

This profile code is a quadruple primary with relatively equal preferences in all four quadrants. Individuals with this profile are characterized as being well integrated and are able to use each processing mode with equal effectiveness.

1-1-2-2

This is a double dominant profile code with primaries in the Upper and Lower Left quadrants. This profile indicates a preference for the logical, analytical, technical and rational processing of the Upper Left quadrant and the organizing, implementing, controlling, and conservative processing of the Lower Left quadrant. The interpersonal, emotional, and intuitive processing of the Lower Right quadrant and the holistic, creative and synthesizing processing of the Upper Right quadrant would be at the secondary level, yet functional.

1-1-2-3

This is a double dominant profile code with primaries in the Upper and Lower Left quadrants. This profile indicates a strong preference for the logical, analytical, and rational processing of the Upper Left quadrant and a very strong preference for the controlled, structured, and organized processing of the Lower Left quadrant. The Lower Right quadrant, characteristics of interpersonal, emotional, and intuitive processing would be secondary and functional. The Upper Right quadrant, characteristic of holistic, synthesizing, and conceptualizing processing would be avoided.

1-1-3-2

This is a double dominant profile code with primaries in the Upper Left and Lower Left quadrants. This profile indicates a very strong preference for the logical, analytical, and rational processing of the Upper Left quadrant and a strong preference for the controlled, conservative, and organized processing of the Lower Left quadrant. The secondary of this profile is in the Upper Right quadrant, in which the characteristics of imaginative, holistic and synthesizing processing would be functional, yet secondary in comparison with the primary left hemispheric processing. The Lower Right quadrant characteristics of emotional, interpersonal, and kinesthetic processing would be avoided. An avoidance in the Lower Right quadrant would strengthen and make more visible the processing in the Upper Right quadrant.

1-1-1-2

This is a triple dominant profile code, featuring two primaries in the Left quadrants and a third primary in the Lower Right quadrant. This profile indicates a preference for the analytical, rational, and quantitative processing of the Upper Left quadrant; a preference for the controlled conservative, structured organized processing of the Lower Left quadrant; and a preference for the interpersonal and emotional aspects of the Lower Right quadrant. Distinctly secondary, but generally functional, would be the integrative, creative and conceptual characteristics of the Upper Right quadrant. Although this is a relatively well balanced profile, clearly the descriptors of the Upper Right quadrant (conceptualizing, synthesizing) are secondary.

1-1-2-1

This is a triple dominant profile code, featuring two primaries in the Left quadrants and a third primary in the Upper Right quadrant. This profile indicates a preference for the analytical, rational, and quantitative processing of the Upper Left quadrant; a preference for the controlled conservative, structured, and organized processing of the Lower Left quadrant; and a preference for the conceptual, creative, and holistic aspects of the Upper Right quadrant. Although this is a relatively well balanced profile, clearly the descriptors of the Lower Left quadrant (emotional and interpersonal) would be secondary. In a relative sense, this profile lacks a level of "personal touch" that would be present if the Lower Right quadrant were a primary.

1-2-2-1

This is a double dominant profile code with the two primaries in the lower quadrants. This profile indicates a strong preference for the logical, analytical, quantitative processing in the Upper Left quadrant, and in contrast would also have a preference for the integrative, synthesizing, creative, and holistic aspects of the Upper Right quadrant. This profile indicates a secondary preference for the emotional, interpersonal processing of the Lower Right quadrant as well as a secondary preference for the controlled, conservative, organized processing of the Lower Left quadrant. Individuals with this profile frequently exhibit the ability to switch back and forth between the two primary quadrants, as the situation demands.

1-2-1-2

This is a double dominant profile code with a diagonal axis between the Upper Left quadrant and the Lower Right quadrant. This profile indicates a strong preference for the logical, analytic, and rational processing of the Upper Left quadrant and a strong preference for the intuitive, interpersonal, emotional aspects of the Lower Right quadrant. The controlled, conservative, structured processing of the Lower Left quadrant and the holistic, creative and synthesizing of the Upper Right quadrant would be secondary yet functional. It is possible for the primaries in this profile to create an inner conflict within the individual.

2-1-2-1

This is a double dominant profile code with a diagonal axis between the Lower Left quadrant and the Upper Right quadrant. This profile indicates a strong preference for the controlled, structured, organized, and conservative processing of the Lower Left quadrant and a strong preference for the holistic, conceptual, creative aspects of the Upper Right quadrant. The analytical, rational, and quantitative processing of the Upper Left quadrant and the emotional and interpersonal processing of the Lower Right quadrant would be secondary yet functional. Individuals with this profile may be quite controlled and structured on one occasion and may display opposite processing in another situation.

2-1-1-2

This is a double dominant profile code with the two primaries in the Lower quadrants. The profile indicates a strong preference for the conservative, structured, and controlled processing of the Lower Left quadrant and a strong preference for the emotional, intuitive, and interpersonal processing of the Lower Right quadrant. The analytic, rational, and logical processing of the Upper Left quadrant and the conceptual, holistic, creative processing of the Upper Right quadrant would be secondary yet functional. Persons with this profile tend to worry about details. The two primaries could represent an important duality causing internal conflict.

2-1-1-3

This is a double dominant profile code with the two primaries in the Lower quadrants. The profile indicates a very strong preference for the conservative, controlled, structured, and organized behavior of the Lower Left quadrant and a strong preference for the emotional, intuitive, and interpersonal processing of the Lower Right quadrant. The analytical, rational, and logical processing mode of the Upper Left quadrant would be secondary yet functional. The conceptual, holistic, creative, and synthesizing processing mode of the Upper Right quadrant would be tertiary and would be avoided. An avoidance in the Upper Right quadrant would strengthen and make more visible the processing in the Lower Left quadrant.

2-1-2-2

This is a singular dominant profile code with the most preferred processing mode being the Lower Left quadrant. This profile indicates a strong preference for the controlled, organized, structured and conservative processing of the Lower Left quadrant. An individual with this profile would tend to be a perfectionist in terms of detail and the implementation of activities. The other three processing modes, Upper and Lower Right and Upper Left quadrants are secondaries for this profile.

2-2-1-1

This is a double dominant profile code with primaries in the Upper and Lower Right quadrants. This profile indicates a strong preference for the creative, holistic, and synthesizing processing of the Upper Right quadrant and a strong preference for the emotional, interpersonal, and intuitive processing of the Lower Right quadrant. The logical, analytical, and mathematical processing of the Upper Left quadrant and the conservative, controlled, and structured processing of the Lower Left quadrant are secondary yet functional.

2-1-1-1

This is a triple dominant profile code with two primaries in the Right quadrants and the third in the Lower Left quadrant. This profile indicates a preference for the holistic, conceptual, and synthesizing processing of the Upper Right quadrant; a preference for the emotional interpersonal, and intuitive processing of the Lower Right quadrant; and a preference for the controlled, conservative, and organized processing of the Lower Left quadrant. Distinctly secondary, but generally functional, would be the logical, analytical, and sequential processing of the Upper Left quadrant.

3-1-1-1

This is a triple dominant profile code with two primaries in the Right quadrants and the third in the Lower Left quadrant. This profile indicates a strong preference for the holistic, conceptual, and synthesizing processing of the Upper Right quadrant; a very strong preference for the interpersonal, emotional, and intuitive processing of the Lower Right quadrant; and a strong preference for the controlled, conservative, and organized processing of the Lower Left quadrant. The Upper Left quadrant, characteristic of logical, sequential, and analytical processing modes would be avoided. An avoidance in Upper Left quadrant tends to strengthen and make more visible the three primaries with particular strength in the Lower Right quadrant.

3-3-1-1

This is a double dominant profile code with primaries in the Upper and Lower Right quadrants. The tertiaries occur in the Upper and Lower Left quadrants. This profile indicates a very strong preference for the creative, holistic, and synthesizing processing of the Upper Right quadrant and a very strong preference for the interpersonal, emotional, and intuitive processing of the Lower Right quadrant. The logical, analytical, and mathematical processing of the Upper Left quadrant and the conservative, controlled, and structured processing of the Lower Left quadrant would be avoided. An avoidance in each of the Left quadrants would strengthen and make more visible the two primaries.

THE RELATIONSHIP BETWEEN SCHOOL PRINCIPALS' SELF-PERCEIVED BRAIN HEMISPHERIC PROCESSING MODES AND THEIR SELF-PERCEIVED LEADERSHIP STYLES

Barbara McSwain Kean

ABSTRACT

This study was designed to examine the relationship between the self-perceived preferred brain hemispheric processing of West Virginia public school principals and their self-perceived leadership styles. Seventy-five respondents completed the Herrmann Brain Dominance Profile, the Leader Behavior Description Questionnaire, and a demographics sheet. Data were analyzed using the General Linear Model of the Statistical Analysis Systems (SAS). Chi Square analyses at the 0.05 alpha level were used to test two directional hypotheses that guided this study. Both hypotheses were confirmed.

Public school principals in West Virginia who perceived themselves as preferring mental processes that are predominantly left brain hemispheric perceived themselves to be initiating structure leadership style. Public school principals in West Virginia who perceived themselves as preferring mental processes that are predominantly right brain hemispheric perceived

themselves to be consideration leadership style.

Fifty-six principals had preferences for left hemispheric processing, 16 principals had preferences for right hemispheric processing, and three principals preferred neither left nor right hemispheric processing and were considered to be integrated. Of the 56 left hemispheric principals, 47 were males and nine were females. Of the 16 principals who preferred right hemispheric processing, five were males and 11 were females.

Significant differences were found between principals' preferred hemispheric processing modes and their predominant leadership styles. Additionally, significant differences were found between male and female principals' hemispheric preferences.

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