

To the Graduate Council:

I am submitting herewith a dissertation written by Cynthia Jeanette Norris entitled "Discussion of Brain Hemisphere Characteristics and Creative Leadership Among Selected Educational Administrators in Tennessee." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Educational Administration and Supervision.

C. M. Achilles

Charles M. Achilles, Major Professor

We have read this dissertation
and recommend its acceptance:

John T. Lovell

Larry Roberts

Lawrence J. Coleman

Accepted for the Council:

C. W. Mink

The Graduate School

A DISCUSSION OF BRAIN HEMISPHERE CHARACTERISTICS AND CREATIVE
LEADERSHIP AMONG SELECTED EDUCATIONAL ADMINISTRATORS
IN TENNESSEE

A Dissertation
Presented for the
Doctor of Education
Degree
The University of Tennessee, Knoxville

Cynthia Jeanette Norris

August 1984

Copyright © Cynthia Jeanette Norris, 1984

All Rights Reserved

DEDICATION

I am a part of all that I have met. . . .

Tennyson

This dissertation is dedicated to my parents,

Juanita and David Hudson

my husband,

Joseph Leon Norris

my daughters,

Sherry and Dayna

and my granddaughter,

Stephanie

Each has played a special part in the culmination of this work.

ACKNOWLEDGMENTS

Many individuals have assisted me in a meaningful way during the completion of this dissertation, and to each one I am grateful. Special appreciation is extended to Dr. Charles M. Achilles, my major professor, whose perceptive guidance and supporting friendship pointed the way. Grateful acknowledgment is extended to Ned Herrmann whose life and work enriched this study. To each member of my committee I extend a word of appreciation for the technical and conceptual assistance which they provided. To Dr. Gary Roberts, Dr. John Lovell and Dr. Lawrence Coleman I am indebted. A word of appreciation is likewise extended to Melba Wilkins and Dr. Robert Howard for their expert advise and support.

ABSTRACT

This study initiated an exploratory, ex post facto investigation into the cognitive styles of selected educational administrators. The study explored the hemisphere dominance patterns of educational administrators: superintendent (n=39), principal (n=37), and supervisor (n=39).

Five general hypotheses guided the study: (1) leadership in education is characterized by a style predominantly left-brained in orientation, (2) as level of educational position increases, so does the likelihood that leaders will be more narrowly left-brained in focus, (3) female administrators are more whole-brained oriented in cognitive style than males, (4) supervisors, whose duties are more staff than line, exhibit a better balance in hemisphere dominance than other administrative groups, and (5) conceptual skill is less evident among educational administrators at higher administrative levels.

A panel of experts nominated effective leaders who were also ranked according to Katz's leadership skills (technical, human, and conceptual) which they displayed most predominantly. A small random sample of superintendents (N=12) was selected for comparison purposes. All subjects completed: (1) a self-report measurement of brain hemisphere dominance, The Herrmann Brain Dominance Instrument and (2) a researcher-designed questionnaire measured perceived innovation displayed by each leader. Composite profiles of leadership at the respective administrative levels were then drawn.

Positive relationships were found between two of the Katz management skills and specific areas of brain dominance (i.e., conceptual-right brain $p < .003$; technical-left brain $p < .07$). Superintendents were strongly oriented toward a left-hemisphere style and more highly rated in technical than in conceptual skill. Principals exhibited a balance in left-right-brain dominance and a high level of perceived innovation. As a group, principals were ranked highest in conceptual skill. Supervisors, the most whole-brained of the three groups studied, ranked highest in human skills. Women were more characteristically whole-brained than men. Results supported four of the five hypotheses, and results were mixed for one (leadership in education is characterized by a style predominantly left-brained in orientation).

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION TO THE STUDY	1
Introduction	1
Statement of the Problem	6
The Purpose	10
Significance of the Study	11
Definition of Terms	11
Assumptions	13
Limitations and Delimitations of the Study	14
Hypotheses and Questions to Guide the Study	14
Organization of the Study	16
II. REVIEW OF SELECTED AND RELATED LITERATURE	17
Introduction	17
Brain Research	18
Creative Leadership	43
Education and the Change Process	98
Summary	113
III. METHODOLOGY	114
Introduction	114
Procedure used in Nomination and Selection of	
Subjects	115
Herrmann Brain Dominance Instrument	118
Development, Scoring, Field Testing and Validation	
of the <u>Perceived Innovation Questionnaire</u>	124

CHAPTER	PAGE
Statistical Design and Procedures of the Study	131
Summary	139
IV. PRESENTATION AND DATA ANALYSIS	140
Introduction	140
Summary	189
V. SUMMARY OF FINDINGS, DISCUSSION, CONCLUSIONS AND	
RECOMMENDATIONS FOR FURTHER STUDY	190
Introduction	190
Summary of Findings from the Review of Literature . . .	193
Summary of Findings from Exploratory Research of	
Hemisphere Dominance and Perceived Innovation	196
Discussion	206
Conclusions	225
Recommendations for Further Study	229
LIST OF REFERENCES	232
APPENDIXES	244
APPENDIX A: NOMINATION MATERIALS	245
APPENDIX B: REQUEST FOR SUBJECTS FOR STUDY	249
APPENDIX C: BRAIN DOMINANCE MATERIALS	251
APPENDIX D: PERCEIVED INNOVATIVE MATERIALS	263
APPENDIX E: LETTER TO RANDOM SAMPLE SUPERINTENDENTS	273
VITA	275

LIST OF TABLES

TABLE	PAGE
I. Interpersonal Skills ^a	90
II. Average Progress in Management by Major	91
III. Frequency Distribution Administrators/Supervisors by Brain Dominance Code in Tennessee, 1984	143
IV. Frequencies and Percentages of Most Prevalent Dominance Patterns Among Administrators (N=115) in Tennessee, 1984	145
V. Frequency Distribution Cluster Code: Whole Brained, Right Brained, Left Brained, and Limbic by Nominated Administrative Group in Tennessee, 1984	151
VI. Total Administrative Group by Whole-Brain/Right vs. Left/ Brain/Limbic Dominance in Tennessee, 1984	153
VII. Means for Left/Right Brain Dominance by Administrative Group in Tennessee, 1984	155
VIII. Frequency Distribution Conceptual, Human, Technical Nominations by Administrative Group and Nomination Rank in Tennessee, 1984	157
IX. Percentage of Right and Left Hemisphere Subjects by Rank of Nomination and Classification Conceptual, Human and Technical Skill (N=103) in Tennessee, 1984 . .	159
X. <u>t</u> -Test--Conceptual #1 and Technical #1 by Right Brain Score for Administrative Groups in Tennessee, 1984 . . .	161

TABLE	PAGE
XI. <u>t</u> -Test--Conceptual #1 and Conceptual #2 or #3 Right By Brain Score for Administrative Groups in Tennessee, 1984	162
XII. Sample Chi Square Analysis for Skill Rank/Position Value by Dominance Position in Tennessee, 1984	164
XIII. Results of Chi Square Analyses of Katz's Administrative Skill Ranking by Dominance Position Value for Total Group (N=103) in Tennessee, 1984	165
XIV. Administrative Group by Nomination Value of Administrative Skill as Defined by Katz (N=103) in Tennessee, 1984	166
XV. Sample Chi Square Analysis for Innovation/Administrative Group in Tennessee, 1984	170
XVI. Means, Standard Deviation, and Range of Scores for Total Score on <u>Perceived Innovation Questionnaire</u> by Administrative Group in Tennessee, 1984	171
XVII. Frequency Distribution Whole-Brained/Right-Brained vs. Left Brain/Limbic Dominance Patterns for Nominated Sample (N=103) in Tennessee, 1984	173
XVIII. <u>Perceived Innovation Questionnaire</u> Score Ranges (Low, Medium, High) for all Administrative Groups in Tennessee, 1984	174
XIX. <u>t</u> -Test Total Score/Subtotal Score on <u>Perceived</u> <u>Innovation Questionnaire</u> by Brain Dominance (Right/Left) for Administrative in Tennessee, 1984 . . .	176

TABLE

PAGE

XX.	Frequency Distribution and Percentages by Sex for Brain Dominance and Level of Innovation as Determined by <u>Perceived Innovation Questionnaire</u> (N=103) in Tennessee, 1984	178
XXI.	<u>t</u> -Test for Elected vs. Appointed Superintendents by Left/Right-Brain Dominance and Innovation as Measured by the Total Score on <u>Perceived Innovation Questionnaire</u> (N=27) in Tennessee, 1984	187
XXII.	Pearson r Correlations Between Left/Right Brain Dominance Scores and Total Score on the <u>Perceived Innovation Questionnaire</u> in Tennessee, 1984	188

LIST OF FIGURES

FIGURE	PAGE
1. Motor and Sensory Pathways	19
2. A Comparison of Left-Mode and Right-Mode Characteristics . .	25
3. Hemispheric Dominance	26
4. Resident Functions of Left and Right Hemispheres	27
5. The Triune Brain	29
6. Measuring Brain Dominance	31
7. Lateral vs. Vertical Thinking	39
8. Creativity: A Whole-Brained Process	42
9. Model of the Minds of Man	48
10. Hierarchy of Management Skills	51
11. Dominance Style: Analysis vs. Conceptualization	54
12. Comparison of Brain Dominance of Chief Executive Officers with School Superintendents	56
13. The Principal's Average Time Spent on the Media of Work During the School Day	63
14. Proportion of Scheduled and Unscheduled Time Spent on the Work Media	64
15. Dominance Style: Logic vs. Intuition	68
16. Comparisons between Custodial Attitudes and Creative Attitudes	72
17. Dominance Style: Creativity vs. Status Quo	75
18. The Interaction of Executive Functions and Predispositional Sets	82

FIGURE	PAGE
19. The Two Modes of Consciousness: A Tentative Dichotomy	85
20. Clustering of Dominance Styles in the Medical Profession	88
21. Dominance Style: Task vs. Relationship	93
22. Human Information Processing in Management Decision Making	99
23. Dominance Style: Flexibility vs. Stability	100
24. Brain Dominance Scoring Worksheet	121
25. Most Common Brain Dominance Profiles	122
26. Dominance Profile Grouping	123
27. Profile Clusters* of Administrative Groups	125
28. Herrmann Brain Dominance Consolidated Score Sheet	126
29. Code: 1122--Nominated Superintendent's Dominance Code . . .	147
30. Code: 1121--Principal's Dominance Code	148
31. Code: 1111--Supervisor's Dominance Code (N=37)	149
32. Code: 1122--Random Sample Superintendent's Dominance Code (N=12)	150
33. Frequency Distribution and Percentages of Male and Female Groups on <u>Innovative Management</u> <u>Questionnaire</u> by Brain Dominance	179
34. <u>Perceived Innovation Questionnaire</u> Score Ranges (Low, Medium, High) for all Nominated Administrative Groups by Right or Left Dominance	181

FIGURE

PAGE

35.	High, Medium and Low Score Ranges on <u>Perceived Innovation Questionnaire</u> by Brain Dominance (Right/Left) and System Size	182
36.	Percentages for Categories of City vs. County on High, Medium or Low <u>Perceived Innovation Questionnaire</u> Score Ranges by Brain Dominance	184
37.	Percentages for Categories of Doctorate vs. Non-Doctorate on High, Medium or Low <u>Perceived Innovation Questionnaire</u> Score Ranges by Brain Dominance	185
38.	Dominance Profiles of School Superintendents in Current Study and School Superintendents in Coulson Study	208
39.	Dominance Profiles of School Superintendents and Chief Executive Officers	209
40.	Dominance Profiles of Random Sample School Superintendents and Chief Executive Officers	211
41.	Dominance Profiles of Random Sample and Nominated Sample Superintendents (N=27)	212
42.	Dominance Profiles of School Principals and Chief Executive Officers	214
43.	Dominance Profile of Nominated School Supervisors and Chief Executive Officers	217
44.	Profiles of Nominated Superintendents, Principals and Supervisors	218
45.	Composite Profile of School Administrators-- Code 1121, (N=103)	219

CHAPTER I

INTRODUCTION TO THE STUDY

I. INTRODUCTION

As society approaches a new era of economic uncertainty, technological sophistication and self-oriented individualism, current literature is noticeably silent in its affirmation of a leadership style based predominately on the logic long revered in Western Culture. There are instead cries for a leadership of vision and intuitive awareness which somehow seems more appropriate for dealing with the complex challenges of an evolving society. The educational system, a reflection of this larger society, is not immune to its transitory nature. Maintaining an existing educational order based on logic alone appears outdated in a world characterized by uncertain change.

Maccoby in his latest work, The Leader: A New Face for American Management (1981), discusses the importance of a leader being one who can visualize the positive values of the new American character and allow these qualities to evolve in positively shaping our new directions. Levine (1982:31) makes a similar point for revitalized educational leadership by stating that "American higher education needs leaders of vision;" and he challenges that higher education is mired in survivalism, making real leadership impossible.

The reality of whether top-level educational leaders will be guided in the future primarily by the logical thought processes emphasized in current educational administration training programs, or will rely more upon other capabilities of the human psychic not yet fully utilized, may ultimately be decided by society's changing attitudes and demands of its leadership.

The visionary qualities so vital to this evolving concept of leadership are not new. Nearly 50 years ago Barnard (1937:235) discussed the implications of logical and non-logical thought upon decision making in management and suggested that leaders needed to consider three purposes of mental effort: "To ascertain truth, to ascertain a course of action and to persuade." The latter two purposes, he emphasized, should be dealt with from a non-logical approach and should incorporate intuitive and conceptualized thought processes.

Barnard in his later work, The Functions of the Executive (1968:85) explained that the executive process was one of integration of the whole and concluded that few leaders exhibited or possessed this "formal and orderly conception of the Gestalt." Katz (1974) described this same characteristic of leadership as conceptual skill and emphasized the importance of its being a major portion of the expertise found among leaders at the highest echelons of an organization. Realizing that organizational objectives and purposes are focused at the executive level, Mintzberg (1976:56), too, emphasized the importance of holistic thinking by indicating that there must be

among the top-level administration a "creative individual who can visualize and conceptualize for the entire organization."

While holistic and intuitive approaches appear to be important to top-level leadership in terms of decision making, equal attention is being directed toward a leader's intuitive assessment of situations and people within the organization. Much has been proposed in the realm of situational leadership. One is taught to flex one's style, to adapt to the maturity level of the group and to the systemic organizational design. One must, however, first be perceptive and adaptable. The ability to adapt and to sense intuitively the appropriate is not logically based; neither is the understanding of when and how to flex one's style. Both depend upon one's ability to exercise the intuitive-ness necessary for sensing the appropriate. Both call for empathy and adaptability on the part of a leader.

Hersey (1981) indicates that although a person may have a wide-style range, that person will be an ineffective leader without the perception required to make the appropriate modifications in changing situations. Successful leadership is more dependent upon ability to adapt than it is upon incorporation of any style of management.

Each of the management authorities previously discussed has contributed to the growing awareness that a more holistic approach is needed in the area of leadership. Each has helped to pave the way to a realization that such an approach is possibly centered in the manner in which one perceives and reacts to the external world, i.e., his/her cognitive style. Perhaps the greatest impact toward this awareness has occurred, however, through recent scientific discoveries related to the

human brain and the influence of its specific hemispheres. This emerging body of knowledge could well provide new directions in future management training and selection procedures.

In the scientific realm considerable interest exists concerning the dual nature of human consciousness. This phenomenon, which has been of concern for hundreds of years, has only in the last decade been supported by scientific evidence. Recent research has answered many of the questions concerning the intricate workings of the brain and has defined the parameters of its hemispheres. Such scientific breakthroughs can be attributed to Dr. Roger Sperry and co-worker, Dr. Joseph Bogen, who through their work with epileptic and brain-damaged stroke patients, were able to study the surgically separated hemispheres and thereby define their respective capabilities. Researchers such as Paul McLean (1964), Robert Ornstein (1977), Marcel Kinsbourne (1978), and Jerre Levy (1980) have helped to clarify further the nature of the hemispheres, the effects of the brain's triune evolutionary development and the interaction made possible through the corpus callosum.

Studies indicate that the halves of the brain do think in distinctly different ways. Such research supports the assumption that the left hemisphere is analytical, sequential and verbal, as well as being the center for reading, writing, speaking and mathematics. The right hemisphere is characterized by intuitive, creative thought and is holistic in nature. Visual images and metaphoric thinking are controlled by the right hemisphere, which is likewise the center for emotion.

Not only has recent research enabled us to understand how the separate hemispheres act in isolation, but we now have a greater understanding of the interrelatedness of the hemispheres in the thinking process. We now understand that the creative process is whole-brained in nature and is dependent upon the use of both logical and non-logical thought for its fulfillment (Bogen, 1976). As Raudsepp (1981:49) expressed it, "The intuitive mode is not opposed to the rational, cognitive mode, but works with it in a complimentary fashion." This hemisphericity has implications for management.

It would appear that both hemispheres are important in effective management and that top-level administrators would improve their chances of being effective leaders by using a "whole-brained" approach rather than relying so heavily on the analytical, logical processes emphasized in current management training programs. As Blakeslee (1980:6) concluded "Man's highest achievements are a result of using the full power of both halves of the brain together."

The popularity of Japanese management has increased the tendency to look beyond logic for answers in the management milieu. It has been stated that Japanese manage with the whole brain, and their non-linear style is being examined more closely by American businessmen (Lim, 1982). Many believe that America's business schools need to scrutinize their curricula and incorporate skills previously considered to be outside the realm of necessary training. A similar need exists in the realm of educational leadership.

II. STATEMENT OF THE PROBLEM

Rationale

As the world becomes more complex, so, too, do the demands placed upon top-level educational leaders who will be faced with the dilemma of guiding education through this evolutionary phase. The coming of a new age offers the potential for revitalizing and enhancing the very nature of our educational system while at the same time it presents us with the dilemma of a leadership crisis.

The new order is characterized by decline in almost every facet of our lives: populations, resources, satisfaction and confidence (Culbertson, 1976:256). Added to this are (1) an upsurge in technology which promises virtually to reorganize and direct our present life style, and (2) a staggering rate of growth in cultural diversity which is bringing us even closer to being a culturally pluralistic society (Harris, 1976:270). Individuals in this evolving society are searching for self-fulfillment and are beginning to question rather than to accept the status quo of their existence. Leadership during this evolutionary age must move beyond the left-brained managerial attitudes of the past and formulate new directions. During a period of escalating change, the "answers" are not likely to be found in an analysis of past situations. As Levine (1981:31) suggests: "Survival strategies that work today are unlikely to work tomorrow. They certainly will not meet the challenges of the day after."

It is imperative during this transitory phase that education's leaders be those who are capable of conceptualizing visions of the

future and who will maintain a way of thinking that is perceptive and open to new ideas. Lim, in A Japanese Agenda for Management Development (1982:65) suggests that managers in our Western culture have too long "put the premium on the knowing mind" supported by hard data rather than the "beginner's mind" which maintains an attitude of openness and receptiveness. Lim stresses that the pursuit of excellence is a "continuing search and not a quickly grasped fact."

Manager vs. Leader

Such a frame of reference demands that educators search out and endeavor to develop leadership talent further rather than be content with mere "managerial" skill among its administrators. Zaleznik (1977:68) suggests that organizations by the very nature of their logical and bureaucratic structure tend to encourage a conservatism that promotes the development of managers of the status quo rather than leaders of a new order. As he states: "Out of this conservatism and inertia organizations provide succession to power through the development of managers rather than individual leaders."

This fact was vividly portrayed by Ziegler and Carlson in their respective research related to the superintendency. Ziegler refers to present administrators as "survivors" and points to Carlson's findings that the 10 percent of all male teachers who last over five years in education tend "to become more politically conservative and to develop an unusually high need for respect, an exaggerated concern for authority, and a personal rigidity and a fear of risk-taking behavior" (Schneider, 1972:3). From among this 10 percent of "survivors" school systems select the vast majority of their administrators.

The manager vs. leader dilemma is further noted in research tying the building-level administrator to the educational change process. One such study indicates that "the individual school site is the basic unit of educational change and improvement making the principal the most vital leader in the improvement of public schools" (Hodgkinson, 1982:42). McCarthy (1982) noted that among administrative groups, the building administrator has the greatest longevity in his/her current position. McCarthy (1982:30) states: "It seems likely that current job incumbents will provide the major source of supply for administrative positions for at least the next couple of decades." and she concludes: "The fact that 85 percent of the respondents were not currently working on an advanced degree, indicates that continued professional education may not be insured if left totally to the individual." It would appear that present educational administrators will continue to occupy existing positions for some time to come, and that any immediate changes in administrative styles will need to be accomplished through intervening measures.

If current leaders are willing to modify thought patterns and to open their minds to fresh approaches, is leadership style change possible? Just how much can be improved by training and how much is innate to the individual's cognitive style is yet to be determined. Some authorities in the field of brain research believe that much can be done to strengthen areas of weakness in hemisphere dominance thereby improving total cognitive style (Blakeslee, 1980; Torrance, 1981; Herrmann, 1980). Others seem less hopeful that major change will take place.

In a discussion of the conceptual skill needed by top level leaders, Katz (1974:101) suggests that "Unless a person has learned to think this way early in life, it is unrealistic to expect a major change on reaching executive status." He further states, "I question how easily this way of thinking can be inculcated after a person passes adolescence. In this sense, then, conceptual skill should perhaps be viewed as innate ability."

Zaleznick (1977), too, suggests that much of what distinguishes a leader from a manager is developed early and depends upon the path of development an individual pursues. He explains that managers are developed through socialization, or a desire to maintain the social order to which they feel a major part and on which they depend for their identity. Leaders, in contrast, evolve through "personal mastery." Zaleznick refers to persons who exhibit personal mastery as "twice born" individuals who have developed within themselves the confidence and personal security that allows them to find their own identity irrespective of groups association. A similar idea is suggested by Sheehy's discussion of pathfinders (1981:48):

Pathfinders are just as concerned with their inner achievements as they are with their outer attainments. How well they do in developing strength of character, deepening ties to their intimates, doing something worthwhile in their culture . . . these are achievements that can only be self-measured.

It would seem, then, that initial selection of potential candidates for positions in educational administration is equally critical to the training provided them after selection takes place.

The Problem

There is little doubt that the interrelationships between appropriate training (both formal and through life's experiences) and the administrative style necessary to enable educational leaders to face the mounting problems of an evolving society are of importance. These and other concerns lead directly to the problem for this exploratory study. Although there have been some theoretical formulations and related studies of brain dominance and cognitive styles in the private sector of business and industry, little such work has been done with educational administrators. The problem of this study was to initiate some brain dominance research in educational administration at an exploratory level. Results of this study should generate hypotheses for future research.

III. THE PURPOSE

The purpose of the study is to explore the cognitive styles of educational administrators at various levels: superintendent, principal and supervisor. Administrators are surveyed to determine their respective brain hemisphere dominance. Cognitive style is compared with certain administrative competencies as set forth by Katz (i.e., conceptual, human, and technical) as well as to the perceived innovation of the leader. Other variables that may possibly contribute to the collective cognitive style of the various groups (i.e., sex, leadership position, size of school system) are also explored.

IV. SIGNIFICANCE OF THE STUDY

Results of this study will have implications for the recruitment, selection and training of educational administrators by identifying, through exploratory research, the cognitive styles most compatible with innovation/leadership among educational administrators at selected levels. Results could assist in selecting advanced-degree candidates for educational administration programs and in guiding individuals into the most appropriate course of study within the administrative field. Since the study explores both the analytical and conceptual aspects of management, it could influence the content and design of future educational administration training programs. Lastly, it will provide some initial information on cognitive styles of educational administrators that may shed some light on barriers to educational change and innovation.

V. DEFINITION OF TERMS

An understanding of certain key terms is important to this study. Some terms of interest are defined here, particularly those related to brain dominance.

Analytical. The cognitive process of separating the whole into its component parts.

Brain dominance. The hemisphere of the brain that has governance over behavior.

Cognitive. Concerned with the thinking and perceiving processes.

Conceptual skill. The ability to visualize the total picture.

Convergent. To come together at one point or to establish the one correct answer or best method.

Corpus callosum. A bundle of nerve fibers forming the link between the left and right hemispheres of the brain.

Creative. A synthesis of the logical with the intuitive, or the analytical with the conceptual.

Empathy. An intuitive awareness of others feelings.

Gestalt. Formulation of the total picture in contrast to separating the component parts.

Hemisphericity. A term referring to the brain's hemispheres.

Holistic. Cognitive processing that is characterized by a balanced use of both left and right hemispheres.

Intuitive. Formulating conclusions from feelings rather than a logical process.

Janusian thinking. A creative process of utilizing opposites.

Leader. One who searches out opportunities for change and visualizes new directions.

Linear. Referring to the left brain's sequential patterning.

Logical. Basing one's actions and decisions upon sound reasoning.

Manager. One who gets things done through people, but generally in standard, status quo ways.

Metaphoric. Having to do with the right brain and its tendency toward comparative, symbolic thinking.

Non-linear. Referring to the right brain's free thought patterns.

Rational. Governance by a process of reasoning.

Sequential. Parts put together in a sequence to form a whole.

Situational leadership. Management based on adapting one's style to correspond with an existing situation.

Style flex. Changing one's style to match a situation.

Survivalism. Maintaining the status quo and protecting an organization from the uncertain.

Vision. The ability to discern through foresight and to formulate images of the future.

Whole brained. Utilizing both hemispheres of the brain in balanced proportion.

VI. ASSUMPTIONS

The basic assumptions related to this study are:

1. Brain hemisphere dominance can be determined by personal evaluation.
2. Innovative leadership can be inferred.
3. Different qualities of leadership are effective at different administrative levels.
4. The cognitive style of an individual determines whether he/she will be an innovative leader.

5. Nominated subjects in this study exhibited innovation/ leadership as one basis for their being nominated.

VII. LIMITATIONS AND DELIMITATIONS OF THE STUDY

Limitations

1. Testing procedures may not conclusively determine brain hemisphere dominance.
2. The sampling, using a nominative technique, is subject to the limitations of the reputational nomination process, e.g., visibility, popularity.

Delimitations

1. Because of the necessary one-to-one testing procedures, the sample is relatively small.
2. Due to their quantitative nature, "scores" on the Perceived Innovation Questionnaire are treated for some analyses as interval data to benefit from the robustness and parsimony of some parametric tests.

VIII. HYPOTHESES AND QUESTIONS TO GUIDE THE STUDY

Kerlinger suggests that "when guided by hypotheses the results of such [ex post facto] studies are more valid . . . " (p. 391). Therefore, based on extensive library research, this researcher has developed certain research hypotheses to guide this study.

H₁ Leadership in education is characterized by a style predominately left-brained in orientation.

H₂ As level of educational position increases, so does the likelihood that leaders will be more narrowly left-brained in cognitive style.

H₃ Female administrators are more whole-brained oriented in cognitive style than are males.

H₄ Supervisors, whose duties are more "staff" than "line," exhibit a better balance in hemisphere dominance than do other administrative groups.

H₅ Conceptual skill is less evident and technical skill is more evident among educational administrators at higher administrative levels.

Because of the exploratory nature of this research, a series of related questions guided the inquiry. Answers to the questions will provide data to support or reject the hypotheses.

1. What brain dominance patterns are most prevalent among the following groups of educational leaders: nominated superintendents, random sample superintendents, supervisors and principals?

2. What are the differences among these groups in terms of dominance patterns?

3. Is there a difference among respective groups between brain dominance as measured by the Herrmann instrument and the Katz skills of management used in the nomination: conceptual, technical, and human?

4. What differences exist between perceived innovation and brain dominance patterns in terms of the following variables: (a) sex, (b) leadership position, (c) school system size, (d) city or county system, (e) doctorate vs. non-doctorate, (f) method of superintendent

selection, and (g) nominator ratings: conceptual, technical, and human.

5. Is there a difference between perceived innovation and a whole-brain cognitive style?

6. Is brain dominance as measured by the Herrmann Brain Dominance Instrument related to perceived innovation as determined by responses to researcher-made questionnaire?

IX. ORGANIZATION OF THE STUDY

Chapter I contains an introduction, a statement of the problem, a statement of the purpose, significance, definitions of terms, the assumptions and delimitations, research hypotheses and questions, and the organization of the study.

Chapter II contains a review of the related literature on brain hemisphere dominance, creative leadership, and educational change.

Chapter III presents the methodology of the study.

Chapter IV presents and analyzes the data collected for this study.

Chapter V contains a listing of the findings, the summary, discussion, conclusions and recommendations for future studies.

CHAPTER II

REVIEW OF SELECTED AND RELATED LITERATURE

I. INTRODUCTION

Creative leadership is viewed in this study as a synthesis of the intuitive nature of man with the realities of an evolving complex environment. Creative leadership provides an organization with purposeful direction. This leadership style requires greater reliance on a brain dominance that is either right brained or an integrated "double dominance" pattern in which right and left hemispheres share approximately equally.

Although this leadership approach is neither trait-oriented nor situational in total orientation, elements of both theoretical constructs are evident. Current trends toward situational leadership and an organizational theory based on a systems approach are compatible with this intuitive cognitive style which is characterized by an ability to sense the appropriate and make necessary adaptations to an ever-changing environment. Similarly, such a style is suggestive of an executive process which represents an integration of the whole referred to by Barnard (1976:257) as "aesthetic and moral" rather than intellectual in nature.

Several key concepts are addressed in the following literature review. Since creative leadership is set against a backdrop of

current brain research, that section of the literature review is dealt with first followed by a section on creative leadership and its components. The concluding section investigates the effects of a creative leadership style upon education and the process of change.

II. BRAIN RESEARCH

Evolution of Current Brain Research

The turning point in our present knowledge of brain functioning and the resultant mushrooming brain research began with the split brain experiments of Roger Sperry in the 1950's. It was through the efforts of Sperry and his associates that the mysteries surrounding the corpus callosum, the unifying and connecting fiber separating the two hemispheres of the brain, were uncovered and the related impact upon the two separate thinking modes of the left and right hemispheres was revealed. Through these studies, previous theories of the duality of man's thinking were confirmed, and it was established that the human brain did indeed contain "two minds in one" (Sperry, 1964:42-52).

Sperry's studies revealed that information received through the body's left sensory field was received and interpreted by the right hemisphere of the brain. Similarly such input channeled to the right sensory field was received and processed by the left hemisphere (Sperry, 1964). Figure 1 illustrates this system of sensory routing. Levy (1981), an associate of Sperry, was able to distinguish, through the incorporation of extensive sensory-processing tests administered

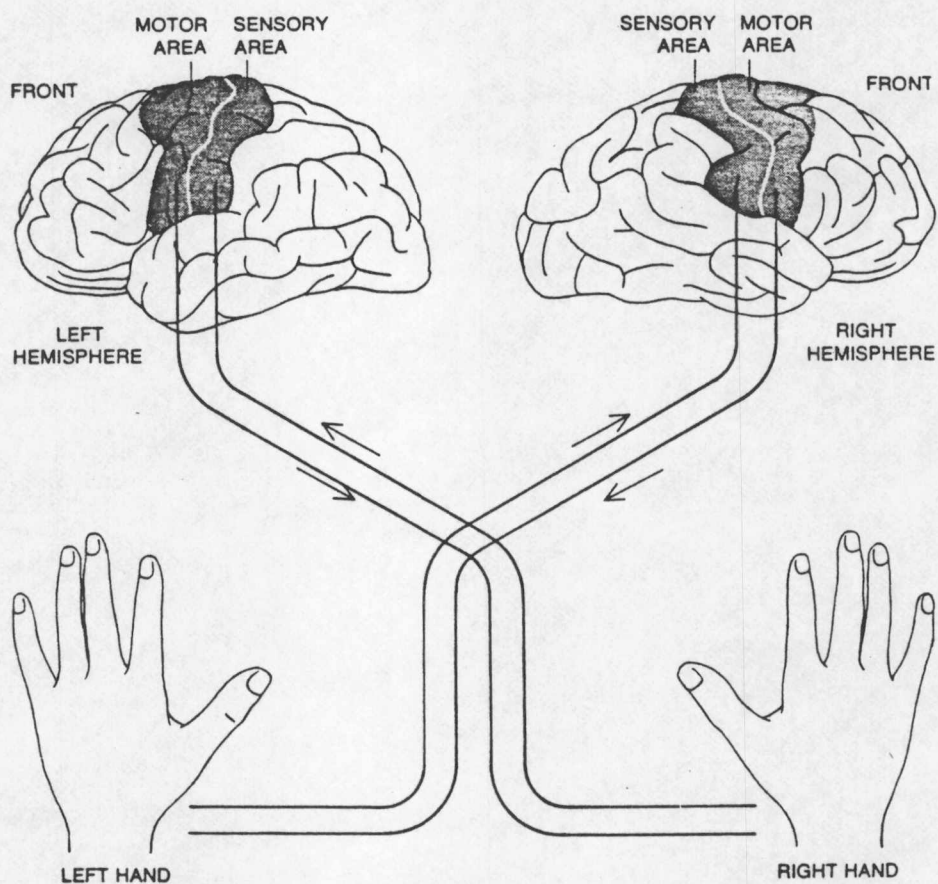


Figure 1: Motor and Sensory Pathways.

Source: Doreen Kimura, "The Asymetry of the Human Brain," Scientific American, Vol. 228, No. 3, 1978, p. 76.

to split-brain patients, that the hemispheres are selective in the type of information which they process most readily. Her experiments demonstrated that (1) the left hemisphere is more adept at verbal tasks incorporating an analytical style of cognitive processing, and (2) the right hemisphere is superior in visuo-spatial tasks incorporating a synthesis or holistic approach in cognitive style.

While the 1950's mark the landmark point for the shaping of current brain hemisphere theories, a brief glance backward from that point reveals that the scientific study of man's duality had its origins over a hundred years ago. Each contributing part of the research puzzle has added to the completed design of current knowledge. According to Levy (1981:248): "It should be recognized that though psychology only has recently come to appreciate the fact and significance of cerebral asymmetry in the human brain, the evidence has been available for over a hundred years."

Restak (1979) in a keynote address to the NASSP (National Association of Secondary School Principals) Conference on Brain Research in New Orleans presented the following summary of historical milestones contributing to our present-day theories (Paraphrased from Restak's Keynote address and Restak, The Brain: The Last Frontier, 1979:164-206).

The Brain in Terms of Dynamic Inter-Relationships--1800's--
Theory of Phrenology. Localization of brain functions was emphasized. This theory was significant in forming the basis of current thought on left-right brain hemisphere functioning.

1844. English physician A. L. Wigan published The Duality of the Mind. He noted in this book:

If only one cerebrum is required to have a mind, the possession of two hemispheres (the normal state) makes possible and perhaps even inevitable the possession of two minds (Restak, 1981:165).

1864. French surgeon, Paul Broca, theorized that failure of a patient to speak was due to damage in a specific area of the left brain. Researchers confirmed this area as a specific language center and termed it "Broca's Area" of the brain.

1874. German neurologist, Carl Wernicke discovered a second speech center having to do with association of meaning. It was theorized that this area must connect in some manner with not only "Broca's Area" but with other parts of the brain.

1875. French neurologist, Joseph Jules DeJérine suggested that the corpus callosum was a unifying mechanism connecting the stimuli received in one hemisphere and transmitting it to the other.

Although pioneers were present during the nineteenth century, their work did not progress toward a theory of lateralization probably due to the emphasis during that time on phrenology, or localization (Bogen, 1973:101-125). Levy (1980:245) suggested that: "Until the middle of the 20th century the only firm generalization regarding higher processes was that speech was localized in the left cerebral hemisphere in most right-handers."

Left Hemisphere

During this period of awakening knowledge, man had a far greater understanding of the functions and nature of the left

hemisphere than of the right. Indeed, it is often stated that our modern day Western culture still worships the left hemisphere to the exclusion of the right (Ornstein and Brandwein, 1977:54-58). This fact can be attributed primarily to our culture's heavy reliance on language and logical thought. Within the left hemisphere is housed man's ability to understand verbal language and his ability to express himself in meaningful terms (Gazzaniga, 1967; Kimura, 1973; Nebes, 1974). This hemisphere also is the domain of logical, mathematical thought (Messick, 1963; Bogen, 1973; Dumas, 1975), sequential planning (Luria, 1970) and controlled emotion (Sperry, 1975; Restak, 1979). Levy (1980:253) sums up our current knowledge of the left hemisphere by stating:

A converging body of evidence . . . points to the conclusion that the left hemisphere is vastly superior and dominant to the right in linguistic processing, that it thinks logically, deductively, analytically and sequentially, that its linguistic superiority derives from fundamental differences in the way it processes, decodes, encodes and arranges information.

Right Hemisphere

The turn of the twentieth century ushered in a new understanding of the right hemisphere of the brain previously thought to be of little value in higher-level thought processes (Gazzaniga, 1967). Researchers were at last able to demonstrate that not only did the right hemisphere possess certain capabilities, but it actually excelled in many important intellectual skills. To the right hemisphere was attributed a superiority for spatial tasks and visual processes (Kimura, 1973; Kinsbourn and Smith, 1974; Wittelson, 1976). Musical

skills (Gardner, 1982) and artistic (Rennels, 1976; Edwards, 1979) ability were recognized as the domain of this hemisphere, and it was viewed as superior in divergent (Guilford, 1967) and metaphorical capabilities (Eccles, 1973; Samples, 1975). It was proclaimed the domain, also, of intuitive thought (Ornestein and Brandwein, 1972).

Researchers agreed that the right hemisphere did have its own special type of language: the metaphoric language of the poet, the analogistic language of the scientist and the non-verbal expression of the mime. Such language is expressive in terms of feelings it can convey, but it remains unable to verbalize those feelings.

Samples (1980) perhaps celebrates most poetically the beauty of the right brain process. He terms the right brain a "maverick . . . as wild and unruly as a child" (p. 26) and states that: "It follows us doggedly and plagues us with its presence as we wander the contrived corridors of rationality" (p. 26). According to Samples, the right hemisphere of man is the most natural avenue for thought; and it is the process of culturalization, primarily through the introduction of language, that refines its open-endedness to a system of structure and detail indicative of man's left brained nature. Samples (1980:24) explains that man is born into the world with an:

. . . Unspecialized Metaphoric mind--as a child of nature; time is cyclic, space is limitless; all things are holistic and unified. But shortly after birth, culturalization begins. Language is the dominant cultural influence, and it introduces the child to its first cultural discovery; the undifferentiated, holistic world it perceives cannot be communicated holistically. It must first be chopped up and labeled.

Several researchers have proposed dichotomies of thinking styles which are attributed to the two hemispheres. Edwards (1979) suggested the listing presented in Figure 2. She referred to the two separate thinking styles as "L mode" and "R mode." Figures 3 and 4 represent similar dichotomies suggested by other researchers.

Interrelatedness of Brain Areas

Restak (1979:164-206) described the human brain as an interrelated model making it impossible to completely isolate functions as being merely right or left brained. The brain, because of its dynamic nature is both localized and holistic. Organization of the human brain is set in the lower sections even before reaching the more sophisticated regions of the neo-cortex. There is a constant interrelatedness among all parts of the brain made possible not only through the corpus callosum but also through the subcortical connections in regions of the brain underlying the neo-cortex.

The knowledge of this unifying system and of the underlying regions of the brain we owe to the work of McLean, Chief of the Laboratory of Brain Evolution and Behavior at the National Institute of Mental Health. During the 1950's, McLean (1978) discovered what he termed the "triune brain" which, he suggested, was actually composed of three layers that evolved during three separate stages in man's evolutionary development. According to McLean, man has, in fact, three brains in one, with each part through the brain's interrelated pathways, contributing to the total thought process. McLean explains it in the following way (p. 277): "Man finds himself in the

A COMPARISON OF LEFT-MODE AND RIGHT-MODE CHARACTERISTICS

L - MODE

Verbal: Using words to name, describe, define.

Analytic: Figuring things out step-by-step and part-by-part.

Symbolic: Using a symbol to stand for something. For example, the drawn form 13 stands for eye, the sign + stands for the process of addition.

Abstract: Taking out a small bit of information and using it to represent the whole thing.

Temporal: Keeping track of time, sequencing one thing after another: Doing first things first, second things second, etc.

Rational: Drawing conclusions based on reason and facts.

Digital: Using numbers as in counting.

Logical: Drawing conclusions based on logic: one thing following another in logical order --for example, a mathematical theorem or a well-stated argument.

Linear: Thinking in terms of linked ideas, one thought directly following another, often leading to a convergent conclusion.

R - MODE

Nonverbal: Awareness of things, but minimal connection with words.

Synthetic: Putting things together to form wholes.

Concrete: Relating to things as they are, at the present moment.

Analogic: Seeing likenesses between things; understanding metaphoric relationships.

Nontemporal: Without a sense of time.

Nonrational: Not requiring a basis of reason or facts; willingness to suspend judgment.

Spatial: Seeing where things are in relation to other things, and how parts go together to form a whole.

Intuitive: Making leaps of insight, often based on incomplete patterns, hunches, feelings, or visual images.

Holistic: Seeing whole things all at once; perceiving the overall patterns and structures, often leading to divergent conclusions.

Figure 2. A Comparison of Left-Mode and Right-Mode Characteristics.

Source: Betty Edwards, Drawing on the Right Side of the Brain, Los Angeles: J.P. Tarcher, 1979, p. 40.

HEMISPHERIC DOMINANCE	
CLINICAL AND EXPERIMENTAL EVIDENCE	
LEFT HEMISPHERE	RIGHT HEMISPHERE
(RIGHT SIDE OF BODY)	(LEFT SIDE OF BODY)
SPEECH / VERBAL LOGICAL, MATHEMATICAL LINEAR, DETAILED SEQUENTIAL CONTROLLED INTELLECTUAL DOMINANT WORLDLY ACTIVE ANALYTIC READING, WRITING, NAMING SEQUENTIAL ORDERING PERCEPTION OF SIGNIFICANT ORDER COMPLEX MOTOR SEQUENCES	SPATIAL / MUSICAL HOLISTIC ARTISTIC, SYMBOLIC SIMULTANEOUS EMOTIONAL INTUITIVE, CREATIVE MINOR (QUITE) SPIRITUAL RECEPTIVE SYNTHETIC, GESTALT FACIAL RECOGNITION SIMULTANEOUS COMPREHENSION PERCEPTION OF ABSTRACT PATTERNS RECOGNITION OF COMPLEX FIGURES

Figure 3. Hemispheric Dominance.

Source: Robert J. Trotter, "The Other Hemisphere,"
Science News, April 3, 1976, Vol. 109(4), p. 219.

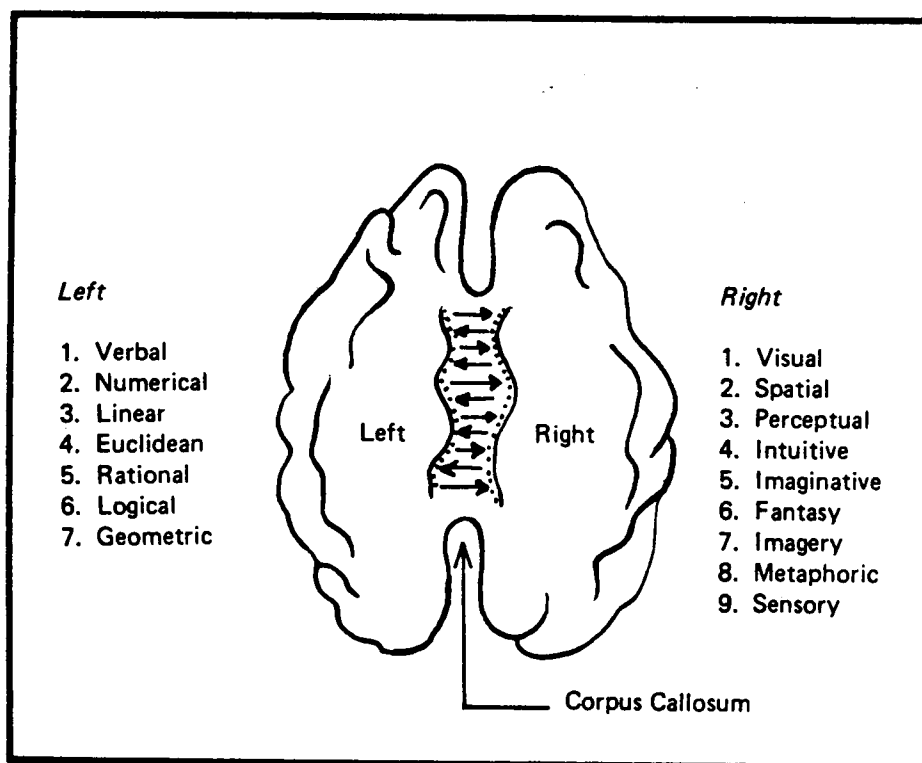


Figure 4. Resident Functions of Left and Right Hemispheres.

Source: Max R. Rennels, "Cerebral Symmetry: An Urgent Concern for Education," Phi Delta Kappan, March 1976, 57, (7) 471-472.

predicament that Nature has endowed him essentially with three brains which, despite great differences in structure, must function together and communicate with one another."

McLean labeled the three parts of the triune brain: (1) R Complex or Reptilian Brain, (2) The Limbic System, and (3) The Neo-Cortex (See Figure 5 for a diagram of the relationship of these three separate brain areas.) The R Complex is the oldest and most primitive brain. Although it is inhibited by more dominant parts of the brain, its presence is still keenly felt. This is especially true during sleep when the neo-cortex is less operative. During this time the R Complex operates on a reflex action to maintain protection. McLean (1978) describes this portion of the human brain as quite safe-keeping in nature and concerned with maintaining the status quo.

The reptilian brain is filled with ancestral lore and ancestral memories and is faithful in doing what its ancestors say, but it is not a very good brain for facing up to new situations. It is as though it were neuroses bound to an ancestral ego (p. 277).

The Limbic System, the second part of the triune brain, completely encloses the R Complex. It is situated at the base of each of the cerebral hemispheres. The left limbic system seems to be the center for planning and organizing activities. It influences the degree of structure and control that colors one's thinking and is itself greatly influenced by the safe-keeping aspect of the reptilian brain. The right limbic system is the seat of our emotional activity and its principal function is "to produce and deal with emotions"

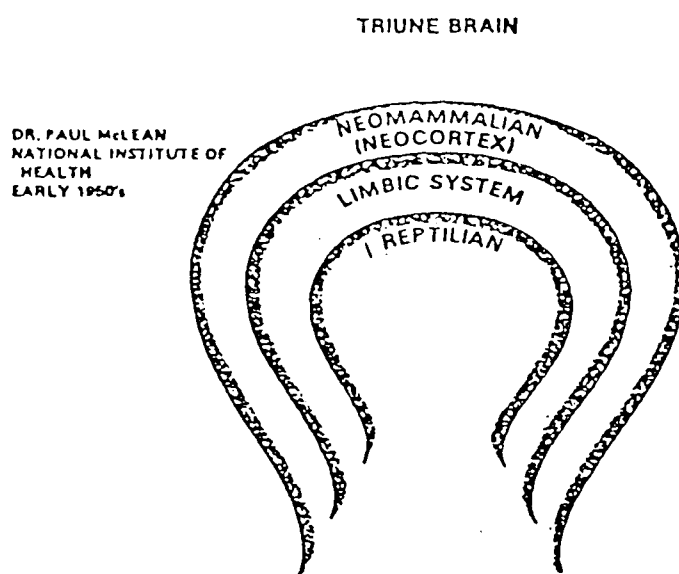


Figure 5. The Triune Brain.

Source: Ned Herrmann. Materials
presented at Application Workshop, Herrmann
Dominance Instrument, Lake Lure, North
Carolina, February, 1983.

(Froiland, 1981:23). McLean (1978) has this to say regarding the emotional nature of the limbic system:

Investigations of the last twenty years have shown that the lower mammalian brain plays a fundamental role in emotional behavior. . . . It has a greater capacity than the reptilian brain for learning new approaches and solutions to problems on the basis of immediate experience. But like the reptilian brain, it does not have the ability . . . to put its feelings into words (p. 278).

The limbic system connects with the right hemisphere of the neo-cortex during man's waking hours and is responsible for the emotional response. It is operative during sleep in the form of dreams (Froiland, 1981).

The third and most advanced part of the brain is the new mammalian brain--or the neo-cortex, which is divided into hemispheres separated by a bundle of fibers known as the corpus callosum (Restak, 1979). Herrmann (1982) suggests that the limbic system, like its surrounding neighbor the neo-cortex, is also divided into left and right hemispheres. This assumption led Herrmann to propose a "quadrant view" of the brain and its resulting brain dominance patterns (see Figure 6 for a graphic representation of this theory).

Herrmann theorized that brain dominance can be a result of greater focus in one of four areas of the brain (or combinations of areas). Two quadrants, as proposed by Herrmann, are more cerebral signifying a greater reliance on the neo-cortex. The remaining two lean heavily upon the earlier brain formations of the limbic system which tend to operate from an emotional or status quo frame of reference. Herrmann's theory is reminiscent of earlier work by Carl

Figure 6

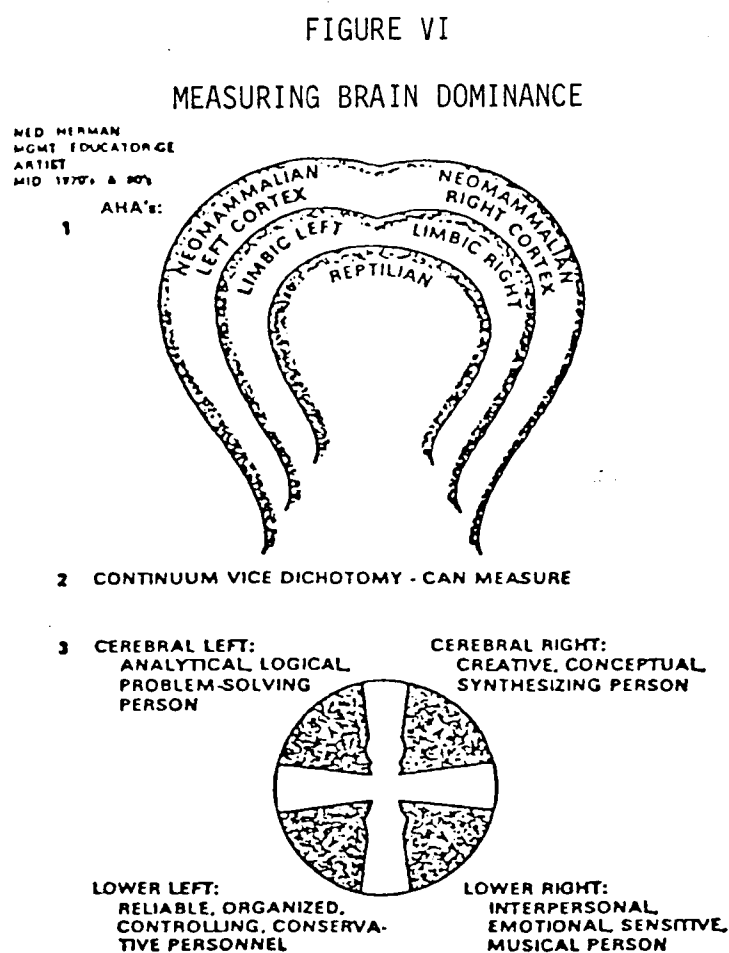


Figure 6. Measuring Brain Dominance.

Source. Ned Herrmann. Materials presented at Application Workshop, Herrmann Brain Dominance Instrument, Lake Lure, North Carolina, February, 1983.

Jung (1923) who espoused the "thinking" vs. "feeling" aspects of formulating judgements (see Chapter II, Section I, pages 35 and 36). Herrmann stresses that man uses all aspects of these quadrants but leans more toward the use of some than others, hence man's dominance pattern or style of cognitive processing emerges.

Dominance

The hemispheres, by the nature of their extreme differences in thought processes, do, in fact, process information in quite opposite ways. How this sensory information is integrated and directed is determined by the integrating function of the corpus callosum as well as by other sub-cortical connections previously mentioned. As pointed out by Sperry (1964:44): "The corpus callosum has the important function of allowing the hemispheres to share learning and memory."

This sharing of information can be accomplished by the corpus callosum in one of two ways: (1) transmission at the time learning takes place; or (2) supplying the information to the opposite hemisphere on demand (Sperry, 1964). In patients in whom the corpus callosum has been severed, it is now proven that learning accomplished in one hemisphere is inaccessible to the other (Sperry, 1964). Trevarthen (1980) has found that sometimes both hemispheres learn their respective answers fully and simultaneously, and at this point, a conflict results.

The hemisphere which apparently "takes command" in the learning of a particular task is considered to be dominant at the time. It is possible for shifts in dominance to take place between the hemispheres as various tasks are presented to the brain's sensory fields. Cohen theorizes that such a shift in focus is not only possible but probable. As Cohen suggests (1978:309): "The magnitude and direction of the observed differences can shift from task to task, from subject to subject and from trial to trial."

Several theories have been proposed as to what factors contribute to shifts in the use of one hemisphere over another and what does, in fact, constitute dominance. Cohen (1979:310) maintains that such shifts are "determined by the appropriateness of the task for the hemisphere of entry." Others propose a coding strategy explanation for determining which hemisphere will be directed toward a task. Such a theory suggests that material is directed toward the hemisphere most parallel to the style of its presentation (Wilkins and Stewart, 1974).

Activation of one hemisphere can create an inhibitory influence on the other causing it to be less involved in the task (Cohen, 1979:310). Some researchers suggest that hemisphere focus can be "primed" through strategies designed to gain the attention of the hemisphere one wishes to activate (i.e., playing music to stimulate the right hemisphere for creative thought; or the use of language to stimulate the left hemisphere for tasks of reasoning). It has been demonstrated through electroencephalograph (EEG) measurements of alpha

and beta waves that such attention seeking strategies do activate the hemisphere in question (Restak, 1979).

Even though specific tasks may be directed to different hemispheres, there is a tendency for an individual to develop a style of cognitive processing in which one hemisphere usually is dominant. In other words, the dominant hemisphere tends to approach the problem solving according to the nature of that hemispheric style regardless of the nature of the task (Levy, 1980). Bundersen, Olsen and Herrmann (1980:4) state that:

Brain dominance may be likened to focusing the light of our consciousness in consistent and preferred ways in various areas of the brain space. At any point in time an individual could focus the light of consciousness in any of the various regions of the brain, but each individual will likely use a consistent and preferred focusing strategy. The focusing strategy might involve for some persons an integrated highlighting of several areas of the brain space.

Herrmann (1980) suggests that dominance should be considered "a continuum with the focus in shifts between the separate hemispheres in the nature of a 'primary and secondary relationship'." As he explains: "For the great majority of individuals in this culture, there would be a brain dominance condition in which the two hemispheres would be working together, but with one taking the lead" (p.8).

Cognitive Processes

Since the late 1960's and early 70's there has been a new focus in brain research which is highly compatible with the theory of brain dominance. Rather than dwelling so much on localization of specific functions in the brain, there has, instead, been a shift toward looking

more closely at the nature of the thought processes employed by the separate hemispheres. Levy (1980:253) points out that this research: ". . . has concentrated on delineating the nature of those thought processes that characterize the differential specializations of the two sides of the brain." The significance of this latest research focus is tremendous in terms of identification of particular cognitive styles and their relationship to brain hemisphere dominance. As Levy states:

Even among individuals having well-lateralized brains in the typical direction, the tendency of one or the other hemispheres to dominate affective responses, cognitive processing, and behavioral control is correlated with variations in personality structure (p. 259).

These findings seem far more significant and more far reaching in effect than merely searching for a localization of specific functions as had been the case prior to Levy's studies in 1968.

Sperry (1975:32) identifies this significance when he recounts: "It is most impressive and compelling to watch a subject solve a given problem like two different people in two consistently different ways, using two quite different strategies--depending on whether he is using his left or his right hemisphere." Bogen (1969), too, indicates that there is a difference in thought processes. He states: "In the human where propositional thought is typically lateralized to one hemisphere, the other hemisphere evidently specializes in a different mode of thought which may be called oppositional" (p. 157).

Cognitive Style--(Jung)

Closely related to the field of cognitive processes as defined by hemisphericity is Carl Jung's (1923) work which formed the basis of

earlier theories related to cognitive styles. According to Jung the process of thinking involves both perception and judgment.

Jung defined perception as the manner in which one becomes aware of objects, persons and ideas. It, in turn, can be accomplished through sensing or intuition. Sensing deals with facts and actuality and is based on an awareness through the senses. Intuition, in contrast, is becoming aware through an indirect means, via the subconscious, and incorporates the addition of ideas or associations to what is sensed literally.

After perception it is necessary to form a judgment on that perception. This process is the second step in thinking. As with perception, judgment, too, is of two types: thinking and feeling. Thinking is a logical process based on facts and the accumulation of data. Feeling, on the other hand, is subjective and incorporates an intuitive sense of "rightness" in making a decision (Myers and Myers, 1980).

Thinking and sensing modes bear striking resemblance to the left hemisphere processes as defined by current research. Feeling and intuitive modes, in similar fashion, are patterned after right hemisphere style (Myers and Myers, 1980:272). Any person, according to Jung, may possess all four of the cognitive functions to a degree; however, one is typically more dominant than the others.

Nature of Creativity

The human brain, although lateralized, is at the same time a dynamic model that operates most efficiently as an interrelated unit

(Restak, 1979). It is in the realm of creativity that interrelatedness is especially crucial. Although many authorities point to the superiority of the right brain in formulating or conceptualizing an innovation (Bruner, 1965; Brandwein and Ornstein, 1977; Blakeslee, 1980) it is only as the left brain selects, refines and structures that a creative product results (Ornstein, 1972; Samples, 1980; Suojanen, 1976).

Osborn (1957:52) comments that in the creative process there are two separate thinking processes which interact. As he explains:

Our thinking mind is mainly two-fold: (1) A judicial mind which analyzes, compares and chooses. (2) A creative mind which visualizes, foresees, and generates ideas. Judgment can help keep imagination on the track, and imagination can help enlighten judgment (p. 52).

Other writers have recognized this duality in the creative process.

Ornstein (1972) points out that:

Our highest creative achievements are the product of the complimentary functioning of the two modes. Our intuitive knowledge is never explicit, never precise in the scientific sense. It is only when the intellect can begin to process the intuitive leaps, to explain and "translate" the intuition into operational and functional knowledge that the scientific becomes complete (p. 12).

Samples (1980:143) notes:

"Recent studies show that relative equilibrium exists between the hemispheres of the brain in creative people. Further, in such people, the rational and metaphoric minds seem to be integrated and to achieve high levels of activity together."

Suojanen (1976:24) notes: "It is clear that the truly creative individual is one in whom a balance exists between the cerebral hemispheres." He also states, "serendipity then is a symbiosis or

Gestalt of the RHB (right half brain) and the analytical functioning of the LHB (left half brain) out of which new knowledge emerges."

The alteration between left and right modes of thinking was referred to by DeBono (1971:5) as "first stage" and "second stage" thinking. He termed these processes lateral and vertical thinking and indicated the importance of both in the creative experience. He commented that there was an intermingling of the two processes while at the same time they remained distinct. DeBono outlined this alternate process of shifting back and forth between the hemispheres as a contrast in style. These contrasts appear in Figure 7.

Bogen and Bogen (1976:257-258), commenting on the implications of split brain surgery to the field of creativity, state:

The observations . . . (derived from split-brain studies) suggest that integrated use of verbal and visuo-spatial thought may be dependent on inter-hemispheric communication, including an important contribution from the corpus callosum (p. 257).

They state also, "Creativity requires more than technical skill and logical thought; it also needs the cultivation and collaboration of the appositional mind" (p. 258).

How, then, does this creative process work and how are the shifts accomplished between hemispheres? It would be helpful first to look at the possible steps involved in the creative process and to examine their relationship to the respective hemispheres.

Osborn (1953:115-169) outlined his theory relative to the basic steps in the creative process. Each step is presented with an explanation of the process involved.

1. Orientation involves pointing up the problem by analyzing it and compartmentalizing it into its components.

Vertical Thinking (Left)	Lateral Thinking (Right)
1. Is selective; judges	1. Is generative
2. Concern for stability	2. Change oriented
3. Proves and establishes points or relationships	3. Movement from one concept to another; attempts to explore
4. Looks for what is right	4. Looks for what is different
5. Looks for answers	5. Looks for questions
6. Analytical	6. Provocative
7. Concerned with where an idea originates	7. Concern for where an idea leads
8. Step by step; sequential	8. Holistic--"jumps" in thinking
9. Chooses what is to be considered	9. Welcomes intrusions--sets off new ideas
10. Obvious	10. Explores beyond the obvious
11. Promises at least a minimal result	11. Increases the chances of a maximal result but makes no promise
12. Develops an idea	12. Originates an idea

Figure 7. Lateral vs. Vertical Thinking.

Source: Edward DeBono. Lateral Thinking for Management.
England: American Management Association, 1971, p. 5.

2. Preparation requires that one associate previously stored information with current knowledge.

3. Ideation is the process of generating ideas. Although quality at this point is not the major focus, it is theorized that quantity yields quality.

4. Incubation is the stage in which illumination takes place and "bright ideas" result. This stage is most effective during states of relaxation.

5. Synthesis involves a "putting of the pieces together." This step is the mirror opposite of analysis but depends upon a thorough prior analysis to be effective.

6. Evaluation is the stage in which judgment instead of imagination is the focal point.

It would appear that these six steps work in alternation between the hemispheres. Orientation, preparation, analysis, and evaluation depend upon skills more predominately characteristic of the left hemisphere; the right hemispheric mode comes into play during ideation, incubation and synthesis.

Osborn's theory seems closely related to a theory proposed earlier by Wallas (1926) who maintained that creative thought was "a continuous process, with a beginning and a middle and an end of its own." He presented four stages for the creative process: preparation, incubation, illumination and verification. During the stages of preparation and verification, the left-brained logical processes are at work consciously and analytically collecting information and making judgments. The right brain plays an active part during the stages of

incubation and illumination where there is an emphasis on the unconscious thought processes and the intuitive hunch connected with the "bright idea."

Expanding on the theory of Wallas, Herrmann (1982) presents a creativity model which relates to particular thinking styles characterized by brain location. He explains:

This process represents the natural sequence of events as individuals engage in creative work, particularly creative tasks that have an applied outcome.

If any one of the quadrants is unavailable, then the process tends to fall apart or be greatly sub-optimized. . . . If the mode of thinking is unavailable or blocked for any reason, then the process tends to stop and the creative outcome is never attained (p.83).

Herrmann (1982) illustrates that the creative thinking process originates in the left hemisphere with the preparation stage (see Figure 8). Here information is gathered, analyzed, and processed. Thought process then shifts to the right hemisphere where the open-ended stages of incubation and illumination occur. The final stage of the creative process, verification, takes place in the structured realm of the left hemisphere. Herrmann maintains that these "iterative" movements back and forth between the hemispheres of the brain "take place in micro-seconds, minutes, hours, weeks or even years" (p.83).

If creativity then is a shifting of activity back and forth from right to left brain, this would tend to suggest that the creative act is, likewise, a combination of not only process but product. The controversy of process vs. product has been explored by many writers in the field of creativity.

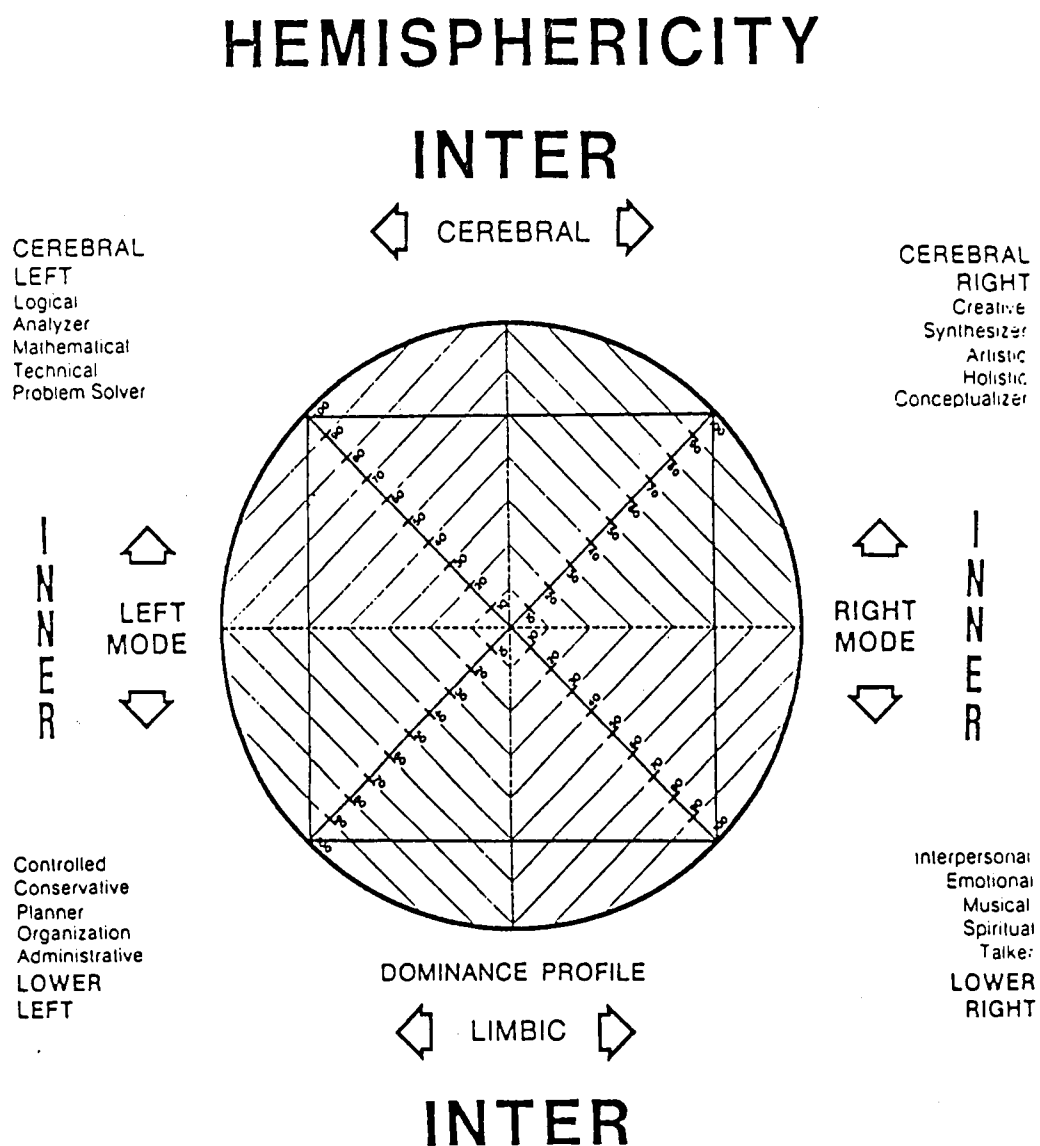


Figure 8. Creativity: A Whole-Brained Process.

Source: Ned Herrmann. Materials presented at Application Workshop, Herrmann Dominance Instruments, Lake Lure, North Carolina, February, 1983.

Rogers (1976) explains his viewpoint:

My definition then, of the creative process is that it is the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people or circumstances of his life on the other (p. 297).

This brings us to the major focus of this study. How do these previously stated relationships, uncovered through recent brain research, present themselves in the area of leadership? More particularly, how are they reflected as manifestations of an innovative style in which change is fully implemented? These questions form the basis of the remainder of this literature review.

III. CREATIVE LEADERSHIP

The art of the creative leader is the art of institution building, the reworking of human and technological materials to fashion an organism that embodies new and enduring values.

Selznick, Philip. Leadership and Administration: A Sociological Interpretation. New York: Harper & Row, 1957, p. 28.

Leadership, as defined in this study, is the ability to bring about constructive change. Such leadership is innovative and demands of the leader a capacity to conceptualize the creation of new avenues for change, as well as an intuitive awareness in working with and through people to move an organization forward. A leader is an expert at utilizing the abilities and skills of all employees in a creative manner beneficial both to the organization and to the personal development of all members of the organization.

Creativity has been defined earlier in this study as a combination of process and product. This has implications for the development of creative leadership. Levitt (1981) in relating the field of management to the creative thought process, separates the creative element into two factors: creativity and innovation. He explains that: "Creativity is thinking up new things. Innovation is doing new things." He states:

The scarce people are the ones who have the know-how, energy, daring and staying power to implement ideas. . . . Since business is a "get things done" institution, creativity without action oriented follow-through is a barren form of behavior. In a sense, it is irresponsible" (p. 96).

The person who can, in fact, combine creativity and innovation, who utilizes both left and right hemispheric thinking, is defined in this study as a creative leader. Creative leadership demands that the leader endeavor to operate from a "whole brained" perspective by incorporating the full power of both cognitive processes. A leader demonstrates this ability by successfully combining the following paradoxical qualities: (1) conceptualization vs. analysis, (2) intuition vs. logic, (3) creativity vs. maintenance, (4) relationship vs. task and (5) flexibility vs. stability. Each pair of contrasting qualities will be explored through this section of the literature review. Consideration will first be given to the relationship between conceptualization and analysis.

Conceptualization vs. Analysis

Mankind is limited not so much by his tools as by his vision (Richard Pascale and Anthony Athos, The Art of Japanese Management, 1981, pp. 21-22).

The embodiment of purpose through the leadership process requires that the leader possess the ability to sense organizational needs from a holistic approach, and that he have an insightfulness or intuitive feel for what the organization can become. The leader must possess a vision! Katz (1974:93) defines this ability on the part of the leader as conceptual skill. It is; he says:

. . . The ability to see the enterprise as a whole; it includes recognizing how the various functions of the organization depend on one another, and how changes in any one part affect all the others; and it extends to visualizing the relationship of the individual business to the industry, the community, and the political, social and economic forces of the nation as a whole. Recognizing these relationships and perceiving the significant elements in any situation, the administrator should then be able to act in a way which advances the over-all welfare of the total organization.

In discussing the executive process, Barnard (1976:235) expresses a similar view:

. . . The essential aspect of the process is the sensing of the organization as a whole and the total situation to it. It transcends the capacity of merely intellectual methods, and the techniques of discriminating the factors of the situation. The terms pertinent to it are "feeling," "judgement," "sense," "proportion," "balance," "appropriateness." It is a matter of art rather than science, and is aesthetic rather than logical.

Barnard (1979) also suggests that:

A formal orderly conception of the whole is rarely present, perhaps even rarely possible, except to a few men of executive genius, or a few executive organizations the personnel of which is comprehensively sensitive and well integrated (p. 239).

Drucker (1954:341-342) expresses the same notion in the following manner:

The manager has the task of creating a true whole that is larger than the sum of its parts, a productive entity that turns out more than the sum of the resources put into it. One analogy is the conductor of a symphony orchestra, through whose effort, vision and leadership individual instrumental parts that are so much noise by themselves become the living whole of music. But the conductor has the composer's score; he is only interpreter. The manager is both composer and conductor.

Katz (1974:101) believes that such skill should possibly be considered "innate ability" and maintains that while to some degree it can be enhanced, it is not effectively "inculcated after a person passes adolescence" since it involves one's basic style of thinking.

Suojanen (1976:19-27) suggests that this visionary ability is a function of the right brain. The integration of the concept and the implication of a strategy, however, are dependent upon the complimentary incorporation of the left-brain processes of analysis and judgement. He explains:

The ability of the RHB (right half brain) to see the forest rather than the trees is overwhelming in its implications. Not only does the RHB form patterns and structures and Gestalts of the world that exists, it can also do the same thing apparently insofar as future states and arrangements and even value systems are concerned. . . . Most significantly, the RHB sometimes performs most optimally under states of consciousness other than one of ordinary, everyday experience. In this context, the RHB thinks laterally and makes observations of the kind that ultimately result in new hypotheses.

The LHB (left half brain) performs the judging-controlling-assessing functions that are necessary to observation, experiment and induction in the scientific method. If research and development are functions of the RHB, the LHB performs the test and evaluation. Both, of course, are necessary to the process of conceptual (RHB) variation and intellectual (LHB) selection. The LHB is rational and specializes in lateral thinking--that which is step-wise, correct, and relevant.

It is clear that the truly creative individual is one in whom a balance exists between the cerebral hemispheres. . . . Serendipity then is a symbiosis of the Gestalt of the RHB and the analytical functioning of the LHB out of which new knowledge emerges (p. 23).

Mintzberg's (1979:78) views are similar to Suojanen's: "the . . . development of a Gestalt strategy requires innovative thinking, rooted in synthesis rather than analysis, based on the 'instinctive' processes . . . associated with the brain's right hemisphere."

Figure 9 illustrates the complimentary functioning of the halves of the brain as well as the "old brain" process explained earlier in this chapter. Likewise the explanation of the differences between the conceptual and analytical thinking processes is reminiscent of DeBono's (1971) idea of the lateral and vertical thinking processes described in the previous section on Creativity. Conceptual skill as defined here would be synonymous with DeBono's explanation of the lateral thinking process (pages 38 and 39).

Ornstein (1979) explains:

The right cerebral hemisphere in most people is the residence of the metaphoric mind. This is the "left-handed" domain. When an idea comes into the metaphoric mind, a sudden rush of relationships flashes into being and the original thought expands rapidly outward into a network of new holistic perceptions. The role of metaphoric thinking is to invent, to create, and to challenge conformity by extending what is known into new meadows of knowing. The metaphoric mind treats all input as fragments of reality, and as soon as a fragment appears the mind begins the search for the whole. Like an archaeologist who discovers a shard, a tiny fragment of an ancient pot, the metaphoric mind at once begins to visualize the whole creation.

Conceptual ability is crucial in steering an organization toward a direction of accomplishment and growth. Greenleaf in Servant

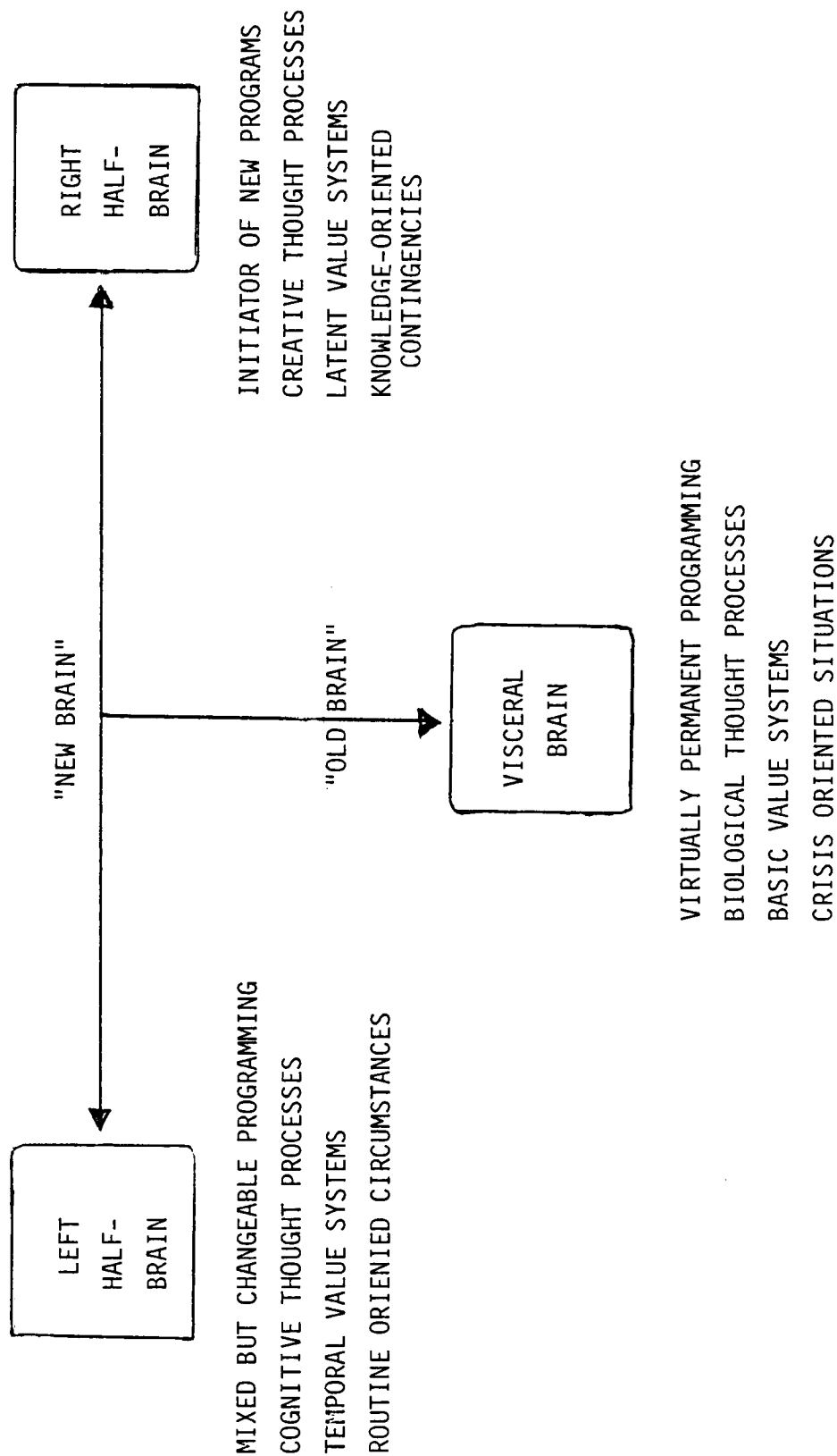


Figure 9. Model of the Minds of Man.

Source: W. W. Suojanen, "Creativity, Management, and the Minds of Man," Human Resource Management, Spring 1976, 15(1), p. 23.

Leadership (1977:15-16) defines it as the mark of leadership. As he states:

A mark of leaders, an attribute that puts them in a position to show the way for others, is that they are better than most at pointing the direction. . . . By clearly stating and restating the goal, the leader gives certainty and purpose to others who may have difficulty in achieving it for themselves.

The word "goal" is used here in the special sense of the over-arching purpose, the big dream, the visionary concept, the ultimate consummation which one approaches but never really achieves. . . .

Just how important is conceptual ability at the various leadership levels within an organization? Katz (1974:90-102) indicates that the higher one progresses in the leadership hierarchy the more crucial this skill becomes. He classifies the skills of administration into three basic areas: technical, human and conceptual. Technical skill he defines as a "specialized knowledge" related to analytical skill within a particular area as well as expertise in the tools and techniques of the subject area being managed. Katz describes this skill as the most concrete of the administrative skills, and he stresses its importance at the lowest level of management.

The next skill level Katz defines as human skill, or the ability to work with people in building "cooperative effort." Although this skill is important at all management levels, Katz (p. 65) identifies it as being especially crucial at lower levels "where the number of direct contacts between administrators and subordinates is greatest." Conceptual skill becomes the most important of all administrative skills at the top level of administration.

Guglielmino (1980:12-14), in a nationwide sample of Fortune 500 companies, surveyed the skills most important for management. Utilizing Katz's original classifications of administrative skill, this researcher attempted to discover the degree of emphasis placed on the respective administrative skills at different levels of management within the organization. He found that 47 percent of the top-level executives' ability was directed toward conceptual skill. This was in contrast to only 18 percent identified at the entry level of management. Figure 10 demonstrates the three administrative skills and their importance at the respective levels.

In this same study Guglielmino isolated various skills suggested as being important from his survey and labeled whether or not such skills were "teachable" after one reaches the management rank. Figure 10 lists these skills and indicates their difficulty in training. Areas related to innovation (i.e., 2 and 6 were found to be especially difficult to train as was 1 which relates to decision making based on forming a concept of what appears appropriate in contrast to a decision based on analyzing known facts. All such areas are related to the ability on the part of the manager to conceptualize or to form a Gestalt of a situation.

In a recent article criticizing United States business leaders for a lack of vision, Cox (1982:89) suggests that they spend too much time concentrating on the technical aspects of their jobs instead of toying with concepts and ideas. In his opinion current leaders have

		TYPE OF SKILL NEEDED			MANAGEMENT SKILL MIX
		CONCEPTUAL	HUMAN	TECHNICAL	
MANAGEMENT LEVELS	TOP	47	35	18	
	MID	31	42	27	
	ENTRY	18	35	47	

Figure 10. Hierarchy of Management Skills.

Source: Paul J. Guglielmino, "Developing the Top-Level Executive for the 1980's and Beyond," Training and Development Journal, April, 1979, p. 11.

"tunnel vision," and he suggests that their narrow intellectuality is in contrast to Japanese executives who are "comfortable with ideas."

Ohmae (1982:9-13) speaks also of the great need on the part of the leader to conceptualize, and he indicates that it is especially crucial during times of adversity. "The more severe the pressure, the more urgently a broader view is needed, the more dangerously their (executives') mental vision seems to narrow down" (Ohmae, 1982:10). It is especially important that the leader "view a situation in the broadest possible context, then zero in on the key factors" (p. 9).

This, in effect, was what DeBono (1971) stressed when he said that lateral thinking (right-brained) originates the idea while vertical thinking (left-brained) develops it. Both conceptualization and analysis are needed. Through the full development of both cognitive styles, or brain hemispheres, an individual leader should be able to combine the best of both personality types and produce more effective and creative results.

Oates (1979:42-49) discusses the differences between what he terms the "conceiver" and "analyst" types and speaks of the advantages of pairing them as a management team. He describes the Conceiver as:

. . . Full of grandiose ideas, which he believes are as good as implemented the moment they enter his mind. He sees in a flash what must be done to increase sales of a problem product or to solve some other intractable corporate difficulty.
. . . The Conceiver is so carried away by his inspiration that he sees all barriers swept away or simply ignores them. And, indeed, the sheer force of his enthusiasm very often pushes through his grand designs against all the odds (p. 47).

Of the Analyst, he says:

The Analyst, by contrast, is the epitome of the plodding personality. He is so absorbed by looking at every detail and implication of any project he is assigned that he often overlooks the prime objective of the exercise, to reach a conclusion and produce recommendations for action. . . . Unless he is carefully directed and handled, he, himself, may despair of ever achieving anything (p. 47).

But, when the two are paired, Oates believes that:

The analyst has the personality to turn brilliant, but embryonic and often ephemeral, schemes into detailed proposals. The character of the Conceiver might inspire his opposite to lift his eyes from over-concentration on details (p. 47).

In his model of hemispheric patterns, Hermann (1980) suggests that both analytical and conceptual skill are cerebral in nature involving a "thinking" rather than "feeling" orientation. The left cerebral hemisphere is the domain of the logical, analytical problem solving skills; whereas, the cerebral right hemisphere is adept at conceptualizing and viewing things in a holistic manner. (See Figure 11 for an illustration of this inter-hemispheric dominance.)

Balance in leadership is possible to the extent that one successfully combines the domains of these brain quadrants. While these two styles are diametrically opposed in their cognitive mode of processing (as suggested by Levy, 1981) they are, nevertheless, compatible and provide a balance or more total-brained approach. Herrmann (1980) suggests that persons who have a brain dominance

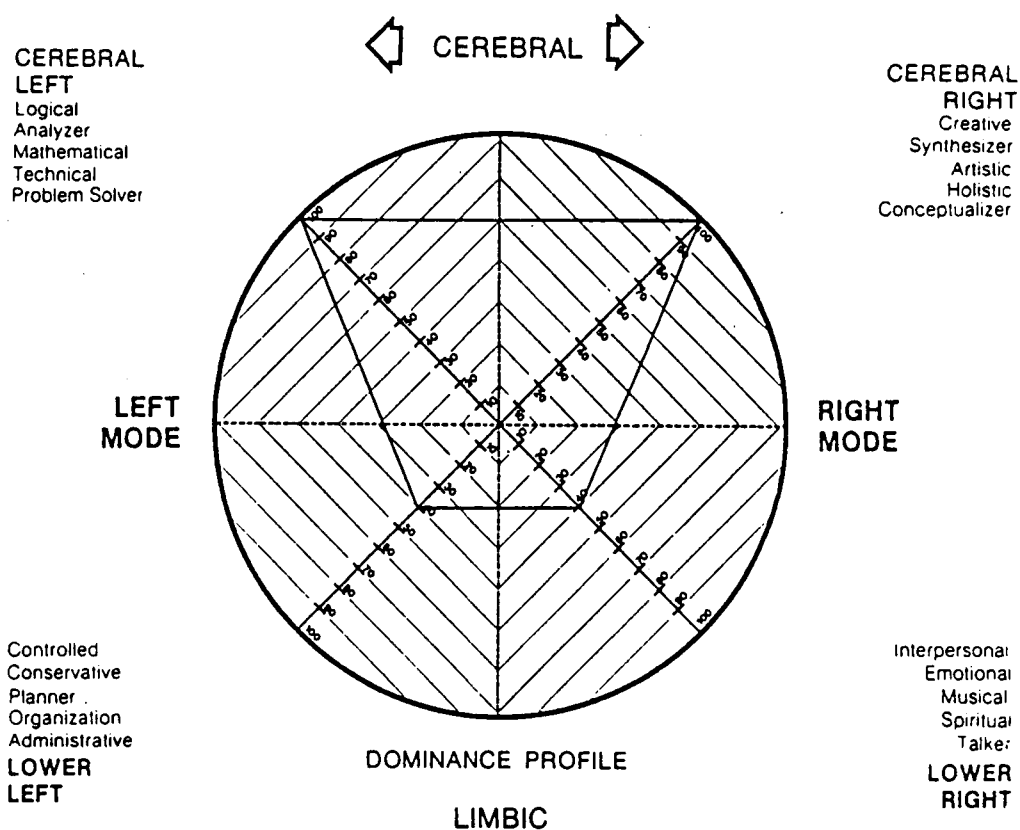


Figure 11. Dominance Style: Analysis vs. Conceptualization.

Source: Ned Herrmann. Materials presented at Application Workshop, Herrmann Brain Dominance Instrument, Lake Lure, North Carolina, February, 1983.

pattern that incorporates these two quadrants equally are inclined to be extremely successful as chief executives (Herrmann, 1980).

Recent research by Coulson and Strickland (1984:23-27) compares the dominance patterns of Chief Executive Officers (CEO's) in relation to School Superintendents. As demonstrated in Figure 12 the CEO's are more balanced in the use of both cerebral hemispheres than are the superintendents; they also demonstrate a far greater use of the right hemisphere. For CEO's the average upper quadrant left brain score was 66.18 and the average upper right brain score was 94.82. Superintendents had an average upper quadrant left brain score of 78.72 in contrast to an average upper right brain score of 67.87. Coulson (1984) in describing the key descriptors used by both these groups in completing the brain dominance survey states:

The number one key descriptor for the CEO's was a tie between logical and creative. The superintendent's key descriptor was logical (p. 24).

Just as leaders should endeavor to balance skills of conceptualization with those of analysis, so, too, should they properly blend the qualities of intuition and logic.

Intuition vs. Logic

Within each of us is a highly accessible reservoir of personally structured, loosely knit networks of experiences, sensations, conceptions, and fancies called the "pre-conscious." The preconscious reservoir is the well-spring of our metaphoric-intuitive mind.

Samples, Robert, "Educating Both Sides of the Human Mind," The Science Teacher, January 1975:22.

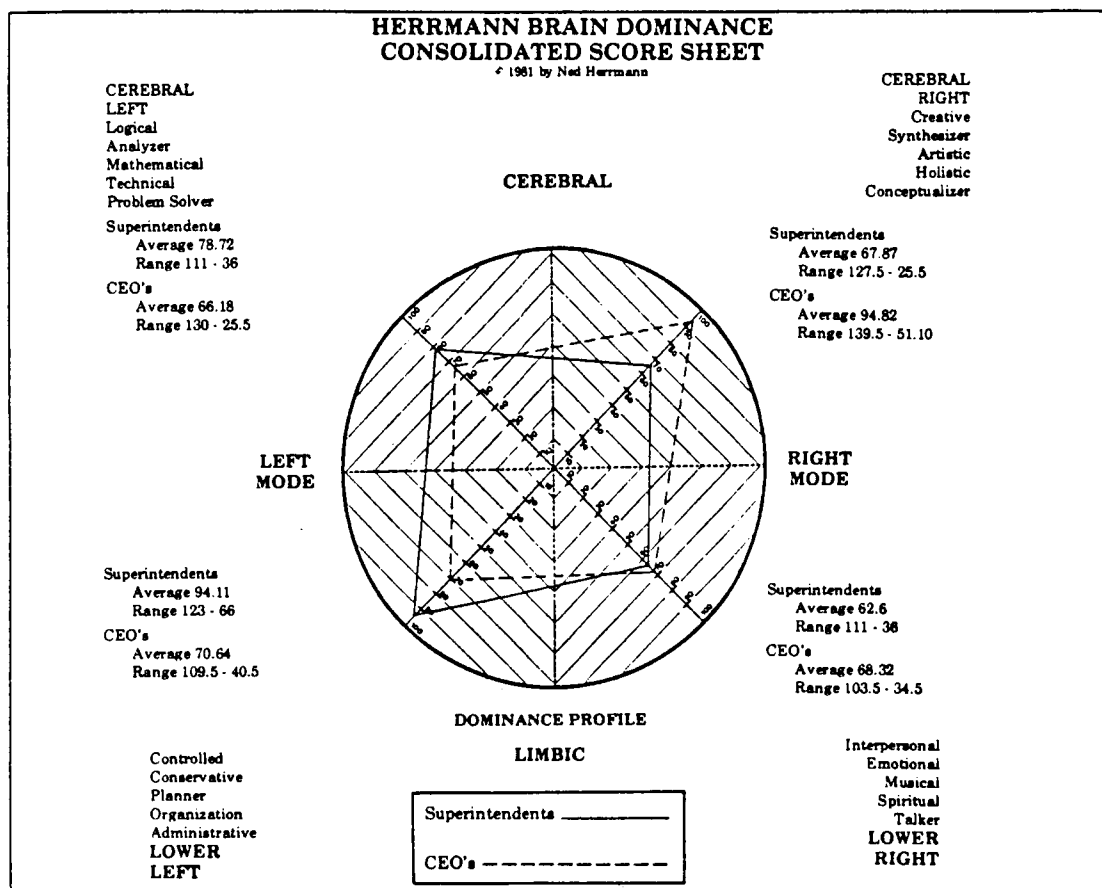


Figure 12. Comparison of Brain Dominance of Chief Executive Officers with School Superintendents.

Source: Louis T. Coulson and Alison G. Strickland. "A Comparison of the Thinking Style Preferences of Superintendents of Schools and Chief Executive Officers," International Brain Dominance Review. Brain Dominance Institute, Lake Lure, N.C., Winter 1984, Vol. 1, Number 1, pp. 23-26.

Raudsepp (1981) defines intuition as an experimental way of knowing or reasoning where the weighting and balancing of evidence are done unconsciously. It is, he says, "A knowing from within " (p. 22) which usually springs from an area of personal familiarity or knowledge and is characterized by a sense of conviction or value which the person appears almost compulsively in need of expressing. Usually the person has little to no awareness of exactly how he arrives at his conclusion but there is a compelling sense of "rightness" in his decision (Raudsepp, 1981).

Rowan (1979) declares that it is in matters of timing that the intuitive hunch is most effective; others feel that it is used most effectively in situations where problem solving is complex. As Raudsepp (1981:36) states: "When you have many variables, logical reasoning or quantitative techniques are frequently inadequate for synthesizing all the elements into a coherent whole." Studies of intuitive awareness among Chief Executive Officers (CEO's) support the importance of intuitive ability to the field of management:

1. A 1980 study by Henderson and Nutt characterizes analytic vs. heuristic (intuitive) managerial style. This study demonstrated that those executives using an intuitive mode of decision making were more likely to adopt new projects (i.e., capital expansion) and felt less risk in doing so than did those managers employing an analytical approach.

2. Burke (1980) cites recent research by Spence and Holmrick at the University of Texas which contrasted analytical vs. intuitive modes of thinking among leaders. These researchers concluded that

leaders exhibiting a balance between both approaches, or styles of thinking, were significantly higher in achievement than were those using logic alone (Burke, 1980).

3. An article in Business Week entitled "Mastering Management in Creative Industries" (1978:86) points out that in the creative industries such as publishing and film-making one of the major prerequisites for the successful manager is "the courage to act on 'gut feeling' and a nebulous sense of the public's taste (via intuitive awareness) when assigning top dollar to film production or book promotion."

4. Doktor (1977), a University of Hawaii Business Professor studied the hemisphere dominance patterns of CEOs and operations researchers. Utilizing an electroencephalograph (EEG) he measured the alpha and beta brain waves of executives during problem-solving sessions and found them to be much more dependent upon the intuitive right hemisphere mode of thinking than on the left hemisphere.

5. A six-year study of 34 leading companies was conducted under the sponsorship of McKinsey and Company. These companies, both Japanese and American, were studied and contrasted for effectiveness and managerial style. Pascale and Athos (1981) relate from this study the importance of an "interplay of intuitive skill along with the logical reasoning" in the management process. As they suggest "Most of the important executive skills are intuitive--that is they are not consciously cognitive" (p. 139). In speaking of an intuitive awareness, they recount "But while we extol clarity, most of those who

excel in organizations, both Japanese and American, are masters at reading the subtle signals (p. 167).

Raudsepp (1981:49), emphasizes this notion:

The intuitive mode is not opposed to the rational, cognitive mode, but works with it in a complimentary fashion. Typically intuitive insights both precede and follow in a cyclical oscillating way the exhaustive use of analysis, reason and logic (Raudsepp, 1981:49).

In a classic study of top-level executives Mintzberg (1976), demonstrated that management was indeed a process calling for both left and right brained skills. He drew a parallel between the logical thinking, left side of the human brain and the holistic, intuitive right side. Each, he emphasized, was important in its own way to the process of management. Together they form a whole-brained approach to management, whereas most management training programs, Mintzberg theorizes, are directed toward the development of left-hemisphere skills of management having to do with the systematic well-ordered thinking process. The real essence of the management process, however, is more appropriately geared to the right hemisphere of the brain which can best cope with the intuitive and ambiguous. It is in this realm of the human brain, Mintzberg explains, that the real keys to management are found. Mintzberg submits ten general findings from his research which tend to suggest that effective managers need strong right hemisphere qualities. A summary of these findings follows (Mintzberg, 1976:53-57, Paraphrased):

1. Most managers favor the verbal mode of communication which enables them to not only receive and to direct messages but to intuitively size up the feelings of others through non-verbal cues.

2. Soft data are more commonly used for the basis of decision making than are hard data. Soft data are related to impressions or intuitive feelings about people and situations. Mintzberg suggests that managers employ a process of synthesis rather than analysis in using use of this information.

3. Although the manager is the most informed member of the organization, he has difficulty relating this information to his subordinates. This is due to the fact that it is "removed from his verbal consciousness."

4. The manager does not operate in a systematic logical manner but instead functions from a base that is more "relational, simultaneous and experimental." Issues are dealt with "in the context of daily activities" (p. 55).

5. The most important roles of management Mintzberg isolates as: leader, liaison, and disturbance handler. He suggests that these areas are the least understood and most likely to be dealt with "inside the realm of intuition and experience" (p. 55).

6. In regard to the seven routines of decision making (i.e., recognition, diagnosis, search, design, screening, evaluation, choice, and authorization) the two that are the least understood and most important are diagnosis and design. The managers, in Mintzberg's survey, could not explain where or how the diagnostic step took place in their decision making, leaving the implication that it was in the subconscious of non-verbal right hemisphere.

7. In regard to the dynamic factors of decision making (i.e., interruptions, timing, branching and cycling) managers have had little

to no training and depend upon their "simultaneous, relational modes of thinking" (p. 55).

8. Considering the three bases of making choices (analysis, judgement and bargaining) managers most often depend upon judgment which is most related to their right-brained intuitive nature.

9. In this formulation of strategy there is a mixture between periods of stability and times of groping or change. This alteration is a result of the dynamic environment in which an organization must operate. Effective managers must be able to cope, and they do this most effectively through the intuitive and experimentive right hemisphere.

10. In developing new strategies after an organization has stabilized, it is usually most effective, Mintzberg concludes, to have one creative individual who can visualize and conceptualize for the entire organization (Mintzberg, 1976).

Researchers in the field of educational administration have replicated Mintzberg's study adapting it to superintendents and to principals at the elementary and secondary level (Duignon, 1980; Willis, 1980; and Martin and Willower, 1981). Few differences in the nature of these administrative positions were found. These studies suggest that educational administration is characterized by a management process highly dependent for its effectiveness on the manager's capability in exercising intuitive, conceptualizing and humanistic skills. These characteristics suggest a right-brained or "whole-brained" cognitive style (Mintzberg, 1976).

Duignon's (1980) study of school superintendents in Alberta, Canada revealed that the superintendency was a position calling for spontaneity of thought, flexibility and intuitive awareness. As Duignon (p. 18) pointed out:

Over 47% of the decisions made by the superintendent were classified as non-programmed decisions, or decisions for which there existed no clear method for handling them. In these instances the superintendent found himself in a "de novo" situation and had to fall back on his expertise and creative ability.

Willis' (1980) study of principals in Melbourne, Australia showed that they faced problems of discontinuity. The high volume of the principal's work load, as it pertained to length of hours and number of tasks, was further compounded by "variety, brevity, and fragmentation" (Willis, p. 38). Willis summarized the duties exercised by the principal during a typical work day (see Figure 13). Figure 14 classified these same duties into scheduled vs. unscheduled categories.

There is a definite need for the administrator to be flexible and tolerant of the ambiguous. Educational administrators at all levels operate within a climate of continuous interruptions. As Duignon (1980:15) concluded from his study: "Superintendents were shown to spend much more of their working time in unscheduled meetings than in any other activity." This conclusion was based on Duignon's (1980:14) finding that unscheduled meetings accounted for 25 percent of a superintendent's time. Second and third were scheduled meetings at 24 percent and desk work at 20 percent. Telephone calls were a distant fourth at 11 percent.

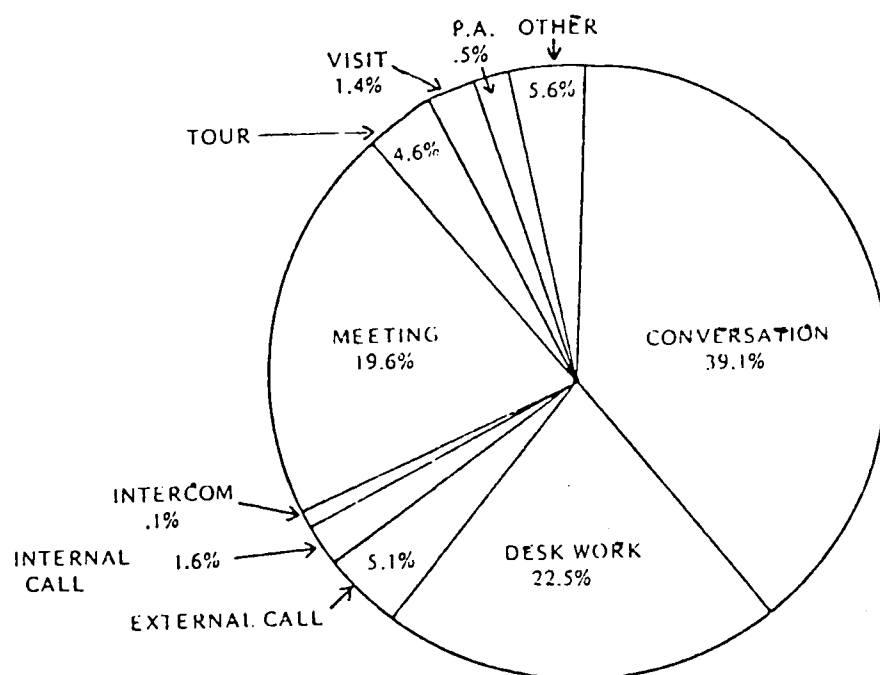


Figure 13. The Principal's Average Time Spent on the Media of Work During the School Day.

Source: Quentin Willis, "The Work Activity of School Principals: An Observational Study," The Journal of Educational Administration, July 1980, 28(1), p. 33.

Percentages									
	Conversation	Desk Work	External Call	Internal Call	Intercom	Meeting	Tour	Visit	(a) P.A.
Scheduled	41.7	95.9	37.1	26.8	0	97.3	18.7	13.1	99.4
Unscheduled	58.3	4.1	62.9	73.2	100.0	2.7	81.3	86.9	.6

Figure 14. Proportion of Scheduled and Unscheduled Time Spent on the Work Media.

Source: Quentin Willis, "The Work Activity of School Principals: An Observational Study," The Journal of Educational Administration, July 1980, 28(1), p. 43.

spent by the administrator in verbal contact with others with face to face conversation being preferred.

Duignon found that approximately 70 percent of superintendents' daily working time was spent in verbal contact. During this time the administrator preferred current information and soft data. This use of "now" information was much preferred over the hard data of statistical reports, tabulations, and such in the formulation of decisions (Duignon, 1980). This fact further emphasizes the educational administrator's dependence upon an intuitive approach to management and one that is relationship-oriented in its context. Mintzberg found such qualities to be highly suggestive of a strong right-brained style among the managers in his study (Mintzberg, 1978).

In a literature review of extensive reasearch related to the decision styles of managers, Gerado, Rivera and others (1981) looked at three areas related to problem solving:

1. How problems are described by managers.
2. The types of cognitive processes they use in formulating decisions.
3. The related research areas needing attention.

They note that most problems faced by managers were ill structured due to: (1) information received by them not being easily defined and complete, (2) a need for defining and redefining of the problem by managers, (3) the multi-person influences, and (4) the extended period over which decisions were made. In contrast, most decision aids developed for management have taken the form of well structured processing models. These may not be applicable in the real world

world where such ambiguity is present. It may be that the traditional models of rationality just won't work. Research seems to indicate that the process of decision making is rather one of filtering and pigeon holing on the part of the manager, and one that is highly dependent on the manager's skill in the use of the intuitive mode.

In a similar vein, Taggart and Robey (1981) considered the left-right hemisphere modes of decision making and emphasized the importance of management training designed to incorporate exposure to alternative styles and strategies of problem solving. Western man is conditioned to think logically and analytically; however, a more effective training program would assist in the development of the affective and intuitive side of the brain as well. It should be the goal of management training to assist the individual in the integration of the whole brain (Taggart and Robey, 1981).

Barnard (1966) contrasted the effective use of the logical thought processes with the nonlogical in establishing a basis for decision making. Society should, he believed, discard the belief that logical thought processes were superior in quality and that basing decisions upon the results of this thinking process yielded more effective decisions. Barnard equated the nonlogical process with intuitive thinking and maintained that it was associated with "common sense, experience, originality, and a sense of adventure" (p. 306). Barnard suggests that in determining which thinking process to employ, three purposes of mental effort should be considered (Paraphrased, pp. 307-308):

1. If the purpose is to ascertain truth, emphasis should be placed upon the logical process. Under such conditions the past or the present is in view, and conclusions can be subject to test and review.

2. If the purpose is to ascertain a course of action, one looks to the future and the thinking process demanded is speculative with less emphasis upon the logical.

3. In attempting to persuade, one should lean strongly upon the sensing, intuitive nature and not let logic get in the way.

Other considerations in determining the effective utilization of thinking processes are: (1) the speed in which decisions must be made and (2) the nature of the materials or subject matter to be considered. When speed is demanded in decision making, it is helpful if one can think in a holistic manner and view the Gestalt rather than focusing upon the details of the problem.

Herrmann (1980) proposes that the ability to think intuitively is centered in the right brain and is influenced considerably by the lower limbic area of the right-brain quadrant. This idea is graphically demonstrated in Figure 15 which illustrates that such thought takes place in the realm of feeling rather than in the realm of thinking more characteristic of the upper-left cerebral area. This latter area is responsible for the logical factual nature of judgement formation. A proper balance between both thought processes results in more effective decision making at the leadership level (Bunderson, Olsen, and Herrmann, 1980).

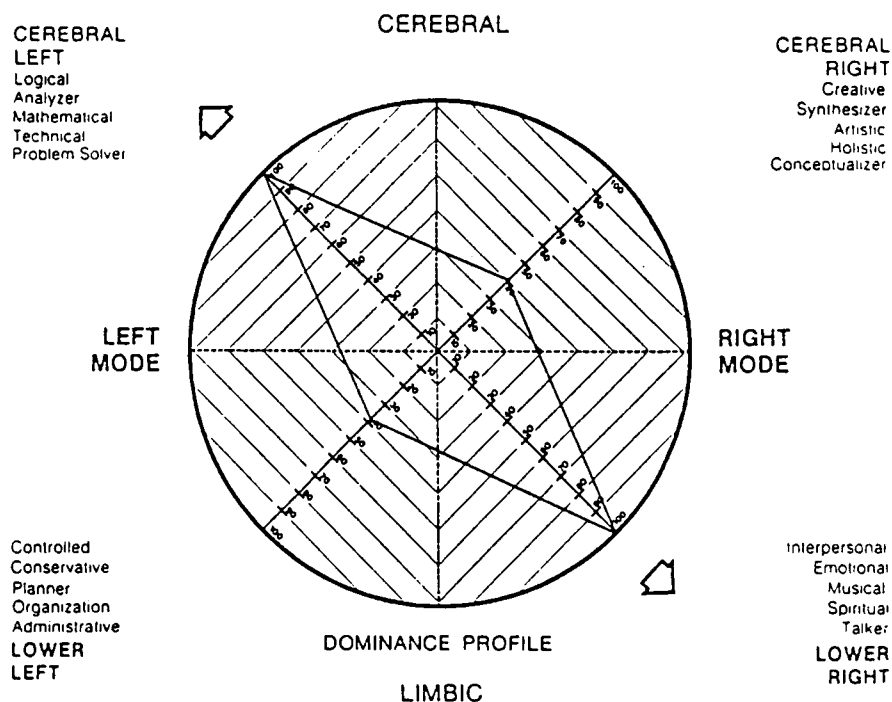


Figure 15. Dominance Style: Logic vs. Intuition.

Source: Ned Herrmann. Materials presented at Application Workshop, Herrmann Brain Dominance Instrument, Lake Lure, North Carolina, February 1983.

Closely related to the concept of intuition is the area of creativity. In the next section creativity is explored in its relationship to the maintenance of "status quo."

Creativity Vs. Maintenance

Paradoxical as it seems, the rational mind prefers the rules it invents to the process of invention.

Samples, Robert. The Metaphoric Mind, 1980, p. 106.

Zaleznik (1977) proposes that there are personality variables which operate in direct contrast between leaders and managers. These differences are manifested in a person's respective orientation toward: goals, human relations, the nature of work and self. Managers, Zaleznik theorizes, have passive and impersonal attitude toward goals which for them arise out of necessity rather than desire. The attitude of the manager is in contrast to the leader who exercises a personal and active interest in goals and who, through his personal commitment and influence, is able to alter positively the thinking of others.

The nature of work is, likewise, viewed differently by managers and leaders. Managers are basically interested in keeping the organization on an even keel; they endeavor to coordinate people and ideas into a smooth organizational operation directed toward maintaining the status quo. Leaders, in contrast, operate from a high-risk position; they attempt to initiate new approaches to problems and explore issues that should be resolved more effectively.

In the realm of human relations, there is also a contrast between the leader and the manager. A manager tends to seek out others

for work and collaboration, avoiding solitude if possible. Although managers desire the company of others, they lack the empathy and intuitiveness necessary for relating to others' thoughts and feelings. Leaders, on the other hand, prefer to work from a more solitary basis, but at the same time, they possess the capacity to empathize with others and to be perceptive of others' reactions to events and situations.

Dyer and Dyer (1965) express their views relative to the differences between creative persons and those more concerned with maintenance; they contend that organizations need both. During the establishment and development phase of an organization there is a real need for creative leaders; however, as an organization progresses to a more routine basis, managerial or custodial types usually replace them. These writers suggest that:

A custodial type organization is concerned with achievement of known, predictable measurable items or goals in accordance with familiar, unchanging doctrines, procedures and methods (p. 33).

It becomes then the duty of the custodial manager to maintain the status quo, to make only minor changes and to achieve perfection of the routine. Custodial persons avoid change. Dyer and Dyer comment:

Consciously or unconsciously, the custodial manager recognizes any change as a threat to the predictability of his management and therefore to the efficiency he has achieved (p. 35).

Dyer and Dyer also quote from Urwick (in Dyer and Dyer, 1965:38) who stated: "Persons whose tasks are to maintain routines

seldom have new ideas; they have a deformation professionnelle which protects them from harboring irritant visitors."

The creative person, in contrast, questions routine. Since it is his desire to vary the "tried and true" he "seeks new approaches, new designs and new breakthroughs" (Dyer and Dyer, 1965:37). It is not the nature of the creative leader to stay with the custodial organization. Those who do remain either become bored and apathetic or are forced out by custodial types. It is only as the organization becomes staffed with more persons of a creative nature, or develops an interest in new approaches or innovations, that the creative individual is content to remain. The contrasting qualities of the creative and custodial leader as outlined by Dyer and Dyer are in Figure 16.

Other writers have recognized the creative nature of leaders. For example, Rogers (1976:297) emphasizes the characteristics of what he terms the "creative ego," persons who are concerned with "individuality, uniqueness and identity." Rather than attempting to become a part of the social group, they are interested in being individuals removed from the mainstream. They possess courage and a confidence in their pursuit of ideas; they are more concerned with finding a better way than with accepting a solution that may already appear adequate.

Maslow (1976) defines this type of person as one who possesses self-actualized creativeness in contrast to the special talent creativity so often equated with the word "creative." These persons, Maslow declares: " . . . do not cling to the familiar, nor is their

CUSTODIAL VS. CREATIVE LEADERSHIP

<u>CUSTODIAL</u>	<u>CREATIVE</u>
Maintains routines. When questioned about them, automatically defends them.	Ignores routines. When made aware of a routine procedure, automatically tries to think of different ways of accomplishing or by-passing the work.
Shows ingenuity only in improving efficiency of present methods, which are characterized by: - Simplification - Streamlining - Mechanization - Repetivity - Predictability	Develops completely new missions and products; operations are characterized by: - Basic design changes - New breakthroughs - Variations - Unpredictability
Replaces creative persons by custodial ones	Replaces custodial persons by creative ones.
Seeks perfection of the status quo - drill and inspect, drill and inspect.	Seeks new horizons - speculates and imagines; devises and guesses.
Fears any change; resents new ideas; cannot understand why anyone wants to change what is already working well enough.	Resents frustration; cannot understand reluctance to try new ideas.
Finds that leadership can be summed up in formulas like: "Be firm, fair, and friendly; know your job; know your men; work through people; and be a man."	Equates good leadership with anyone who is willing to listen to ideas, to be permissive and enthusiastic, and to encourage ways of discussing and trying the ideas.

Figure 16. Comparisons between Custodial Attitudes and Creative Attitudes.

Source: Frederick C. Dyer and John M. Dyer. Bureaucracy vs. Creativity. Coral Gables: University of Miami Press, 1965, p. 39.

quest for the truth a catastrophic need for certainty, safety, definiteness and order . . . (p. 89). For these persons, self actualized creativeness is "emitted" or radiated and "hits all of life regardless of problems" (p. 91).

What are the implications of this contrast between creative and managerial style for the field of educational administration? Enochs (1981:175-177) suggests that management is "less demanding and less risky" than leadership, but challenges, nevertheless, that leadership is "a process for achieving fundamental changes in hard times." He implores educations' leaders to become active and positive in their approach to their responsibilities. Educational administrators have been charged with the task of turning the educational system around (Culbertson, 1976; Harris, 1976; and Enochs, 1981). This transformation can only take place if administrators cease to operate from a status quo basis.

Is it possible for administrative leadership patterns to be altered? Barrett and Yoder (1980) describe a study conducted at the Pennsylvania State University, in which teachers rated school principals on the basis of leader behaviors; the principals, likewise, completed similar scales. The evaluation was followed by an administrative training program utilizing the concepts of leadership considered most necessary for effectiveness: communication, work climate, staff motivation, and productivity. Results indicated that principals quite often did not see themselves and their leadership style in exactly the same light as their subordinates; however, when these differences were made clear to them, and when they were given

opportunities for the development and enhancement of leadership qualities, improvement did result.

Those improvements were noted for the experimental as well as the control groups. Greatest growth areas were in: communication, work facilitation, competence of the principal to lead and in decision processes (Barrett and Yoder, 1980:44-66).

The alteration of one's leadership pattern depends to a great extent upon an internal unity. DeBono (1971) says that creative persons are not polarized in their thinking processes but incorporate, instead, both conceptual and analytical processes in a complimentary manner. Maslow (1976) speaks of this type of person combining a "wholeness" in thought process. As he states:

We speak here of the ability to integrate and of the play back and forth between integration within the person, and his ability to integrate whatever it is he is doing in the world. To the extent that creativeness is constructive, synthesizing, unifying, and interpretive, to that extent does it depend in part on the inner integration of the person (p. 90).

Maintaining the proper balance between creativity and status quo seems to be accomplished in direct proportion to the balance of cognitive styles within the person's brain hemispheres (Herrmann, 1980). Figure 17 shows how Herrmann demonstrates that one's status quo nature comes from the influence of the old reptilian brain which colors the thought processes of the lower left hemisphere. One's creative self, in contrast, is highly dependent upon the full utilization of the upper right cerebral

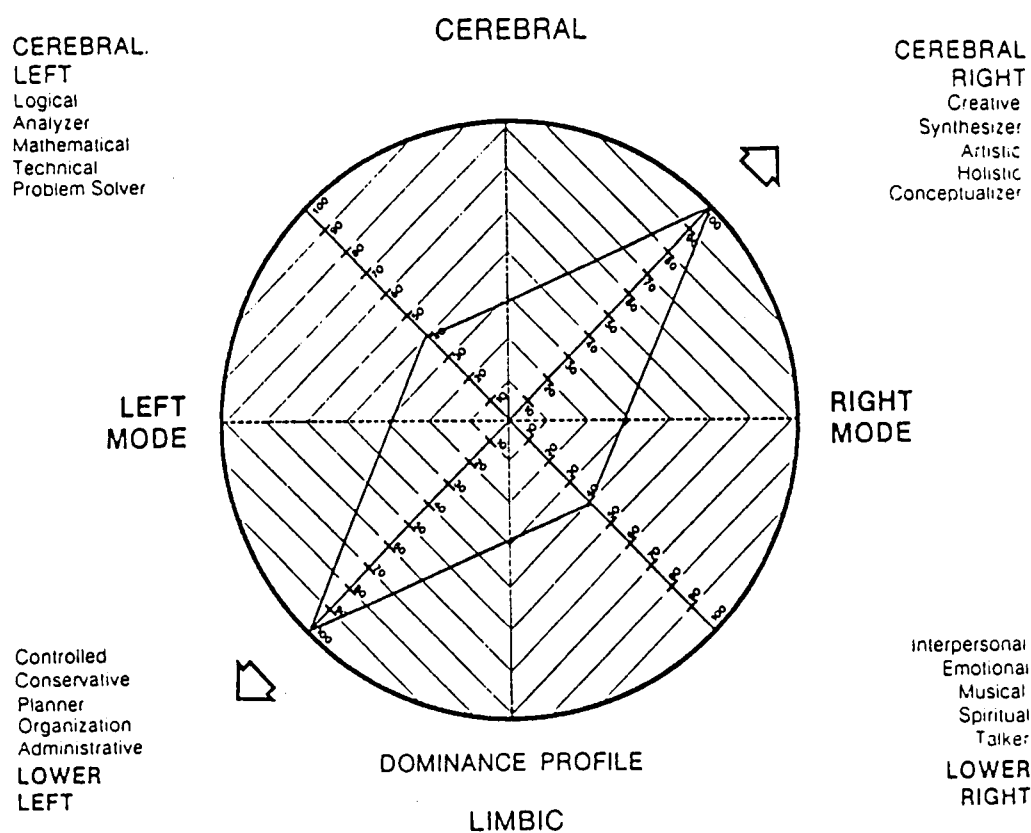


Figure 17. Dominance Style: Creativity vs. Status Quo.

Source: Ned Herrmann. Materials presented at
Application Workshop, Herrmann Brain Dominance Instrument,
 Lake Lure, North Carolina, February 1983.

quadrant which operates from a creative desire to alter the status quo. Proper balance of these cognitive styles is equated with the same balance in one's leadership style (Herrmann, 1980). Just as the qualities of creativity and maintenance must be balanced; so, too, is it necessary that an effective leader endeavor to blend proportionately his/her relationship with others and the task at hand.

Relationship vs. Task

Maccoby (1981) described the leaders needed for the 80's and beyond as "developers."

[Such individuals are] oriented not only to developing new products, markets and technology, but also to human development . . . they invite participation in developing new ideas and they encourage subordinates to share power (p. xv).

Developers, Maccoby suggests, demonstrate a leadership style that builds relationships and inspires trust, and they use the organization as the crucible for such development. He states:

The key to developing the American character is the work place. Unless we overcome the sense of depression at work felt by many talented and willing people, the whole economy and society will lose its vitality (p. 52).

Earlier writings by Burns (1978) point to this same need for not only development of the employee, but development of the self as leader. Leadership is a synthesis of the two, resulting in a transformation within the organization. As Burns states:

Transforming leadership ultimately becomes moral in that it raises the level of human conduct and ethical aspiration of both leader and led, and thus it has a transforming effect on both (p. 20).

Using a detailed study of the leadership of six internationally successful firms, Maccoby (1981:221) points out that the leadership

collectively represented by the chief executives in these firms is characterized by the following qualities:

A caring, respectful and responsible attitude; flexibility about people and organizational structure and a participative approach to management, the willingness to share power. Furthermore, they are self-aware, conscious of their weaknesses as well as strengths, concerned with self-development for themselves as well as others.

Peters and Waterman (1981:236-278), describe a recent 20-year study of the most successful modern day American corporations. This study, conducted under the direction of McKinsey and Company, reveals that companies are successful because they value several universal beliefs, not the least of which is the conviction that the greatest resources within their organizations are the human ones. This concept is reminiscent of earlier writers such as McGregor (1960), Likert (1961), and Miles (1965), who were major influences in the current emphasis on human resource development. McGregor (1960) outlined the two basic managerial viewpoints of the average man operating within an organization: Theory X and Theory Y.

Through an extensive analysis of research Likert (1961) pointed out that high producing divisions and companies were characterized by managers who involved their subordinates both in decisions and responsibilities. Likert suggested that the most effective supervisors were employee centered and exhibited high-performance goals and an enthusiasm toward achievement of those goals. Rather than trying to accomplish organizational goals through unreasonable pressure, the effective supervisor allowed subordinates the freedom necessary to reach those goals. Feelings of trust and concern were characterized

by those supervisors who were accepted by their subordinates as being fair and reasonable in their demands. Organizational skills and technical knowledge among supervisors were factors that did have an effect upon the success of the organization, but they tended to play a lesser part than did the supervisor's attitudes or behaviors toward his workers.

Mitchell and House (1974) likewise advocated what they termed a "path-goal" theory of leadership. This theory emphasized that the effectiveness of a leader was dependent upon his ability to guide subordinates toward a clearer perception of their work and personal goals and to clarify the path to goal attainment. Subordinates were motivated, or led, to the extent that leader behavior increased their expectancy toward achievement of valued goals.

Other writers have commented on the need for blending the goals of the organization with those of the individual employee. Mintzberg, (1975:55) states that: "Every manager must motivate and encourage his employees, somehow reconciling their individual needs with the goals of the organization (Mintzberg, 1975:55). James McGregor Burns (1978:20) notes:

Such leadership (transforming) occurs when one or more persons engage with others in such a way that leaders and followers raise one another to higher levels of motivation and morality. Their purposes, which might have started out as separate but related . . . became fused.

Miles (1965:229-240) discussed the importance of all members of the organization being viewed "as reservoirs of untapped resources." He stressed that such resources would include "not only physical skills

and energy but also creative ability and the capacity for responsible, self-directed, self-controlled behavior" (p. 232).

It seems that human relationship skills are greatly needed by leaders in today's society. Katz (1974:90-102) summed up this need in his discussion of the different managerial skills required by leaders at different levels of the organization; he considered human skills to be a major factor at all levels of management. Katz indicated that human skills were related to the way an individual perceived as well as recognized the perceptions of his superiors, equals and subordinates, and in the way he subsequently behaved. A leader demonstrates such skill by (1) working to create an atmosphere of approval and security and (2) being sensitive to the needs and motivations of others, so that he can judge the possible reactions to and outcomes of various decisions. Having this sensitivity, the leader is willing to act in a manner that takes such feelings into consideration. Katz points out that human skill cannot be a some-time thing. Because everything that a leader says and does (or fails to say and do) has an effect on his associates, the leader's true self will in time show through. Human skill must be developed naturally and be an integral part of the leaders' whole being.

How are human relations skills developed? If it is a natural part of one's being, is it related to a particular cognitive style? Answers to such questions will be considered in the remaining portion of this section. Consideration will be given to the difference between a task or relationship approach in management style.

Barnard (1968) maintained that a manager operated in two realms simultaneously. He classified these functions as:

1. Non-executive--related to the technical aspects of a job (i.e., tasks).

2. Executive--concerned with the human relationship aspects of maintaining the organization and moving it in a purposeful direction. Other writers have recognized this duality in the management process and have categorized leaders on the basis of whether they emphasized one purpose to a greater extent than the other (Blake and Mouton, 1964; Hersey and Blanchard, 1978; Reddin, 1979). Expanding on Barnard's classification of a manager's functions, Zaleznick (1964:157) described the executive function as the ability to "influence the individual and groups within the organization to modify behavior and attitudes so that some different adaptation to the environment is established."

Zaleznick concluded that the executive function was of three types:

(1) homeostatic, (2) mediative, and (3) proactive.

In the homeostatic function, the manager is basically concerned with maintaining the organization; in the mediative function, the manager attempts to activate change in response to environmental pressures. In the proactive function, the leader "seeks out environmental possibilities." Zaleznick (1964:157) explains this function: "Instead of reactive it is proactive and in a sense introduces change in the environment to conform to the creative use of resources available within the organization."

Zaleznick (1964) proposed that a leader would approach these functions in such a manner that one would be emphasized more than another depending upon the leader's personal life history or on the development of certain "internal sets." As Zaleznick states: "By the time an individual joins an organization to embark on a managerial career, he has established internal sets that form how he seeks to engage his environment" (p. 160). In Zaleznick's theory the person develops according to one of three such internal sets: (1) idea; (2) person-orientation or (3) fusion. A person's "internal set" is formed by the way that person's relationships were established within the family unit.

Persons who were influenced more by the feminine figures in their lives appear to be more person-oriented, while persons reared by a distant father and nurturant mother direct their energy more toward the completion of the task (idea set). Zaleznick defines fusion types as those whose parents showed equal affection and influence over them. Such persons attempt to balance both task and relationship in their management styles. As he explains, such an individual would: ". . . Weigh both persons and ideas as important to him and blend them in his concerns with situations in the real world" (p. 161).

Figure 18 graphically illustrates how these internal sets operate in conjunction with the functions of the manager. As shown in the figure, each idea set has an area of primary, secondary and tertiary performance suggesting that there is a range of possible functions within which a manager could conceivably operate depending upon the circumstances and his unique "internal set."

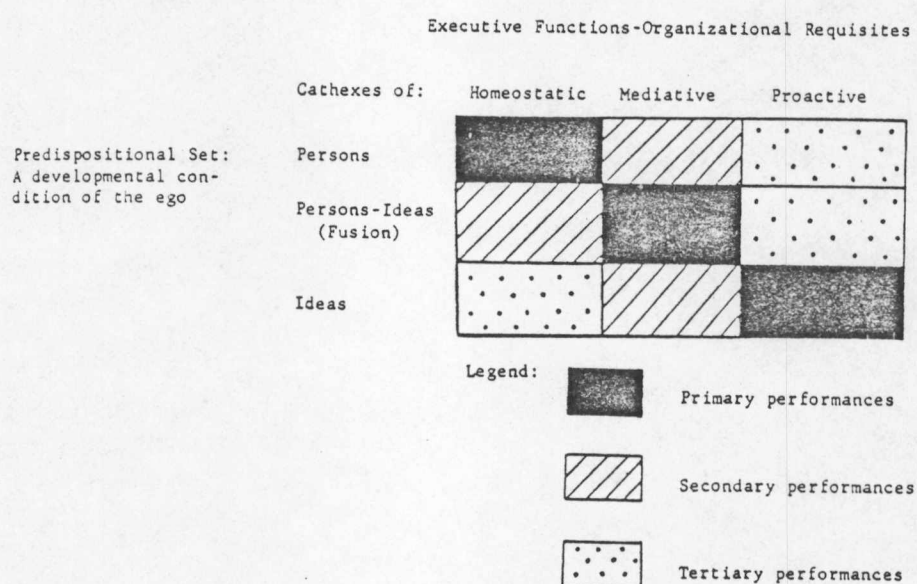


Figure 18. The Interaction of Executive Functions and Predispositional Sets.

Source: Abraham Zaleznick, "Managerial Behavior and Interpersonal Competence," Behavioral Science, April 1964, 9(2), pp. 156-166.

Along a similar line, Burke (1980:54-56) refers to a University of Texas study by Spence and Helmreich in which the masculine and feminine qualities of a leader are related to a task and/or relationship orientation. Masculine and feminine attributes, as defined in this study, are acquired as the result of a person's environment rather than being related to the biological sex of the individual. A leader would be considered masculine or feminine depending on the degree of the specific personality type which she/he manifested. Conceivably a person might demonstrate a significant mixture of both personality types and would be considered "androgynous" (Burke, 1980:56).

Using a combination of effectiveness measurements, Spence and Helmreich demonstrated that those persons scoring highest in managerial achievement also demonstrated significantly high androgyny scores. Based on this study, Burke poses the following question: "Isn't task behavior essentially masculine and relationship behavior essentially feminine at least as these concepts have been characterized in our culture" (p. 56)? Blake concludes:

The evidence strongly suggests that both task and relationships are of equal importance regardless of the situation. Simply stated, a leader's job is to both provide direction and structure for the task and be considerate of the follower's needs (p. 56).

The concept of masculine and feminine characteristics of personality development relate to earlier cultural beliefs such as those celebrated in the Chinese culture and philosophy of I. Ching

(i.e., masculine Yang and feminine, Yin). Figure 19 presents a compilation of the terms related to the dual modes of thinking which man exhibits and which parallel the modern concepts of Right-Left Brain Hemisphere Characteristics.

Could one also conclude from the previous studies, and from Ornstein's (1972) thought processes classification shown in Figure 19 that a leader who exhibits qualities of both left and right brain processes is more likely to blend task and relationship? Does this fact suggest that those who exhibit a left-brained orientation will lean toward a task approach while the right-hemispherical leader will be relationship oriented? The following studies support this theory.

Witkin (1964:172-205) pointed out from his studies of young adults and children, that persons could be classified as: (1) those needing to impose structure and (2) those who exhibited greater consideration of persons in an environment. Operating from this theory, Witkin developed a test known as the Embedded Figures Test. This test, based on one's ability to distinguish foreground from background, could measure whether or not a person was "field independent" or "field dependent" in solving environmental problems. Field independent persons were defined by Witkin as those who could discriminate foreground from background signifying their tendency to "impose structure." Field-dependent persons, on the other hand, were unable to make such differentiations suggesting that they operated from a relational basis.

Who Proposed It?

Many sources	Day	Night
Blackburn	Intellectual	Sensuous
Oppenheimer	Time, History	Eternity, Timelessness
Deikman	Active	Receptive
Polanyi	Explicit	Tacit
Levy, Sperry	Analytic	Gestalt
Domhoff	Right (side of body)	Left (side of body)
Many sources	Left hemisphere	Right Hemisphere
Bogen	Propositional	Appositional
Lee	Linear	Nonlinear
Luria	Sequential	Simultaneous
Semmes	Focal	Diffuse
I Ching	The Creative: Heaven	The Receptive: Earth
I Ching	Light	Dark
I Ching	Time	Space
Many sources	Verbal	Spatial
Many sources	Intellectual	Intuitive
Vedanta	Buddha	Manas
Jung	Causal	Acausal
Bacon	Argument	Experience

Figure 19. The Two Modes of Consciousness: A Tentative Dichotomy.

Source: Robert E. Ornstein. The Psychology of Consciousness, New York, Viking Press, 1972, p. 67.

Based in part on this theory, Weisenberg and Grunfield (1966:342-395) did a study which compared the two personality types (field-independent vs. field-dependent) with the tendency toward task and/or relationship management. The test used to measure the degree of task and/or relationship behavior employed was Fiedler's Esteem for the Least Preferred Co-Worker. (Fiedler's test is based on the assumption that the more significantly one differentiates between the most and least-preferred co-worker, the more task oriented that person is in leadership style) (Fiedler, 1969:210-215).

Weisenberg and Grunfield's study confirmed that those supervisors exhibiting extreme field independence (left-brainedness) were less considerate than were extremely field-dependent (right-brained) persons. Those persons scoring mid-way between the two extremes (whole-brained) tended to discriminate more sharply than did the group judged field-dependent. These conclusions appear to support the fact that the feminine right-brained qualities are more compatible with a relationship orientation while a mixture of these styles, or a whole-brained approach, tends to represent more of a balance in task and relationship behavior among leaders.

Another interesting correspondence between task-relationship and hemisphere style has to do with occupational choice. It appears that persons cluster in occupations according to similar brain hemisphere styles and the results of the training received through that occupation. Such a combination tends to solidify either a task and/or relationship orientation.

Figure 20 represents a clustering of jobs within the medical profession. This clustering resulted from tests given to this group during an organizational training session (Herrmann, 1983). Several studies have shown the relationship between a left-brained orientation and a choice of careers of a more technical nature (Dumas and Morgan, 1975; Herrmann, 1981).

In contrast, right-hemisphere oriented individuals are often shown to be more inclined toward the humanities or arts (Galin and Ornstein, 1974; Herrmann, 1981). Interestingly, some current writers have indicated a tendency for management style to be more effective when the leader showed qualities of right-hemisphere inclination through training in the humanities. The following writers support this theory: Maccoby (1982:81): "In addition to good technical training, new leaders have to be broadly educated in the humanities." Maccoby, (1981:232): "We have engineers who are technical experts but who don't really understand people." Achilles (1981:2):

The administrator is a person first; an administrator second. The administrator is cast by society in a decision-making role. Therefore, a preparation program for administrators must focus upon a human's relations with the fellow humans by examining those things generally referred to as uniquely human--art, music, philosophy, literature,-- whatever provides humankind with the cornerstones of humanity first, and decision-making ability second.

Graham (1980:235):

In sum, to improve analytic skills and to increase awareness of and sensitivity to human behavior and human dilemmas, I urge educational leaders to experience the humanities--not from the perspective of the art critic, but as human beings studying human behavior.

A 20 year study of 422 managers in the Bell System reviewed several factors which contributed to managerial success (Beck, 1981:

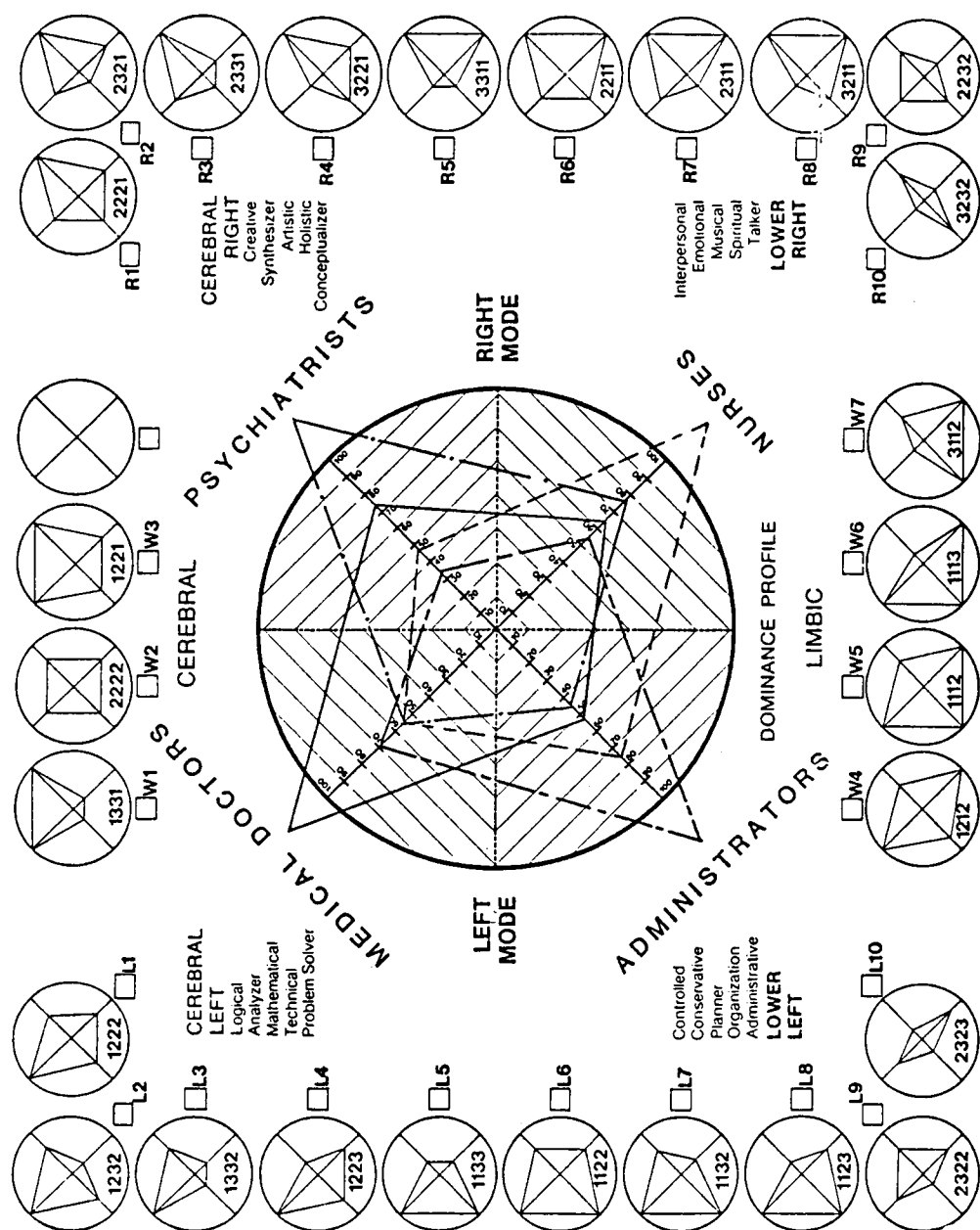


Figure 20. Clustering of Dominance Styles in the Medical Profession.

Source: Ned Herrmann. Materials presented at Application Workshop, Herrmann Brain Dominance Instrument, Lake Lure, North Carolina, February 1983.

1-13). Included were such factors as amount of education and major course of study. Subjects were classified by major into three groups: Engineers, Business, and Humanities and Social Sciences. On the basis of these group classifications, their effectiveness was considered in four basic areas: (1) administrative skills, (2) interpersonal skills, (3) intellectual ability and (4) managerial motivation.

One result of this study was that the patterns of strengths and weaknesses for the group of engineers and the group of humanities majors were exactly opposite. The best overall rating was achieved by the humanities majors who were high scorers in all areas except quantitative skills. Engineers were highest only in quantitative skills with lowest scores demonstrated in all other areas of management. Table I provides a graphic presentation of those differences as they relate to the Interpersonal Skills Area.

Each group was evaluated to determine progress toward management promotion during several intervals within the 20-year period of this study. Humanities majors were shown to have made the greatest progress toward the highest levels of management during the 20-year period. As shown in Table II, at the end of the 20-year period 43 percent of the humanities majors had reached the 4th or higher level of management in contrast to only 23 percent of the engineers (Beck, 1981:1-13). Maccoby presents an interpretive statement relative to such findings when he suggests:

TABLE I
INTERPERSONAL SKILLS^a

Category	Liberal Arts		Engineering	Business
	Humanities/ Social Science	Math/ Science		
<u>Assessment Dimensions</u>				
**Leadership Skills	3.1	2.3	2.4	2.7
**Oral Communication Skills	3.4	2.9	2.5	2.9
**Forcefulness	3.2	2.3	2.3	2.8
<u>Group Exercise Ratings</u>				
*Oral Presentation	3.4	2.9	2.7	3.1
*Competitive Discussion	3.3	2.6	2.7	3.1
<u>Personality Questionnaires^b</u>				
**Dominance (CPI)	56%ile	34%ile	38%ile	50%ile
**Ascendance (G-Z)	78%ile	48%ile	55%ile	67%ile

^aAverage Score (1 = low, 5 = high).

^bBell System College Graduate Norms, 1978.

*Group differences statistically significant at $p < .005$.

**Adjusted for level of education $p < .005$.

Source: Robert E. Beck, The Liberal Arts Major in Bell System Management,

TABLE II
AVERAGE PROGRESS IN MANAGEMENT BY MAJOR

Category	Humanities/ Social Science	Engineering	Business
**Years To Reach 2nd Level	4.0	5.4	3.9
N	57	47	68
**Level At 8 Years	2.6	2.2	2.4
N	48	46	60
Level At 20 Years	3.4	3.2	3.2
N	43	40	47
% 4th Level or Higher, Year 20	43%	23%	32%
N	43	40	47

**Group differences statistically significant at $p < .005$.

Source: Robert E. Beck, The Liberal Arts Major in Bell System Management,

Without a commitment to culture that supports the practice of life described in the great humanistic religious traditions, people find meaning in idols of self, possessions, technology, or organizations. They put their faith in bureaucracies rather than the divine spirit in each other, and the self remains childish and undeveloped (p. 234).

In summary, maintaining positive relationships depends to a great extent on one's ability to exercise the right side of the brain particularly that area of the lower right quadrant which is highly controlled by the emotional limbic system (Herrmann, 1980). This quadrant controls one's ability to operate from an intuitive feeling basis and allows for a keenness of perception necessary for empathizing with others. Herrmann defines this quadrant as being both interpersonal and emotional in cognitive style (see Figure 21).

Task accomplishment, on the other hand, is influenced more from those abilities indicative of the left hemisphere (Herrmann, 1980). As shown in Figure 21 the upper left quadrant influences one's ability to deal with the technical and problem solving aspects of a task; the lower left quadrant influences one's ability to be organized and controlled. Both are qualities necessary for task completion. Not only is it important that leaders possess the qualities inherent in both relationship and task orientation, but they must be perceptive of when and how to blend these qualities to suit a particular situation. This knowledge implies a willingness on the part of the leader to be flexible. The concept of flexibility in relation to rigidity is addressed in the final part of this literature review section.

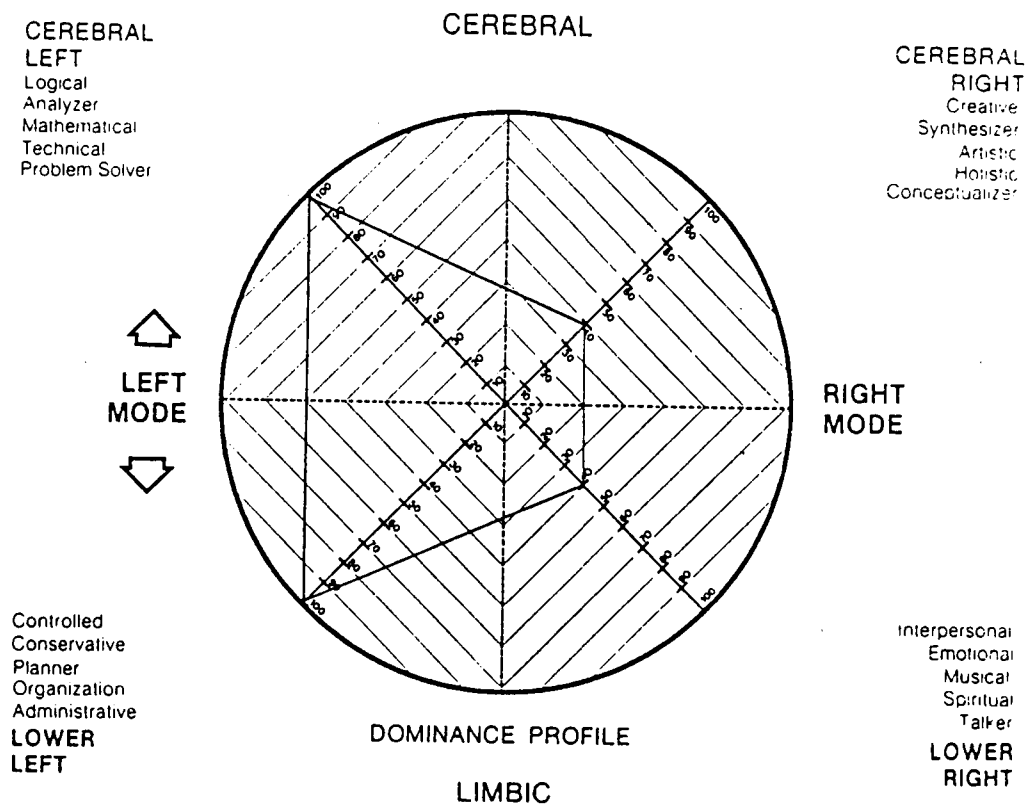


Figure 21. Dominance Style: Task vs. Relationship.

Source: Ned Herrmann. Materials presented at
Application Workshop, Herrmann Brain Dominance Instrument, Lake
Lure, North Carolina, February 1983.

Flexibility vs. Rigidity

Much emphasis has been placed on the concept of situational leadership, which implies that an effective leader will adopt a style of management to match the situation in which the leader must lead. The theory of situational leadership basically centers around the leader being able to alternate appropriately between an approach of relationship orientation in contrast to task.

Tannenbaum and Schmidt (1958) suggest that the successful leader is neither primarily authoritative nor permissive but is instead sensitive to situations and competent in his ability to flex his style to fit the situation. A "style flex" depends upon the leader's consideration of the forces within himself, his subordinates and the situation.

Forces within the leader include value systems, confidence in subordinates, leadership inclinations and the feelings of security the leader has in uncertain situations. Forces within subordinates require the leader to weigh the subordinates' need for independence, their ability to assume responsibility, their tolerance for ambiguity, and their interest in the specific problem and general goals of the organization. Situational forces to be considered include the values and traditions of the organization relative to group effectiveness as well as the nature of a specific problem and the time available for resolution (Tannenbaum and Schmidt, 1958:95-101).

Hersey and Blanchard (1981:31-54) agree that leadership style is not an either/or choice between task and relationship behavior but

is, instead, a combination in varying degrees of the two. They propose that a leader has both a basic leadership style and a style range. Style adaptability or style flex is the degree to which a leader can adapt his style to the demands of a given situation, and even though a leader has a wide-style range, the leader will be ineffective unless she/he possesses the perception needed to make appropriate changes to match a situation.

Along with the concept of style flex, Hersey and Blanchard propose a Life Cycle theory which suggests that the leader gauge the degree of task and/or relationship behavior she/he exhibits to the maturity of the group. (Maturity is defined as the subordinates' capacity to set goals that are both high and attainable.) A task approach should be emphasized in the leadership of immature groups. As the maturity of the subordinates increases, the leader would reduce task behavior and increase relationship style. Full maturity of the group would signal a need for a balance between the two styles.

Hersey and Blanchard's theory is reminiscent of the work of Fielder (1969) who suggested that particular situations call for particular leadership styles. As the result of extensive research, Fielder found that where either low or high extremes of power and influence existed, a task-oriented leader was most effective. Mixed situations demanded a leader who was relationship oriented. Fielder also discovered that the nature of the task had its influence. In low and high extremes of task favorableness, a task-oriented leader was needed; mixed situations operated best under the direction of a leader

who was relationship oriented. Fiedler suggested that the effective leader was one who provided a task approach in either positively or negatively extreme situations and a relationship approach when there was a mixture of the favorable and unfavorable.

Fielder differs from most situational theorists in the method advocated for style adaptability. Fielder suggests that matching the leader to the job situation in which she/he can operate most effectively is more feasible than attempting to change the basic nature of the leader. "A man's basic style of leadership depends upon his personality. Changing a man's leadership style means trying to change his personality" (p. 215). Fielder also states, ". . . it is doubtful that intensive training techniques can change an individual's style of leadership" (p. 215).

Other writers have advocated styles of leadership and decision making that emphasize a shift in orientation as the situation demands. Reddin (1979) proposed a 3-D theory consisting of four basic styles of management: (1) related (more orientation toward task than relationship); (2) separate (less than average task and relationship behavior); (3) dedicated (less relationship orientation and more emphasis upon task); and (4) integrated (more than average task and relationship behavior).

Reddin theorized that each basic style had shades of less effective and more effective behavior. A leader must have the ability to adjust his style to suit the occasion. The ability is dependent upon: (1) sensitivity to the situations, (2) style flexibility, and

(3) management of situations. In the management of situations, the leader would be concerned with organization and technology as well as the interaction of all human groups. The leader's ability to match his style to the situation determines his effectiveness.

Taggart and Robey (1981) have considered style flex not only in terms of task and relationship behavior but have explored the implications that these areas would have for the realm of decision making. They placed their theory against a backdrop of left-right brain hemisphere orientation and suggested that leaders operated according to four basic decision-making strategies which emphasized a movement from left to right-brain approaches as the situation demanded. Four basic strategies were explored:

1. Adaptation: the person changes to match the demands of the environment.
2. Placement: the environment is modified to fit the individual.
3. Accommodation: a combination of the first two approaches.
4. Prediction: a harmonizing with the situation and a withholding of intervention (Paraphrased, pp. 193-194).

These writers suggested that the left-brained styles of decision making included: (1) adaptation which is an active, systematic changing of the person through the process of organizational training rather than through socialization and/or experience on the job; and (2) accommodation which "regards results as sacred and emphasizes purposeful manipulation of person and environment" (p. 193).

Taggart and Robey considered the right-brained styles to be: (1) placement, which is more of a person-job fit than it is a modification of the individual and (2) prediction which implies a

"willingness by the individual to harmonize with the situation" (p. 193). Prediction represents withholding of intervention to allow changes to occur in a natural manner. Figure 22 demonstrates the relationship of each decision style to the left-right brain hemispheres. Taggart and Robey stress that leaders should be familiar with each of the four styles and become adept at using each as the situation demands. In other words, leaders should endeavor to develop all aspects of their thinking processes; leadership should be a "whole brained" process.

Herrmann (1980), likewise, suggests that one's ability to shift styles effectively is highly dependent upon brain dominance being balanced between left and right hemispheres. This would be especially true of the left and right quadrants situated in the limbic area. Figure 23 illustrates this interrelatedness. Herrmann points out that flexibility is enhanced through the use of the lower right hemisphere which is more attuned to "reading" situations and people and forming judgements as to when style flex is appropriate. Stability, on the other hand, is centered in the lower left quadrant and is represented by the controlled conservatism of this style.

IV. EDUCATION AND THE CHANGE PROCESS

It is time to demand more of ourselves and each other. Businesses, governments and schools must promote a climate of innovation and creativity so that they can raise their standards and goals. This requires results--oriented leadership.

"A Crisis in Mediocrity," Management World, Vol. II, No. 1, January, 1982, p. 21.

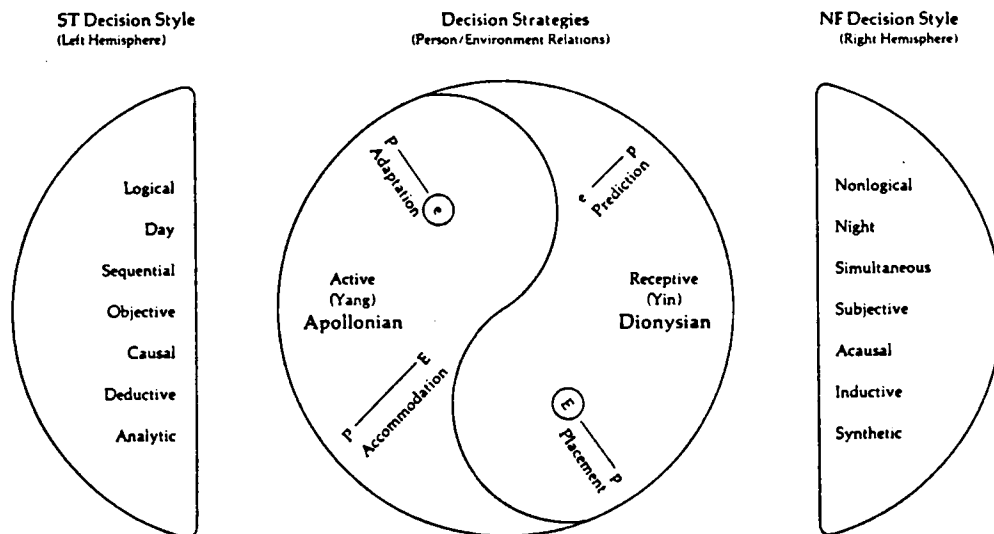


Figure 22. Human Information Processing in Management Decision Making.

Source: William Taggart and Daniel Robey, "Minds and Managers: On the Dual Nature of Human Information Processing and Management," Academy of Management Review, 1981, Vol. 6, No. 2, p. 192.

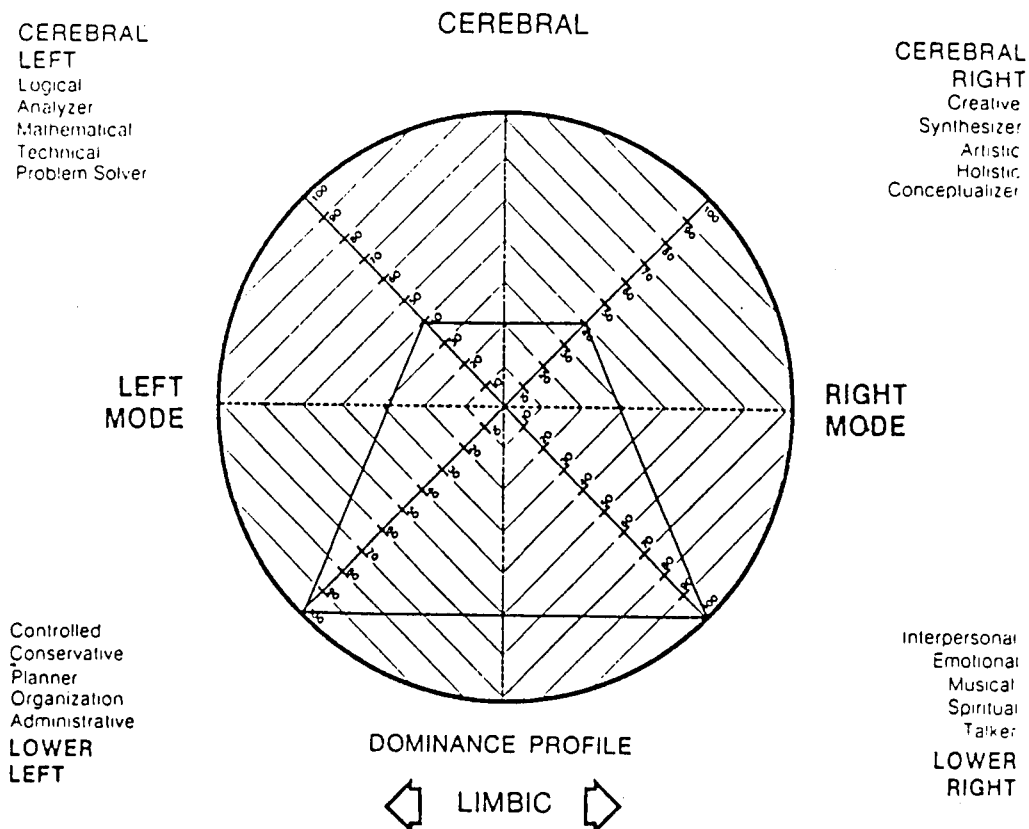


Figure 23. Dominance Style: Flexibility vs. Stability.

Source: Ned Herrmann. Materials presented at Application Workshop, Herrmann Brain Dominance Instrument, Lake Lure, North Carolina, February 1983.

Educational Change

Nothing is permanent but change--Heraclitus, 1513 B.C.

Change is inevitable! The fact that our country is preoccupied with change, both from the standpoint of factors in the human environment as well as the turmoil of the inner person is evident in the volume of present-day literature designed to assist people in understanding themselves and adapting to these changes. The educational system, a mirror to this tempestuous environment, is not immune to its transitory influences. Superintendents, principals and supervisors who serve as education's leaders cannot function effectively without realistically accepting the challenge to serve as change agents. This brief literature review demonstrate that the strategic position of these leaders within the structure of the organization provides them with unique opportunities to affect change. These opportunities are unique to them and cannot as effectively be accomplished by others.

A study of major educational change efforts over the past 75 years reveals that the largest volume of educational change has indeed been through the efforts of those within the school setting rather than through individuals or agencies outside the school (Orlasky and Smith, 1972). It appears, however, that the success rate of internal changes may not have been as high as the success rate of those changes which have occurred externally. As Orlasky and Smith suggests, the source of the change has had less to do with its retention than has the support the change received and the strain it exerted upon the school staff (Orlasky and Smith, 1972:413).

This fact emphasizes the need not only for leaders who can visualize a concept of the future, but also leaders skilled in implementing changes. It demonstrates a need for results-oriented leadership (McKendrick, 1982), a leadership that provides a combination of conceptualization and implementation and requires that leaders exercise a cognitive style that is holistic in its approach. Gaining an understanding of how leadership can become results oriented requires that one first understand the nature of change itself (Mintzberg, 1975).

Owens (1975) defines change as:

A planned, systematic, controlled effort to alter more than one of the following aspects of the organization: (1) its tasks, (2) its structure, (3) its technology, or (4) its participants in ways thought to be more effective in achieving the organizations' goals (p. 78).

Change can be either a product or a process. Product change is concerned with the adoption and/or use of a new product or invention. Process change, on the other hand, focuses on the manner in which decisions are made in the organization and on the possibility of improvement in the quality of those decisions (Miles, 1965).

In considering both types of change, leaders must understand that there is a fine distinction between (1) the outward appearance of change and (2) the acting upon that change in a meaningful manner. Houge (1980), who calls this dilemma "style vs. engineering," defines style as all those things that pertain to the external appearance of change, such as: commitment to change or the reorganization of a structure to allow for change. Engineering change, on the other hand, is change that affects performance of the daily operation within the classroom. It includes such aspects as the inservice training of

teachers to deal with specific curriculum needs or assistance to teachers in understanding the curriculum (Houge, 1980). Engineering, then is synonymous with implementation. Leaders must combine style with engineering to affect real change; a product should result from the creative birth of an idea.

Educational leaders are in strategic positions to insure that change is not only conceptualized but also implemented. Superintendents and supervisors, being somewhat removed from the local school setting, have a global vantage point which offers them the advantage of viewing the possibilities that change can bring to the total system. If they are, in turn, individuals who have exercised their right hemispheres to the degree that they can think holistically, they are able to form a Gestalt of the situation and more effectively predict and plan for the change process. Miles (1965) indicates that before change can effectively take place the total organizational health should be considered. Grossnickle, too, emphasizes the importance of planning any change by considering the effect that it will have upon every part of a system (Grossnickle, 1980). Such knowledge implies not only analytical but intuitive skill as well.

Perhaps the educational leader who is in the best position to conceptualize needed change for the entire school system is the school superintendent. As Paulson (1982:25) states: "there seems to be universal agreement among strategic planners that the key to strategic change is the chief executive."

The Role of the Superintendent

Results of a literature survey suggests that the chief executive is the focal point and determiner of change in an organization. The school superintendent, who serves as the chief executive officer of the local school association, executes this role in affecting change in the educational system. It is the superintendent who must, in fact, define the purpose for the organization.

Weick (1976) discusses the importance of an educational leader being able to infuse the organization with appropriate symbols to define its purpose. According to Weick, educational systems lack a "consensus on goals and the means to attain those goals" as well as an "unpredictability of problems and of resources to those problems" (p. 673). This makes it difficult for the organization to operate in a typical bureaucratic structure of inter-dependence. Because the ties among educators are weaker than they are in other kinds of organizations (due to less inter-dependence) there is a necessity to strengthen and clarify the purpose that unites individual educators to the organization. Such an infusion of purpose, Weick suggests, is dependent upon the leaders' ability to articulate "a common vision." Paulson (1982:42) expresses this position clearly: "In times of strategic change, the organization must be able to look to him (the leader) as the 'Moses' leading it through the wilderness toward a vision that is clear only to a few."

Although goals are important in specific situations, it is the symbol that helps to clarify exactly what is to be done and why (Weick, 1976). Rody (1978:74) suggests:

The effectiveness of a leader lies in his ability to make activity meaningful for those in his role set--not to change behavior but to give others a sense of understanding what they are doing, and especially to articulate it so they can communicate about the meaning of their behavior.

The chief executive not only defines the purpose for the organization but he helps to set the "tone" for the way in which that organization will operate. The superintendent is responsible to a large degree for the innovation that will be displayed by others in schools. Osborn (1957) says: "The ideal top executive is both a creative pace-setter and a creative coach. He cultivates the creativity of those around him and makes it bloom. Above all else, he must feel a real regard for the power of ideas" (p. 346).

Owens places much emphasis upon the superintendent in the change process and suggests that his proximity, not only to educational personnel, but to community spokesmen provides him with unique opportunities to fulfill such a mission (Owens, 1970). A study of school superintendents and the nature of their jobs revealed that superintendents devoted over 70 percent of their verbal contact time to those persons involved in formulating policy and to other school administrators. The study suggests that the superintendent functions as "information broker" for the school system. His access to key informants both within and outside the system, and his pivotal role in the system go hand in hand (Duignon, 1980:23). How effectively the superintendent uses this advantage to affect change is often determined by how she/he is regarded by others (Carlson, 1965).

Carlson (1965) suggests that a major factor in a school system's rate of adoption and diffusion of new practices is the superintendent's position in the social structure. Carlson's study of the superintendency revealed that those superintendents who were more highly educated and who came from outside a school system were most successful in encouraging change (Carlson, 1965).

The Role of the Supervisor and Principal

If the superintendent is the most adept educational leader in terms of visualizing purposes and pointing directions, supervisors and principals have a decided edge when it comes to the implementation phase of the change process. Harris (1976:267) says that, "Supervisors can claim both credit and blame for some significant part of what the United States has become within the past 200 years. They must also be accountable for part of what the future holds for mankind."

Supervisor and principal both have opportunities to assist in implementing change. The supervisor, first of all, is in a role that can bring to the change process the overall modifications in structure and redirection of purpose necessary to insure that change is a process of growth. The supervisor, through position in the organizational structure, exerts positional influence in effecting change. In referring to the central office staff, House (1974:52) says that the values of the inner circle elite turned out to be more important than those of the executive director by himself or of the entire staff in predicting innovation.

House concludes that "the initiatory power for innovation adoption resides there." Firestone alludes to the part that the central office staff have in effecting change, and maintains that they are effective because they have the authority, money and time to accomplish the necessary administrative work (Firestone, 1977).

Supervisors are also in a position to develop a cosmopolitan outlook and to become exposed to more ideas and innovations. In discussing innovations, Rogers (1965) encourages a system to provide opportunities for travel and attendance at out-of-town meetings for their staff in attempts to develop this tendency. Rogers also stresses that it matters little how innovative a person is or becomes unless the system in which he operates allows him to play a meaningful role. Otherwise, his fresh perspective is of little value. Positional power, to some degree, allows the supervisor the freedom to expand his horizons and to incorporate fresh approaches in leadership activities. This is in contrast to the opportunities that the classroom teacher has to affect change. As Janango (1978:38) states:

One school teacher's convictions, unsupported by scientific research and experimental data, are hardly a match for the institutionalized super structure we call the public schools and the overwhelming inertia of tradition.

Principals, as well as supervisors, have unique opportunities to provide innovative leadership within the public school setting. Research by Hall (1982) indicates that principals have in fact been instrumental in bringing about many "incidental interventions" merely through their daily interactions with staff. This fact is further

supported by a review of the literature reported by Phi Delta Kappa's Practical Applications of Research in which principals are given credit for program implementation in cases where they have provided practical assistance to teachers in the technical aspects of the change being considered (Callen and others, 1983).

Because of positional power, both from an authority and influential base, supervisors and principals both have the opportunity to become true change agents rather than mere innovators. They can be effective in developing what is termed "engineering change." Engineering change, as defined previously, is a change that has an effect on the performance within a classroom. It is concerned with role performance, or the actual changes in the processes of instruction. This fact is crucial, for as Rutherford (1978:20) points out: "The real test of any change is whether or not the teacher makes use of the innovation in helping to make a difference in the outcomes of student learning."

The authors in a study evaluating educational changes which have occurred during the past 50 years, conclude that all significant instructional changes have been brought about from within the public school setting and that changes in instructional procedures have been far more difficult to effect than have been changes in curriculum or administrative structures (Orlasky and Smith, 1972). Engineering changes, then, appear to be difficult. Can the value of an effective instructional leader be discounted in the face of such evidence? Positional prestige offers supervisors and principals opportunities to be change agents and it affords them a proximity to the teaching staff.

The resulting influential power that they are able to exert enables them to give to the change process an unique advantage. Results of the research on change emphasize that change is not possible unless the educational group in question sees a need for that change and understands how it will benefit them. There is a great hesitancy to give up current practices for something new.

Chin and Benne (1967) stress that an approach of rational self-interest must be used in effecting a change process. The supervisor and principal, through their positions as instructional guides, can help direct the target group in the realization that there is some positive benefit to the change being considered. Through clinical supervision and inservice content they can play a major role in the normative re-education process that occurs as people become convinced to change old patterns and develop new ones (Chin and Benne, 1967).

Supervisors and principals have the opportunity to make use of a pragmatic model of change whereby there is less emphasis on planning for people and more on planning with them. The non-coercive process is built upon a mutual faith between the advocate and the target group. It represents a combined belief that change is needed and that it will occur (Gallaher, 1965).

In discussing the diffusion process, Owens (1976) points out that the effectual process begins as one searches for a solution to a problem. Awareness that there is some knowledge or invention that exists to deal with that problem is a beginning in the acceptance of an innovation. Supervisors as well as principals can assist the teacher

in this search for possible alternatives. Firestone proposed that true participation in planning must take place. He viewed this participation as "formal opportunities to be present during the planning process" (Firestone, 1977:168). Firestone believed that teachers supported innovations designed to address their needs and interests. Teachers' influence is important in insuring that their needs are being met and in their increased commitment to the organization.

The continued monitoring of a change process is essential to its successful continuation. Feedback serves as a necessary ingredient to the continued health of an organization and to the effectiveness of the change process within that organizational framework. The real power to change is closely related to the evaluation phase for it is through this process that the connection between means and ends can be determined. What an organization ought to be doing can be seen in light of what it is doing (Owens, 1970).

Throughout the change literature there is an emphasis on the need for support systems during the change process. Supervisors and principals, by the very nature of their interactions with the staff, can serve to effect this need. Heichberger (1976:116) states that "threatened colleagues must be supported in maintaining positive self images and in understanding the discomforts that change can produce." In discussing planned change, Heichberger emphasizes that a group undergoing change needs to know that there is a support system

available to them throughout the change process. Certainly both the supervisor and the principal can assist in this realization. As Morphet points out, change will be directed according to the behavior pattern or style of the change agent; therefore, the way in which the leader reacts to others, the way she/he chooses to assist others and the purpose behind the desire to initiate change are all factors in the kind of change agent she/he will become (Morphet, 1967).

Future Directions

What type of change is likely to be conceptualized and implemented by building administrators during the 80's? Wiles, Wiles, and Bondi (1981) foresee most change as a refinement of the status quo rather than a creation of new approaches. They attribute this to mandates for accountability and wise use of resources. Change agents, according to these researchers, must become political in order to be effective. Harris, too, urges leaders to use political expertise in "escaping the tyranny of academic traditions" (Harris, 1976:270).

Have superintendents demonstrated that they are, and will continue to be, innovative leaders who support change? Research does not suggest that this is the case. Schneider (1973) in "Roadblocks to Reform" discusses the research of Zeigler, who studied the change process in education. Zeigler's research does not present a positive picture of the superintendent as an agent for change. The conclusions of this study suggest that: "What the superintendent generally wants, unfortunately for the reformers and critics, is status quo" (Schneider,

1973:3). Zeigler's study also implies that the small percentage of male teachers who remain in the teaching profession for more than five years (and from whom the majority of current administrators are selected) tend to become usually conservative and unwilling to take risks (Schneider, 1973). This research is confirmed by the recent research by Coulson (Chapter II) in which superintendents were compared with Chief Executive Officers and shown to be quite left-brained in style.

The results of this research appear to be in direct contrast to what authorities suggest is needed in the way of educational leadership. For example, Thomas (1982:10) suggests that:

. . . If the crisis in American public education is to remain a tolerable pressure, the educational leaders must become a catalyst for organizational reform. It is not enough to "defend the tower," one must articulate a new way of doing business.

Dede and Allen (1981:362) likewise challenge leaders to be forward looking:

Historically, most educational planning has been characterized by narrow, limited visions of possible directions. As a result school systems are widely perceived as among the most backward of the institutions in our society, and demands are frequently made that educators move from a pre-occupation with the past to focus on the future.

Conclusion

What does this literature review say to the topic of creative leadership and cognitive style? It suggests that if effective changes are to take place within the public schools there must be educational leaders of vision who can creatively conceptualize future educational directions. This implies an ability to "see the forest" instead of

merely the trees or to think in a style that is global or holistic. Such is the cognitive style of the right hemisphere.

Not only is it imperative that education have visionary leadership but that leadership must be courageous in its efforts to move in new directions. The status-quo nature, so indicative of left-brained thinking, must be balanced by an open, receptive mode which is again characteristic of an intuitive right-brained nature.

Finally, if educational leaders are to move the educational system forward effectively, they must be adept at working with and through others to accomplish needed change. A humanistic, empathetic feeling for others must exist as well as an intuitive sense of the appropriate. Refinement of these abilities is highly dependent upon a leader exercising his/her right-brained nature or developing the full power of a whole-brained style. If, instead, educational leadership comes predominately from the technical, conservative managerial style of the left hemisphere, there is little likelihood that education will move creatively toward new horizons.

V. SUMMARY

This literature review explored areas of brain research, creative leadership and the educational change process. Topics of brain research which were not explored involve recent developments related to male/female differences in brain styles, learning styles compatible with teaching styles, and brain development growth and plateau periods.

CHAPTER III

METHODOLOGY

I. INTRODUCTION

This exploratory research studies brain hemisphere dominance patterns of selected leaders from various educational administrative and supervisory positions throughout the State of Tennessee. The study attempts to determine if there is a cognitive style most compatible with perceived innovative leadership and investigates the effects of such intervening variables as: sex, leadership position, school system size and educational level on the formulation of this style. It likewise explores the cognitive style(s) most prevalent among the three groups of leaders studied: superintendents, principals and supervisors. The study incorporated the following procedures to obtain the sample and the data.

1. Panels of experts nominated three groups of subjects based on the panel members' perceptions of the subjects' effective leadership in their respective administrative/supervisory positions.

2. Nominators rated each nominated participant on the basis of three leadership qualities: conceptual ability; technical skill; and human relations (Katz, 1974).

3. Selected leaders completed a self-report questionnaire designed to ascertain their perceptions of the degree of innovation/ leadership they practiced in their respective position.

4. These same leaders completed a personal assessment of their own brain dominance patterns using the Herrmann Brain Dominance Instrument (see page 118).

This chapter discusses the methods and procedures used to complete this study. The rest of the chapter is designed around four major sections: (1) Procedures used in Nomination and Selection of Subjects; (2) The Herrmann Brain Dominance Instrument; (3) Development, Administration, Scoring, Validation and Reliability of the Perceived Innovation Questionnaire and; (4) Statistical Design and Procedures of the Study.

The variables considered in this study were brain hemisphere dominance, innovation/leadership, sex, administrative position, educational level of subject, size of school system represented by subject, and method of superintendent selection.

II. PROCEDURE USED IN NOMINATION AND SELECTION OF SUBJECTS

A nomination procedure was used in this study with the belief that subjects thereby selected would more likely represent the best in educational administrative leadership than if the selection had been dependent on a random sample of all administrators. In this procedure "the researcher chooses instances on the recommendation of experienced experts in an area" (LeCompte and Goetz, 1982:19).

Organizations and professional groups most likely to have a direct knowledge of leaders throughout the state served as the panel of experts from whom nominations were solicited. The groups selected as nominators included:

TOSS--Tennessee Organization of School Superintendents

CASE--Council for Administration and Supervision in Education

TASCD--Tennessee Association of Supervision and Curriculum
Development

TASSP--Tennessee Association of Secondary School Principals

TAESP--Tennessee Association of Elementary School Principals

Departments of Educational Administration of the following

Universities:

The University of Tennessee-Knoxville

East Tennessee State University

Middle Tennessee State University

Memphis State University

Tennessee Technological University

A letter of explanation and request for participation as a nominator group was sent to each organization. Along with the letter, nomination forms and a definition of the terms to be used in the rating of each nominee were also sent. (See Appendix A for copies of these forms.) All nominating groups were instructed to select carefully the 25 nominees whom they judged to be most effective in each of the three categories of which they had direct knowledge: superintendents, principals, supervisors. This resulted in some groups completing all three nomination forms while other groups, of a specialized nature, completed only the one pertinent to their organizational membership.

A total of 198 names was submitted by the various organizations. This total included: 55 superintendents; 83 principals; and 60 supervisors. There was considerable renomination at the superintendent

level and some renomination (one person mentioned by several nominators) at the other two levels.

Selection of Subjects

All nominated subjects were invited to participate in the study. A letter of explanation and request for participation were sent to each potential participant along with a copy of the Herrmann Brain Dominance Instrument and the Perceived Innovation Questionnaire.

(See Appendix B for a copy of the letter and Appendix C and D for the forms submitted.)

Positive responses were received from a total of 124 of the nominated participants. This total was distributed according to the following groups and reflects the following percentages of return for each administrative level: (1) 32 of 55 nominated superintendents = 59 percent return rate; (2) 46 of 83 principals = 56 percent return rate; (3) 46 of 60 supervisors = 77 percent return rate and (4) 124 of 198 overall total = 63 percent return rate.

This response rate was quite positive in view of the personal nature of the study and the fact that nominees received their requests at perhaps the busiest time of the school year--the last month of school. Since response was completely voluntary, there was no attempt at a follow-up or second request. Of the total responses received, 103 were correctly completed and could be used in the study. This total represents a subject break-down in the following categories: (1) 27 of 55 nominated superintendents (49 percent); (2) 39 of 83 principals (47 percent) and (3) 37 of 60 supervisors (62 percent).

III. HERRMANN BRAIN DOMINANCE INSTRUMENT

Design

The test chosen to determine the brain dominance of the administrators and supervisors in this study is the Herrmann Brain Dominance Instrument. This test, (included in Appendix C), is a paper/pencil self-report instrument organized around several basic categories of information. These include: (1) key descriptors of the individual's basic personality type; (2) work elements which are a part of the individual's current job assignment; (3) educational background and occupational choice; (4) hobbies; (5) psychologically oriented information related to hand position in writing, left/right handedness, motion sickness, and energy level; (6) a forced choice selection of descriptive adjectives; (7) measurement of introversion vs. extroversion and; (8) 20 situational statements to which the respondent indicates level of agreement or disagreement.

The Herrmann Brain Dominance Instrument provides a "three-dimensional analysis of dominance in both the cerebral (frontal) and lower (the region nearer the limbic brain) hemispheric areas." (Brain/Mind Bulletin, 1981:2). This design enables the measurement of dominance in the separate hemispheres along two different planes. The arrangement consists of the following quadrants:

Cerebral Left: the analytical, logical, problem-solving person.

Lower Left: the reliable, organized, controlling conservative person.

Cerebral Right: the creative, conceptual, synthesizing person.

Lower Right: the interpersonal, emotional, sensitive, musical person (p. 2).

Validity

The Herrmann Brain Dominance Instrument was developed over a five-year period by Ned Herrmann, former Director of Management Training Programs for General Electric Corporation. The test has been validated by Herrmann on over 4,000 persons over a five-year period (Bunderson, Olsen and Herrmann, 1980). Additional studies by WICAT Incorporated, under the direction of Bunderson and Olsen (1980), as well as studies by Schkade and Potvin (1981) at the University of Texas have further confirmed the test's validity.

Bunderson and Olsen compared 15 instruments which were part of a learning profile battery suggested by leading neuropsychologists and human ability researchers (Bunderson and Olsen, 1980) as tests most effective in measuring left/right brain characteristics. As pointed out by these researchers, "A factor analysis of the learning profile measures confirmed the pervasiveness of the left vs. right hemisphere dominance factors" (Bunderson and Olsen, 1980:22). They state that their study "provides strong construct validation information about the left and right hemisphere dominance scores and the reliable, analytical, synthesizer and interpersonal scores" (p. 22).

Schkade and Potvin (1981) studied the electroencephalogram (EEG) wave forms of persons in career fields distinctly opposite in content: accountants and artists. Their purpose was to determine if persons in these different careers had opposite hemisphere dominance styles and if these measured styles were matched to their scores on the Herrmann Learning Profile Survey Form. As pointed out by these researchers:

EEG analysis of accountants and artists in our study shows sharply different hemisphere activity by the two groups and supports the validity of the Herrmann Learning Profile Survey Form employed in selecting experimental subjects. The most complete model of human information processing appears to require use of MacLean's trine brain concept-cerebral, limbic, and reptilian. The application of a multiple brain level approach holds significant implications for personal assessment, training, and placement in industry and education (p. 329).

Scoring

Each quadrant of the Herrmann Instrument receives a dominance score of: 1 (signifying primary dominance), 2 (signifying secondary dominance), or 3 (indicating minimal use). These scores are assigned on the basis of the scaled score cut-off points for each quadrant. As shown in Figure 24 scaled scores of 67 to 100 are assigned a dominance score of 1; scaled scores of 34 to 66 are assigned a dominance score of 2; and scaled scores of 2 to 33 are assigned a dominance score of 3. Thus, each individual has within his/her profile score four separate scores which measure the dominance of each brain quadrant.

Figure 25 graphically displays the 29 most common profiles out of the "theoretical total of 81 possible combinations" (Herrmann, 1982). Appendix C contains Herrmann's Summary Overview of Brain Profile Clusters, in which these separate profiles are grouped according to similar patterns. A discussion is presented of each "cluster type."

In this particular study sample size significantly limited the use of small clusters and necessitated that the researcher place all dominance profiles into one of two groups: (1) Right Brain/Whole Brain and (2) Left Brain/Limbic. The dominance profiles occurring in this study and their assignment into the two groups are shown in Figure 26

	Left L	Lower Left LL	Lower Right LR	Right R
<u>Scores Using Overlay Scoring Keys</u>				
Side 1 PS				
Side 2 PS				
20 Questions	X		X	
<u>Scores Using Tables 1, 2, and 3</u>				
Best/Worst Subj. (10 pts.)				
Occupation (8 points)				
Educ. Major (6 points)				
Raw Score Totals (Sum numbers in columns)				
Scaled Score (Multiply Raw Score Total by 1.5, or see Table 4)				
Profile code (e.g. 1232) from scale scores 67 to 100 = 1; 34 to 66 = 2 2 to 33 = 3				
Total Left and Right				
	Total Left Score (Left Plus Lower Left Raw Score)		Total Right Score (Right Plus Lower Right Raw Score)	
	L	L/L	L/R	R
MEMO CAPTURE of ADJECTIVE PAIR DATA				

Figure 24. Brain Dominance Scoring Worksheet.

Source: Ned Herrmann. Materials presented at Certification Workshop, Los Angeles, California, 1982.

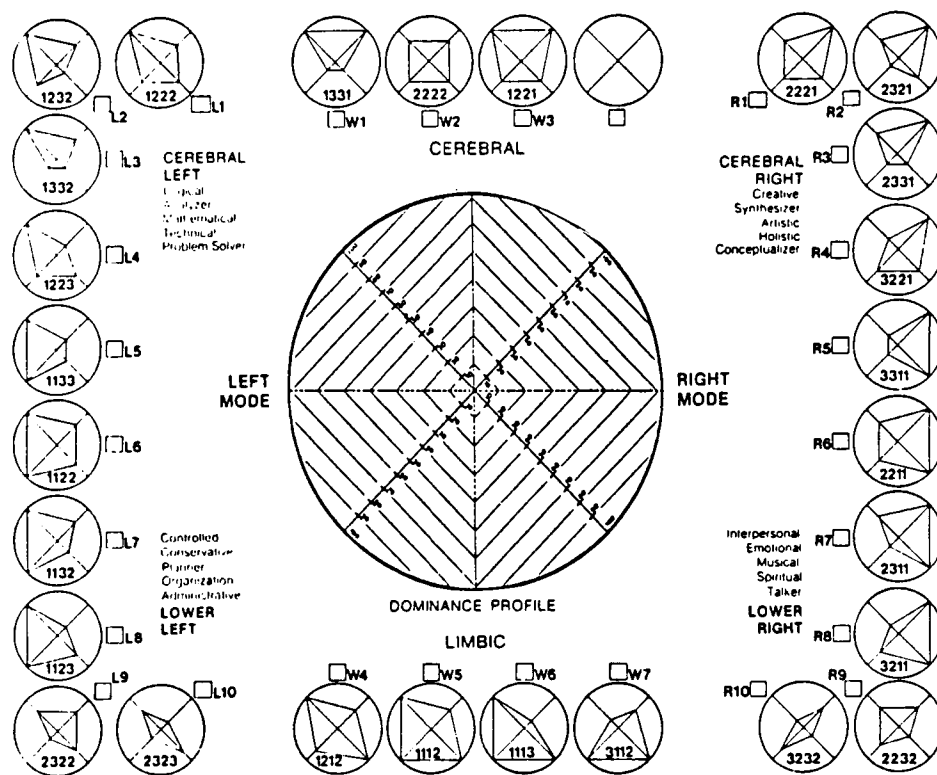


Figure 25. Most Common Brain Dominance Profiles.

Source: Ned Herrmann. Materials presented at Application Workshop, Herrmann Brain Dominance Instrument, Lake Lure, North Carolina, February 1983.

Group I:Right/Whole Brain

Codes: 1111; 1211; 1121; 1221; 2111;
2211; 1131; 1112; 2121 .

Group II:Left/Limbic

Codes: 1122, 1123; 1132; 2122; 2112

Figure 26. Dominance Profile Grouping.

Source: Classification of Codes into larger clusters was done by researcher after confering by phone with Ned Herrmann on November 26, 1983.

These groupings were based on classifications suggested by Ned Herrmann and shown in Figure 27.

In addition to scores provided through the dominance profile, the Herrmann survey also yields a raw score measurement of right and left hemisphere dominance. As shown in Figure 28, the Consolidated Score Sheet enables each category of questions to be classified as either right, left or integrated in emphasis.

III. DEVELOPMENT, SCORING, FIELD TESTING AND VALIDATION OF THE PERCEIVED INNOVATION QUESTIONNAIRE

Development and Construct Validity

A copy of the Perceived Innovation Questionnaire, based on items derived from recent research related to leadership and change, is displayed in Appendix D along with a listing of references consulted in its formulation. Where applicable, questions are shown related to the sources from which the questions were derived. Use of items from prior studies and established theoretic literature increases the probability of context and construct validity. This questionnaire was designed by the researcher to assess perceived innovation by obtaining from respondents a report of perceived quantitative aspects of their own influence on innovation or change.

Items on the questionnaire related to four general areas: (1) innovation in current position, (2) involvement of others in the organization in innovation and new directions, (3) innovative tone in personality, and (4) implementation of change.

<u>Profile</u>	<u>Classification</u>
1111	Whole Brained
1121, 1211, 1131	Whole Brained Cerebral
1221	Double Dominant Cerebral
1112, 2111	Whole Brained Limbic
2211	Right Brained
2121	Double Dominant Left Limbic/ Right Cerebral
2122	Left Limbic
1122, 1123, 1132	Left Brained
2112	Double Dominant Limbic

Figure 27. Profile Clusters* of Administrative Groups.

*As identified and classified by Ned Herrmann in phone conversation on November 26, 1983.

NAME _____ ADDRESS _____

HERRMANN BRAIN DOMINANCE
CONSOLIDATED SCORE SHEET
© 1981 by Ned Herrmann

GROUP _____
OCCUPATION _____
MALE _____ FEMALE _____

100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Left Hemisphere Dominance

Right Hemisphere Dominance

KEY DESCRIPTORS

Analytic	Logical	Mathematical	Abstract	Critical	Quantitative	Factual
Convergent	Controlled	Sequential	Delayed	Dominate	Verbal (Academic)	Verbal (Technical)
Reactive (Personal)	Verbal (Factual)	Intuitive (Factual)	Synthetic	Social	Musical	Emotional
Spontaneous	Synthesizer	Heuristic	Intuitive (Solutions)	Artistic	Creative	

WORK ELEMENTS

Analytical	Technical Aspects	Problem Solving	Financial Aspects
Organization	Planning	Administrative	Implementation
Teaching / Training	Writing	Expressing Ideas	Interpersonal Aspects
Integration	Conceptualizing	Creative Aspects	Innovating

BEST / WORST SUBJECTS

Math	Math / Foreign Language	Foreign Language	English / Foreign Language	English
L	LL	C	LR	R
L	LL	C	LR	R
L	LL	C	LR	R

LANGUAGE CENTER

Left ☐ Distributed ☐ Right ☐

HANDEDNESS

Strong Right Strong Right / Some Left Mixed Strong Left / Some Right Strong Left

MOTION SICKNESS

I II III IV V

ENERGY LEVEL

Day Equal Night

ADJECTIVE PAIRS

Left Lower Left Lower Right Right

TOTAL SCALE SCORES

INTROVERT / EXTROVERT

Introvert Extrovert

8-1-81

Figure 28. Herrmann Brain Dominance Consolidated Score Sheet.

Source: Ned Herrmann. Materials presented at Certification Workshop, Los Angeles, California, 1982.

Much of the questionnaire was based on the notion of quantity as one means of determining the degree of change to which one felt he/she had contributed. In Question 2, the concept of significant change was introduced and defined with subjects requested to rate numerically the number of significant changes they personally introduced, as well as the number which occurred as the direct result of ideas and work of their subordinates.

In Question 16, leaders indicated in the "change" column areas which, under their perceived leadership, had undergone significant change during the preceding five-year period and to rate the degree of each change according to a scale of 0-3. This was requested to gain a measurement of perceived innovation within the environment of the leader as a result of the leadership displayed. In the "importance" column leaders rated the degree of importance that they attributed to each change. This information provided a further measurement ascertaining the degree to which each change was perceived as being implemented. Each subject received a total score which was used in classifying them into one of the following groups: I--High: Highly Innovative Style, II--Medium: Flexible Style, and III--Low: Moderate or Status Quo Style. The cut off points which were established for these groups were: High = 185+, Medium = 156-184, and Low = 155 or less.

Scoring

An item analysis was conducted on each question to gain a perspective of the range of scores for each question, not only for the total group but for the separate groups of superintendents,

supervisors, and principals as well. This analysis was conducted using the following sample sizes from each group: (1) superintendents (N=18), (2) principals (N=20), and (3) supervisors (N=17). Responses were tallied for each question for each sample group.

Rank values were determined for each question based on an averaging of the responses from the item analysis. Each question was assigned a particular value of High (3 points), Flexible (2 points) or Moderate (1 point) (see Appendix D). Examples of both the tally sheets and the score sheets, as well as the values finally determined for each question, are exhibited in Appendix D. The process resulted in a ranking of each question for each individual subject.

To obtain scores for the innovative results response in Question 16, the separate ratings in each column (i.e., "change" and "importance") were multiplied by the number of changes which were considered to be within that range. Totals were then obtained for each separate column as well as for the combined columns; thus; Perceived Innovation = Degree of Change + Importance of Change as determined in this question.

Bonus

A decision was made to use an average of all groups in assigning question values rather than to score each separate administrative group on a separate scale.* After scoring a random

*NOTE. Due to differences in responsibility (building or district, line or staff, etc.) it probably would have been a better technique to have developed different screening and scoring procedures for each group. This result was not apparent until the data analysis had been completed, and may have influenced the relatively low reliability of the instrument.

sampling of questionnaires (N=25) it was noted that the original scoring (1, 2, or 3) did not seem adequately to represent the differences in innovation that were apparent on the instrument. Change did not seem to be linear, but rather geometric. Thus, creating four major changes did not seem to be twice two changes but more like three or four times as difficult. Bonus points were designed to compensate by providing values (ranging from 5 to 30) to selected questions dealing with aspects of change. This bonus scoring procedure is as follows:

Question 2(c), Item 6--30 points, Item 5--20 points, Item 4--15 points; Question 2(d), Item 6--30 points, Item 5--20 points, Item 4--15 points; Question 5g, Research--10 points; Question 6(b), Item 3--5 points; Question 13, Item 5--20 points, Item 4--15 points, Item 3--10 points.

Field Testing

Fifteen persons (not in the nominated sample) participated in field testing the Perceived Innovation Questionnaire. Of this total there were 7 central office personnel in supervisory positions, 6 school principals and 1 superintendent. University professors also reacted to this draft and made suggestions. Based on input from both the administrative and university groups the following modifications in the questionnaire were made before final distribution to participants in the study:

1. Questions were all aligned in order that all responses were made to the extreme right-hand side of the paper. This facilitated

participant's attention to all questions as well as provided a system of greater scoring ease for the researcher.

2. Specific terminology within the questionnaire was more clearly defined (i.e., "significant change").

3. For comparative purposes a question asking size of school system in which the participant worked was included.

Validation

In addition to validity derived from choosing questionnaire items from established research and theoretic literature, validation of the nomination process and the questionnaire was accomplished through a selection of a random sample of superintendents remaining after removal of the nominated sample. Request for participation were mailed to 30 superintendents. (See Appendix E for a sample copy of the letter requesting participation). A total of 18 superintendents responded by returning the questionnaire and/or the brain dominance survey. Only those correctly completing both items were considered a part of the random sample. A total of 12 superintendents became subjects in the random sample. One factor influencing the decision to include only the superintendent group in validating the nomination process and the questionnaire was that this procedure was taking place during the summer months when few from the other two groups were on the job and could be contacted.

In attempting to validate the nomination process, the random sample superintendents were compared against the nominated sample to determine the group most characterized by a whole-brained/right-brained style of leadership. Similarly, the Perceived Innovation

Questionnaire was also compared for both groups to determine differences between the nominated and random sample in terms of degree of innovative leadership.

Field test information provided additional validation by clarifying wording and arrangement of questions. At the same time it assisted in the proper structuring of scoring procedures.

Reliability of Questionnaire

A Cronbach Alpha was used to estimate the reliability of responses on the Perceived Innovation Questionnaire for all people. Seventeen items were tested for the 102 subjects in the reliability study. A reliability coefficient of .44 was achieved for Total Score. This low reliability lent credence to the possibility that separate scoring procedures for separate job responsibilities may have been appropriate.

IV. STATISTICAL DESIGN AND PROCEDURES OF THE STUDY

Design

This study is exploratory, descriptive and ex post facto in nature. Kerlinger (1964) defines an ex post facto study as:

. . . Research in which the independent variable or variables have already occurred and in which the researcher starts with the observation of a dependent variable or variables. He then studies the independent variables in retrospect for their possible relations to, and effects on, the dependent variable or variables (p. 360).

Kerlinger points out that the most important difference between experimental and ex post facto research is control. While in the experimental design control can be maintained through "actively

manipulating" at least one variable and through randomization, this is not true with the ex post facto design. As Kerlinger states, "the ex post facto investigator must take things as they are and try to disentangle them" (p. 361).

The factor of self-selection is another disadvantage. Placing subjects into groups does not insure that they possess only a particular quality being studied as a variable. It is quite possible that, as Kerlinger states, they may

. . . Possess traits or characteristics extraneous to the research problem, characteristics that possibly influence or are otherwise related to the variables of the research problem (p. 362).

A final disadvantage of this type of research is "the risk of improper interpretation brought about through lack of control." Since there are many explanations to events which are concerned with ex post facto research, accepting the first feasible explanation is often tempting. This is especially true if a clear hypothesis has not been established at the beginning; however, this type of research is valuable for certain types of educational or social research which do not "lend themselves to experimental research" (p. 362). This is such a study.

In addition to this study being an ex post facto design, it is likewise an exploratory field study employing survey method. The field survey was accomplished through the use of a questionnaire which provided groups for analysis within the three pre-selected administrative groups (positions) in relation to the variables or questions posed in the study. Kerlinger (1953:17) refers to a statement by Katz which defines a field study of the exploratory type as one that "seeks what

is rather than predicts relations to be found." Kerlinger maintains that such studies

. . . Have three purposes: to discover significant variables in the field situation, to discover relations among variables, and to lay a groundwork for later, more systematic and rigorous testing of hypotheses (p. 388).

Kerlinger further suggests that "field studies are strong in realism, significance, strength of variables, theory orientation, and heuristic quality" (p. 389). There are, however, certain weaknesses to this type of study. The ex post facto nature of these studies makes it more difficult (or impossible) to establish causal relations than it is for experimental studies. There is, likewise, less percision of instrumentation in such a study (Kerlinger, 1964).

Most data in this study are of an ordinal nature with non-parametric tests being applied to the analysis. This is especially true in considering brain dominance patterns, clusters and codes as well as levels of high, medium and low on the Perceived Innovation Questionnaire (PIQ). In some instances, however, data are considered of an interval nature as in the raw scores obtained on the left-right brain hemisphere and the various scores possible on the PIQ. In these few instances parametric tests for analyzing data were employed. Power and parsimony were overriding factors where a choice was made to do this. Similarity of results of non-parametric (e.g., Chi Square analyses) and parametric analyses suggests that the combining of these analysis procedures was permissible.

Procedures

The objectives of the study were to seek answers to questions concerning creative leadership of key administrators in the public

schools of Tennessee and to investigate that leadership in view of the individual's assessed brain dominance, or cognitive style. General research hypotheses, derived from a review of prior studies and theoretic literature were developed for this study. The hypotheses were explored by attempting to answer a set of related questions. The following questions composed the content of the investigation:

Question 1. What brain dominance patterns are most prevalent among the following groups of educational leaders: nominated superintendents, random sample superintendents, supervisors, and principals?

The frequency distributions and percentages of all brain dominance patterns were analyzed to determine if differences existed among the three administrative groups. A review of the literature suggested that the higher the administrative level, the more necessary that leaders possess whole-brained/right-brained thinking styles (Suojanen, 1976, Mintzberg, 1979). This question investigated which groups were more inherently geared to be innovative based on their dominance patterns; and which groups, by contrast, exhibited greater tendencies for status-quo administration.

Question 2. What are the differences among these groups (superintendents, supervisors and principals) in terms of dominance patterns?

Chi Square procedures were employed in which dominance was represented by cluster codes (i.e., whole-brained/right-brained vs. left-brained/limbic) and viewed in relation to the respective

administrative groups. This question was also analyzed through a series of ANOVAs and t-tests in which dominance was measured by a left or right-brain score and considered for each of the groups.

Question 3. Is there a difference among respective groups between brain dominance as measured by the Herrmann instrument and the Katz skills of management used in the nomination: conceptual, technical and human?

Ratings of conceptual, technical and human skills among subjects were obtained through the nomination process (see Chapter III, pages 117, 118, 119). It was possible for a subject to receive a rating of either 1, 2, or 3 on each of the three skills. Each rating could, however, be used only once thereby creating a forced choice. Ratings were analyzed by use of Chi Square at all three levels of 1, 2, and 3 for each of the skills.

In considering this question it was necessary to differentiate between the two types of technical skills measured among educational administrators. One type--termed technical 1--relates to the educational knowledge base that the administrator displays in terms of educational techniques and methodology. The second type of technical skill--identified as technical 2--is related to an individual's skill in management or administrative techniques. Theoretically, although they are both left-brained in concept, each is characteristic of an opposite quadrant in that brain hemisphere (Herrmann, 1982).

On the Herrmann Brain Dominance Instrument, each individual received a brain dominance code which included four separate dominance scores, each relating to one of the quadrants (e.g., Code 1122, 1131,

or 2211). An individual might receive a score of 1-3 in any of the quadrants. A score of "1" signified greatest dominance with a "3" indicating only minimal use of that quadrant as a contributor to cognitive style. In considering this question each particular quadrant dominance position with a rating of "1" was compared to its theoretically matched skill also rated "1" from the Katz model. Thus:

1. A number "1" rating on the conceptual skill was matched to a dominance score of "1" in the fourth position of the dominance code (i.e., 1311).

2. A rating of "1" in human skill was matched to a dominance score of "1" in the third position of the dominance code (i.e., 1311).

3. A rating of "1" in technical skill was compared to a dominance score of "1" in both the second and first positions (1122) or (1122).

Question 4. What differences exist between perceived innovation and brain dominance patterns in terms of the following variables: (1) sex, (2) leadership position, (3) school system size, (4) city or county system, (5) doctorate vs. non-doctorate, and (6) method of superintendent selection?

Three major areas of focus comprised this question. First it was the researcher's intent to investigate the effects of system size, locality and method of superintendent selection on the prevalence of whole-brained/right-brained vs. left-brained/limbic leaders. Second, in terms of the individual, it was of interest to note what differences

in cognitive style and innovative leadership might be attributed to the sex and/or educational level of the subject.

School system size was determined by the subject's response to Question 1 of the Perceived Innovation Questionnaire. Large school systems were considered to be those in excess of 10,000 students; medium size school systems were from a population of 4,000 to 10,000; small school systems ranged were defined as those with a school population below 4,000.

Two methods of superintendent selection were considered: (1) election and (2) appointment either by school board or by County Court. Information relative to method of selection was obtained from the Tennessee School Boards Association.

Statistical procedures for this question consisted of the Chi Square and t-test. Each variable was analyzed in connection with brain dominance and innovation. In the Chi Square procedure, brain dominance was considered in terms of dominance codes and appropriate grouping (i.e., whole-brained/right-brained vs. left-brain/limbic). Innovation was measured by using the total score ranking of high, medium and low on the Perceived Innovation Questionnaire.

Data related to locality of school system were analyzed through Chi Square procedures. Method of superintendent selection, however, was analyzed through the use of t-test due to small cell size. In both cases these variables were compared to left and right-brain score and to the Total Score of the questionnaire.

Question 5. Is there a difference between perceived innovation and a whole-brained/right-brained cognitive style?

In addressing this question perceived innovation was defined as a high score on the Perceived Innovation Questionnaire; whereas, whole-brained/right-brained dominance was determined by a subject's score on the Herrmann Brain Dominance Instrument which placed him/her into one of the dominance categories included in this larger code cluster (see Figure 26, page 123). Right vs. left brain dominance was also established through the use of raw scores derived from the Herrmann Instrument. Each subject had both a right-brain score and a left-brain score. Statistical procedures employed to address Question 5 included Chi Square and t-test. The use of t-test for comparing left and right brain dominance scores with the Total Score of the Perceived Innovation Questionnaire seemed appropriate since data were assumed to be of an interval level, and power and parsimony of the statistic were considered.

A Chi Square procedure was also employed in which the measurement of dominance was by code arrangements signifying either a left-brained/limbic style or a whole-brained/right-brained style. Since this measurement was ordinal in nature, it was appropriate to rank high, medium and low the Total Scores on the Perceived Innovation Questionnaire.

The researcher felt comfortable in using both methods of analyzing brain dominance since the method of identifying right and left dominance by a raw score had several disadvantages when used as the sole method of analysis. These disadvantages were:

1. This scoring system did not allow for the quadrant concept of dominance.

2. It measured only linear magnitude, thereby penalizing those individuals who were more whole-brained or balanced between left and right score.

Question 6. Is brain dominance as measured by the Herrmann Brain Dominance Instrument related to perceived innovation as determined by responses to researcher-made questionnaire (PIQ)?

Perceived innovation was investigated from the standpoint of a subject's Total Score on the questionnaire (PIQ). This variable was analyzed through the use of Pearson r Correlation by comparing each person's mean score on the PIQ with that person's right and left brain score. This procedure was used for the total group (N=103) as well as for each separate administrative group of nominated superintendents (N=27); random sample superintendents (N=12), principals (N=39), and supervisors (N=37).

V. SUMMARY

This study explored the cognitive styles of nominated educational leaders throughout Tennessee and investigated differences found among administrative groups in terms of cognitive style and its relation to perceived innovation/leadership. Chapter IV presents these research findings.

CHAPTER IV

PRESENTATION AND DATA ANALYSIS

I. INTRODUCTION

This study investigated the similarities existing between creative leadership and style of cognitive processing as determined by brain hemisphere dominance. Subjects selected from among educational administrators across the State of Tennessee were chosen on the basis of a nomination process. Various educational organizations as well as educational administration departments nominated those administrators who, in the nominator's professional opinion, exemplified the most effective leadership among that particular group or level of administration. Each nominated subject was ranked by his/her nominator on the basis of those administrative qualities theorized by Katz (1974) as important to the management process: conceptual skill, technical skill and human skills. In addition to the nominated subjects, a random sample of superintendents was also chosen to serve as a comparison group.

Subjects in the study completed the Herrmann Brain Dominance Instrument, an instrument developed to determine hemispheric dominance (Appendix C), as well as the Perceived Innovation Questionnaire designed to measure the perceived quantity of innovation one exhibited in his/her current position (see Appendix D). The Herrmann Brain Dominance Instrument provided several measurements

including an individual dominance code, right and left-brain scores, and information used to place persons into clusters for analysis. Clusters were based on the dominance codes derived from this test which placed subjects into one of two groupings: (1) a whole-brained/right-brained cluster, or (2) a left brained/limbic cluster (see Chapter III, p. 123). Various statistical procedures were used to investigate existing relationships and differences among the dominance styles of these leaders and the degree of innovation displayed as measured by the innovation questionnaire. The remainder of this chapter presents those data in relation to each question considered.

Data are reported for the following groups: nominated superintendents (N=27), nominated principals (N=39), nominated supervisors (N=37) and total nominated sample (N=103). In some analyses a random sample of superintendents (N=12) is also used for comparison purposes. In a few analyses the total group (N=103 + 12, or 115) is used and data are reported for that number of respondents.

Hypotheses and Research Questions

Several hypotheses and research questions were considered in the study.

Hypotheses: The hypotheses were suggested from the literature review and from prior research on brain dominance. The general hypotheses were:

H₁ - Leadership in education is characterized by a style predominately left-brained in orientation.

H₂ - As level of educational administration position increases, so does the likelihood that leaders will be more narrowly left-brained in cognitive style.

H₃ - Female administrators are more whole-brained oriented in cognitive style than are males.

H₄ - Supervisors, whose duties are more "staff" than "line," exhibit a better balance in hemisphere dominance than do other administrative groups.

H₅ - Conceptual skill is less prevalent and technical skill is more prevalent among educational administrators at the higher administrative levels.

Questions: The general hypotheses were explored through the use of seven questions that guided the study. Questions 1 and 2 are considered together, followed by question 3-7 in order.

Question 1. What brain dominance patterns are most prevalent among the following groups of educational leaders: nominated superintendents, principals, supervisors and a small random sample of superintendents?

Question 2. What are the differences among these groups in terms of dominance patterns?

Table III presents the frequency distribution by dominance code for all subjects in the study. As shown in the table, the most prevalent brain dominance patterns for the total group of nominated administrators (N=103) were:

1. 1122 with a frequency of 29 (representing 28 percent of the group).

TABLE III
FREQUENCY DISTRIBUTION ADMINISTRATORS/SUPERVISORS BY BRAIN DOMINANCE CODE IN TENNESSEE, 1984

Dominance Code	Nominated Sample (N 103)			Random Sample (N=12)		
	Frequency	Cumulative Frequency	Percent	Frequency	Cumulative Frequency	Cumulative Percent
1111	11	11	10	0	0	0
1112	11	22	11	3	3	25
1121	16	38	16	0	3	25
1122	29	67	28	6	9	75
1123	1	68	1	0	9	75
1131	1	69	1	0	9	75
1132	1	70	1	1	10	83
1211	1	71	1	0	10	83
1221	3	74	3	1	11	92
2111	11	85	11	0	11	92
2112	7	92	7	1	12	100
2121	4	96	4	0	12	100
2122	5	101	5	0	12	100
2211	2	103	2	0	12	100

2. 1121 with a frequency of 16 (representing 16 percent of the group).

3. 1111, 1112, and 2111 each with a frequency of 11 (each representing 10 percent of the group).

The most prevalent patterns for the random sample group were:

1. 1122 with a frequency of 6 (representing 50 percent of the group).

2. 1112 with a frequency of 3 (representing 25 percent of the group).

Table IV presents the most frequent dominance codes by each administrative group. As shown, all groups have 1122 as their most prevalent code; however, for supervisors, this most frequent category is shared equally by the code 2111. In random sample superintendents the 1122 code represents 50 percent of the total group. Nominated superintendents and principals have an almost equal percentage of subjects represented by the 1111, whole-brained code (12 percent for nominated superintendents and 13 percent for principals). Principals, however, have an additional high percentage (23 percent) of subjects with the dominance code of 1121 which is a holistic code characterized by strong conceptual ability represented in the upper right quadrant. Although the second most prevalent code for nominated superintendents is also holistic (1112), it is lacking in a dominance in the upper right quadrant characterized by conceptual ability. Supervisors, like principals, with a dominance code of 2111, are well represented by subjects having a dominance in the conceptual quadrant (22 percent).

TABLE IV
FREQUENCIES AND PERCENTAGES OF MOST PREVALENT DOMINANCE PATTERNS
AMONG ADMINISTRATORS (N=115) IN TENNESSEE, 1984

Group	#1 Code	N	%	#2 Code	N	%	#3 Code	N	%	Total %
Nominated Superintendents	1122	10	37%	1112	5	19%	1111	3	12%	68%
Principals	1122	11	29%	1121	9	23%	1111	5	13%	65%
Supervisors	1122	8	22%	2111	8	22%	2112	6	17%	61%
Random Sample Superintendents	1122	6	50%	1112	3	25%	--	-	-	75%

These data were further analyzed by computing a group total and average raw scores for each of the four quadrants of the dominance code. These data were plotted and resulted in a group dominance code for each administrative group. Figures 29, 30, 31, and 32 present the profiles for nominated superintendents, principals, supervisors, and random sample superintendents. As demonstrated, nominated superintendents as a group have a dominance pattern of 1122; principals, a dominance pattern of 1121; supervisors, a dominance pattern of 1111, and random sample superintendents a dominance pattern of 1122.

Data portraying the percentages and frequency distributions for nominated and random sample superintendents (Table IV) show that 48 percent of the nominated superintendents are whole brained in contrast to only 33 percent of the random sample superintendents. Nominated superintendents with left brained dominance represent 44 percent of that group in contrast to 58 percent of the random sample. This finding tends to support the validity of the nomination process.

To facilitate statistical analysis procedures dominance codes were clustered according to type resulting in the four major clusters shown in Table V. Based on these groupings shown in Table V, principals and supervisors exceeded superintendents in whole-brained style. Both principal and supervisors are represented by a 54 percent concentration of their total in the whole-brained grouping in contrast to 48 percent for superintendents. Few right-brained individuals were found among school administrators in this study although supervisors

Figure 29

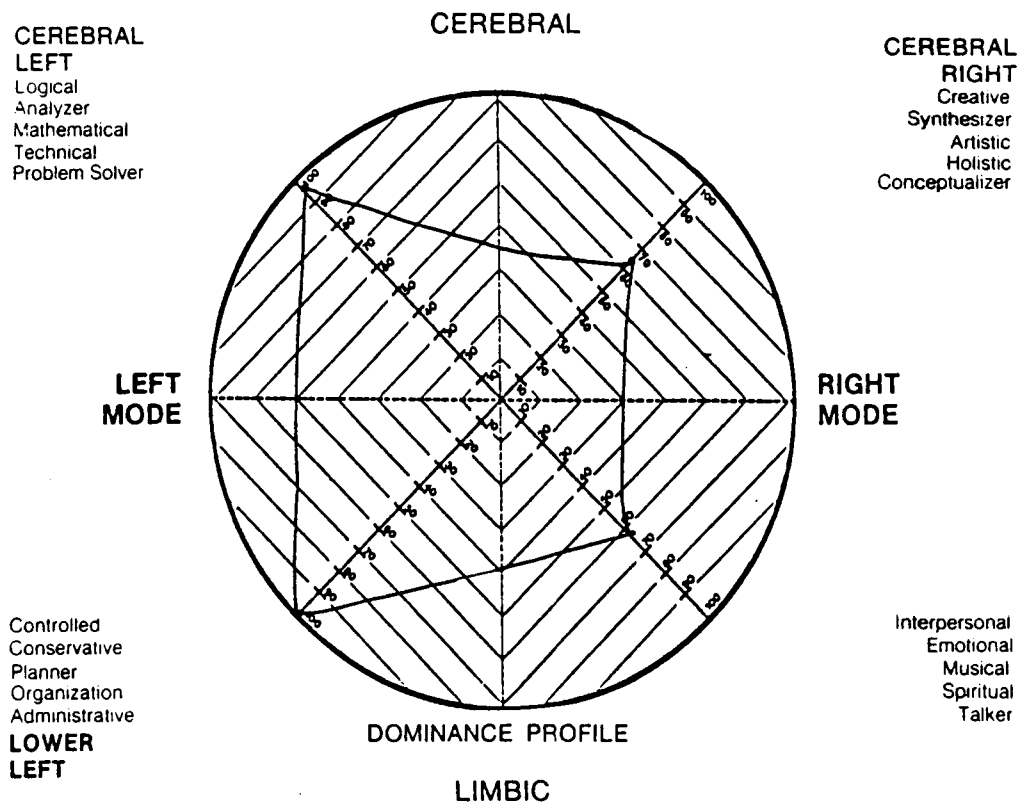


Figure 29. Code: 1122--Nominated Superintendent's Dominance Code.

FIGURE 30

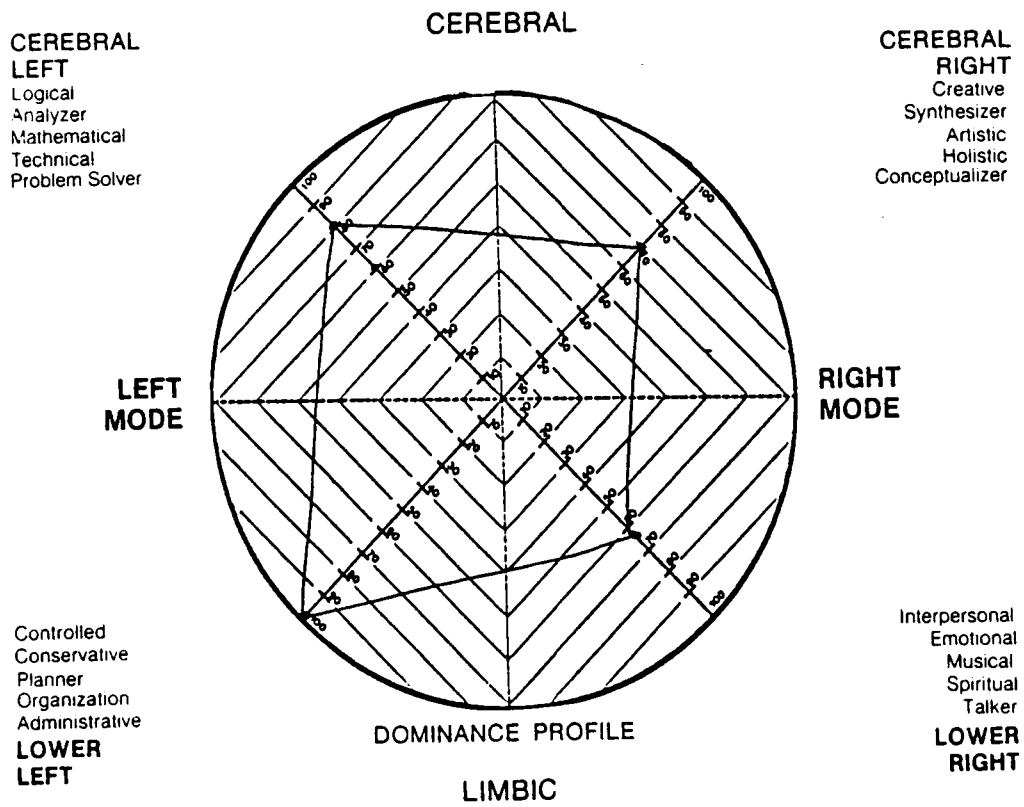


Figure 30. Code: 1121--Principal's Dominance Code.

FIGURE 31

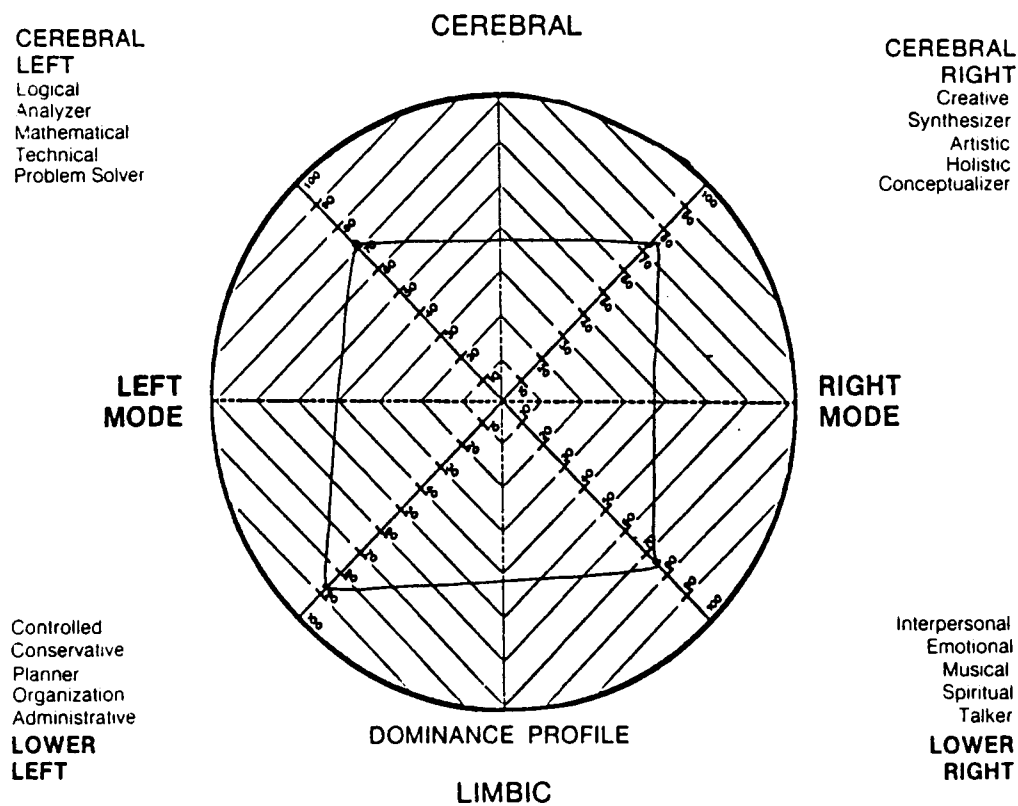


Figure 31. Code: 1111--Supervisor's Dominance
 Code (N=37).

FIGURE 32

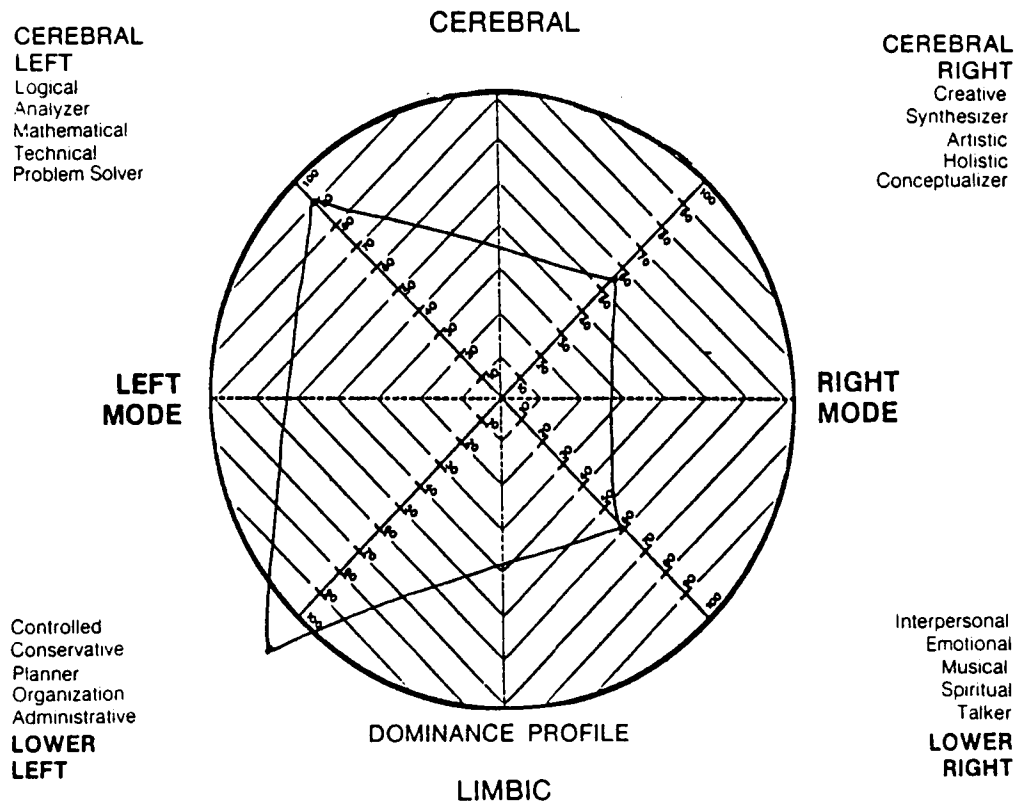


Figure 32. Code: 1122--Random Sample Superintendent's Dominance Code (N=12).

TABLE V

FREQUENCY DISTRIBUTION CLUSTER CODE: WHOLE BRAINED, RIGHT BRAINED, LEFT BRAINED, AND LIMBIC BY NOMINATED ADMINISTRATIVE GROUP IN TENNESSEE, 1984

Group	Whole Brained		Right Brained		Left Brained		Limbic		Total
	N	%	N	%	N	%	N	%	%
<u>Nominated Group (N=103)</u>									
Superintendents	13		1		12		1		
Percent of Total (103)		13		1		12			
Percent of Group (27)		48		4		44		4	26%
Principals	21		2		11		5		
Percent of Total (103)		20		2		11		5	
Percent of Group (39)		54		5		28		13	38%
Supervisors	20		3		8		6		
Percent of Total (103)		20		3		8		6	
Percent of Group (37)		54		8		22		16	36%
Total	54	52	6	6	31	30	12	12	103
<u>Nominated vs. Random Sample Superintendents (N=39)</u>									
Nominated									
Superintendents	13		1		12		1		
Percent of Total (39)		33		3		31		3	
Percent of Group (27)		48		4		44		4	69
Random Sample	4		0		7		1		
Percent of Total (39)		10		0		18		3	
Percent of Group (12)		33		0		58		8	31
Total	17	44	1	3	19	49	2	5	100

did have a slight edge (8 percent). Nominated superintendents exceeded principals in left-brain style (nominated superintendents, 44 percent, principals, 28 percent) and limbic style was greatest among supervisors (16 percent).

In analyzing differences among the various administrative groups and to facilitate statistical procedures, dominance codes were combined into one of two groups: (1) whole-brained/right-brained vs. left-brained/limbic (see Chapter III, page 123) for a complete listing of these codes into the two clusters). Table VI presents Chi Square analyses for the nominated group (N=103) and the random sample group (N=12) where specific group is analyzed by whole-brained/right-brained dominance vs. left-brained/limbic dominance. As shown from Table VI, for the total group there is a 58 to 42 percent difference in favor of a whole-brained/right-brained style. For nominated superintendents there is a strong balance between the two styles (52 to 48 percent) in favor of a whole-brained/right-brained dominance. For principals the ratio is 59 to 41 percent, and for supervisors it is 63 to 37 percent. A Chi Square analysis related to differences in these three groups according to brain dominance did not provide significant ($\chi^2 = .69$, ns $p > .05$) results.

A comparison of nominated and random sample superintendents (Table VI) reveals that random sample superintendents as a group have a tendency to be less whole-brained/right than left-brained/limbic (33 to 67 percent). This represents a 1 to 2 ratio for this group in favor of left-brainedness in contrast to a 1 to 1 ratio for the nominated

group. Chi Square analysis, however, indicated that this difference was not statistically significant ($\chi^2 = .28$, ns $p > .05$).

Not only was dominance considered in relation to code and cluster type, but it was analyzed by using the Herrmann Brain Dominance left and right brain raw scores of respondents as well. Table VII shows comparisons of the means for all groups when brain dominance is represented by a total of left vs. right-brain score. Supervisors as a group have the highest mean for right-brain dominance of any of the other groups. Their mean score (97.95) exceeds the mean score for the total group (89.18) and the mean score of all other groups. Random sample superintendents (N=12) had a mean right score of 75.83 (18.16 standard deviation [SD]) and nominated superintendents (N=27) had a mean of 77.89 (19.88 SD). Both superintendent groups were below the total group score of 89.18. Principals scored nearer the mean represented by the total group with a score of 88.69 (21.18 SD).

Random sample superintendents had the highest left-brain mean score, 131.83 (15.04 SD), and nominated superintendents were second highest with a mean score of 128.11 (8.95 SD) in contrast to a total group score of 116.40 (18.92 SD). Based on standard deviation the supervisors had the most variance in their scores as well as the lowest mean for left-brain dominance (105.46 mean; 20.76 SD). Principals exhibited a mean of 118.67 (16.69 SD) for left-brain mean score.

From these data it appears that supervisors tend to differ more among themselves (as shown by the largest standard deviation) and as a group they have a greater tendency to be more right-brained dominant

TABLE VII
MEANS FOR LEFT/RIGHT BRAIN DOMINANCE BY ADMINISTRATIVE GROUP IN TENNESSEE, 1984

Variable	Number	Mean	Standard Deviation	Minimum	Maximum	Standard Error	Sum	Variance
<u>Nominated</u>								
Superintendents								
Right	27	77.89	19.88	45	121	3.83	2103	395.10
Left	27	128.11	8.95	113	142	1.72	3459	80.18
Principals								
Right	39	88.69	21.18	59	158	3.39	3459	448.38
Left	39	118.67	16.69	82	148	2.67	4628	278.49
Supervisors								
Right	37	97.95	28.29	55	185	4.65	3624	800.05
Left	37	105.46	20.76	47	136	3.41	3902	431.09
Total Group								
Right	103	89.18	24.74	45	185	2.44	9186	611.84
Left	103	116.40	18.92	47	148	1.86	11989	358.02
<u>Random Sample</u>								
Superintendents								
Right	12	75.83	18.16	42	109	5.24	910	329.97
Left	12	131.83	15.04	91	150	4.34	1582	226.33

than do any of the other administrative groups. Supervisors exhibit only an eight-point difference in mean score between left and right dominance suggesting a greater tendency for more balanced or whole-brained thinking.

Nominated superintendents appear quite homogeneous (8.95 SD) in their style which is left-brain oriented. The difference between their mean left and right-brain scores is 51 points in favor of a left-brained style. Principals, likewise, appear to be quite left-brained in their dominance patterns although considerable variance within this group is shown for both left-brain scores (16.69 SD) and right-brain scores (21.18 SD).

Question 3. Is there a difference among respective nominated groups between brain dominance as measured by the Herrmann Instrument and the Katz skills of management used in the nomination: conceptual, technical and human?

Administrators in this study were ranked by the nominators according to the three leadership skills identified by Katz (1974): conceptual, human and technical. Subjects received a ranking of 1 for the skill most characteristic of their management style, 2 for the second most characteristic skill and a 3 for the skill least representative of their management approach. This system provided a forced choice whereby each subject received each numerical ranking only once (Details in Chapter III, p. 135.) Table VIII presents the frequency distributions and percentages of subjects receiving such rankings for each administrative group. As shown, superintendents ranked highest in technical skill (45 percent) and lowest in conceptual

TABLE VIII
FREQUENCY DISTRIBUTION CONCEPTUAL, HUMAN, TECHNICAL NOMINATIONS BY
ADMINISTRATIVE GROUP AND NOMINATION RANK IN TENNESSEE, 1984

Rank	Superintendents			Principals			Supervisors		
	Conceptual	Human	Technical	Conceptual	Human	Technical	Conceptual	Human	Technical
1	4 (15%)	11 (41%)	12 (45%)	27 101	27 101	14 (36%)	13 (34%)	12 (31%)	39 101
2	9 (34%)	12 (45%)	6 (23%)	27 102	27 102	10 (26%)	18 (47%)	11 (29%)	39 102
3	14 (52%)	4 (15%)	9 (34%)	27 101	27 101	15 (38%)	8 (21%)	16 (41%)	39 100
Total Number	27	27	27	39	39	39	39	39	37
Total Percent	101	101	102	100	102	101	101	101	101

NOTE: Percent may not = 100 due to rounding.

skill (15 percent); principals ranked highest in conceptual skill (36 percent) and lowest in technical skill (31 percent); and supervisors ranked highest in human skills (41 percent) and lowest in conceptual and technical skills respectively (30 percent).

The total group was viewed in terms of whole-brain/right vs. left-brain/limbic dominance in relation to administrative skill and nomination rank. Table IX contains Chi Square analysis for each of the administrative skills based on dominance classification and nomination rank. Results of the Chi Square analysis ($p = < .05$) indicate that those most likely to receive a high ranking on conceptual skill were whole-brained/right-brained in cognitive style (23 percent right vs. 5 percent left). Those receiving a lower ranking on conceptual skill were more evenly divided between right and left-brain style (24 to 21 percent).

Rating of human skill had less relationship to a specific cognitive style ($p > .53$). The proportion for both high and low rankings was distributed fairly equally (high: 20 to 17 percent; low 10 to 9 percent).

Ratings of technical skill approached significance (.07) for a left-brained cognitive style. Although at the highest nomination administrative skill level (i.e., "1") there was somewhat of a balance between right and left brain style (15 to 19 percent in favor of left brain), at the lowest nominated administrative skill level (i.e., "3") there was a 2 to 1 ratio in favor of the right-brain style (24 to 12 percent).

TABLE IX

PERCENTAGE OF RIGHT AND LEFT HEMISPHERE SUBJECTS BY RANK OF NOMINATION AND CLASSIFICATION
CONCEPTUAL, HUMAN AND TECHNICAL SKILL (N=103) IN TENNESSEE, 1984

Nomination Rank	Conceptual			Human			Technical		
	Right	Left	Total	Right	Left	Total	Right	Left	Total
1	24 (23%)	5 (5%)	37 (28%)	21 (20%)	18 (17%)	39 (38%)	15 (15%)	20 (19%)	35 (34%)
2	11 (11%)	16 (16%)	27 (26%)	29 (28%)	16 (15%)	45 (44%)	20 (19%)	11 (11%)	31 (30%)
3	25 (24%)	22 (21%)	47 (46%)	10 (10%)	9 (9%)	19 (18%)	25 (24%)	12 (12%)	37 (36%)
Total	60 (58%)	43 (42%)	103 (100%)	60 (58%)	43 (42%)	103 (100%)	60 (58%)	43 (42%)	103 (100%)
Chi Square 11.06 df=2 Probability .004				Chi Square 1.26 df=2 Probability .53 ns			Chi Square 5.23 df=2 Probability .07		

This finding is further confirmed through a series of t-test in which the right-brain score of conceptual ranking number 1 was compared with the right-brain score of technical ranking number 1. Table X presents these data which support the conclusion that conceptual skill, as determined by highest nomination rank, is more closely related to right-brain dominance than is technical skill. This is true for the total group ($p=.0004$) and for the nominated superintendents ($p=.01$). It is true (but not significant) to a lesser degree for principals ($p=.07$) and supervisors ($p=.13$).

A similar finding was revealed when a t-test was used to compare the right brain scores of those individuals receiving a nomination rank of 1 in conceptual skill against those receiving nomination ranks of 2 or 3. As shown in Table XI, results clearly support the likelihood that superintendents nominated as highly conceptual (i.e., "1") will also be right brained ($p=.03$). Results for the other two groups are not significant, but they tend toward the same conclusion (principals at $p=.10$ and supervisors at $p=.19$).

The final stage of analysis employed in this question was to isolate each position value in the individual brain dominance code and to measure the value of that position in terms of the qualities it represented against the Katz skill that most nearly represented what that quadrant of the brain was purported to measure. In a dominance code such as 2132, the position codes are:

I	II	III	IV
2	1	3	2

TABLE X
t-TEST--CONCEPTUAL #1 AND TECHNICAL #1 BY RIGHT BRAIN SCORE FOR
ADMINISTRATIVE GROUPS IN TENNESSEE, 1984

	Number	Mean	Standard Deviation	Standard Deviation Error	Minimum	Maximum	t-test	Degrees of Freedom	Probability
<u>Total Group</u>									
Conceptual #1	29	102.68	28.31	5.25	66	185	3.77	50	.0004*
Technical #1	35	78.82	20.77	3.51	45	150			
<u>Superintendents</u>									
Conceptual #1	4	105.50	18.30	9.15	79	121	3.80	4	.01*
Technical #1	12	67.08	14.84	4.28	45	88			
<u>Principals</u>									
Conceptual #1	14	97.07	25.81	6.89	69	158	1.86	21	.07 ns
Technical #1	12	82.00	14.49	4.18	65	115			
<u>Supervisors</u>									
Conceptual #1	11	108.81	34.49	10.39	66	185	1.56	18	.13 ns
Technical #1	11	88.18	26.82	8.08	55	150			

*Significant ($p \leq .05$).

TABLE XI
t-TEST--CONCEPTUAL #1 AND CONCEPTUAL #2 OR #3 BY RIGHT BRAIN SCORE FOR
ADMINISTRATIVE GROUPS IN TENNESSEE, 1984

	Number	Mean	Standard Deviation	Standard Deviation Error	Minimum	Maximum	t test	Degrees of Freedom	Probability
<u>Superintendents</u>									
Conceptual #1	4	105.50	18.30	9.15	79	121	3.32	3.8	.03*
Conceptual #2	23	73.08	16.07	3.35	45	109			
<u>Principals</u>									
Conceptual #1	14	97.07	25.81	6.89	69	158	1.70	19.4	.10 ns
Conceptual #2	25	84.00	16.88	3.37	59	124			
<u>Supervisors</u>									
Conceptual #1	11	108.81	34.49	10.39	66	185	1.35	14.5	.19 ns
Conceptual #2	26	93.34	24.54	4.81	55	150			

*Significant ($p \leq .05$).

Position I relates to technical skill as it applies to logical, analytical reasoning; Position II more closely relates to technical skill defined as organizational ability; Position III relates to human relations skill, and Position IV relates to creative or conceptual skill. A Chi Square analysis was used to investigate the relationships among the variables of Katz skill rank against brain dominance position value or code as shown by the sample Chi Square (Table XII).

Table XIII shows that position value is highly significant ($p=.0003$) for all subjects when the dominance code of Position IV is analyzed relative to the ranking that subjects received on conceptual skill. Although non-significant, data tended in the expected direction for the analysis of Position III and human skills ($p=.15$) and Position I and technical skill ($p=.19$). Chi Square analysis was not possible for Position II due to small cell size in key cells.

Technical skill, defined as a logical, theoretical knowledge base that can be applied as educational technique, is reflected by a dominance in the upper left quadrant of the brain dominance pattern (Position I). The comparison among groups shows that significant differences ($p=.006$) do exist relative to the degree of dominance present in that quadrant. For superintendents and principals there is a definite tendency for those ranked #1 in technical skill to be dominant in the upper left quadrant; for supervisors the tendency is less apparent (Table XIV).

TABLE XII

SAMPLE CHI SQUARE ANALYSIS FOR SKILL RANK/POSITION
VALUE BY DOMINANCE POSITION IN TENNESSEE, 1984

Skill Rank	Dominance Position Value		Variables
	1	2 or 3	
1, 2, 3			Position I
1, 2, 3			Position II
1, 2, 3			Position III
1, 2, 3			Position IV

TABLE XIII
RESULTS OF CHI SQUARE ANALYSES OF KATZ'S ADMINISTRATIVE SKILL RANKING BY DOMINANCE POSITION
VALUE FOR TOTAL GROUP (N=103) IN TENNESSEE, 1984

Rank	Technical Skill/ Position I			Technical Skill/ Position II			Human Skill/ Position III			Conceptual Skill/ Position IV			
	Dominance Code Value			Dominance Code Value			Dominance Code Value			Dominance Code Value			
	1	2+3	Total	1	2+3	Total	1	2+3	Total	1	2+3	Total	
1	29 (29%)	6 (6%)	35 (34%)	34 (33%)	1 (1%)	35 (34%)	21 (20%)	18 (17%)	39 (38%)	23 (22%)	6 (6%)	29 (28%)	
2	21 (20%)	10 (10%)	31 (30%)	29 (28%)	2 (2%)	31 (30%)	15 (15%)	30 (29%)	45 (44%)	9 (9%)	18 (17%)	27 (26%)	
3	24 (23%)	13 (13%)	37 (36%)	34 (33%)	3 (3%)	37 (36%)	7 (7%)	12 (12%)	19 (18%)	17 (17%)	30 (29%)	47 (46%)	
Total	74 (72%)	29 (28%)	103 (100%)	97 (94%)	6 (6%)	103 (100%)	43 (42%)	60 (58%)	103 (100%)	49 (48%)	54 (52%)	103 (100%)	
Chi Square 3.24 df=2 Probability .19				Cells to Sparse to Compute				Chi Square 3.85 df=2 Probability .15				Chi Square 16.35 df=2 Probability .0003	

TABLE XIV
ADMINISTRATIVE GROUP BY NOMINATION VALUE OF ADMINISTRATIVE SKILL AS
DEFINED BY KATZ (N=103) IN TENNESSEE, 1984

Group	Technical Skill/ Position I						Technical Skill/ Position II						Human Skill/ Position III						Conceptual Skill/ Position IV						
	Dominance Code Value			Dominance Code Value			Dominance Code Value			Dominance Code Value			Dominance Code Value			Dominance Code Value			Dominance Code Value						
	1	2 or 3	Total	1	2 or 3	Total	1	2 or 3	Total	1	2 or 3	Total	1	2 or 3	Total	1	2 or 3	Total							
	#	%	#	#	%	#	#	%	#	#	%	#	#	%	#	#	%	#							
<u>Superintendents (N=27)</u>																									
Percent of Total	24	3	27	26	1	27	9	18	27	10	17	27													
Percent of Group		23	3	26		25	1	27		9	17	26				10	17	26							
<u>Principals (N=39)</u>																									
Percent of Total	30	9	39	38	1	39	13	26	39	19	20	39													
Percent of Group		29	9	38		37	1	38		13	25	38				18	19	38							
<u>Supervisors (N=37)</u>																									
Percent of Total	20	17	37	33	4	37	21	16	37	20	17	37													
Percent of Group		19	17	36		32	4	36		20	16	36				19	17	36							
Percent of Group		54	46			89	11			57	43					54	46								
<u>Total</u>	N	74	29	103	97	6	103	43	60	103	49	54	103												
%			72	28	100	94	6	100	42	58	100	48	52	100											
		Chi Square 10.16 df=2 Probability .006						Cells to Sparse to Compute						Chi Square 5.34 df=2 Probability .07						Chi Square 1.84 df=2 Probability .40					

The strong tendencies in this direction within groups appear to be with superintendents who show a percentage differential of 89 to 11 for high dominance score in relation to high technical nomination and principals who exhibit a dominance pattern in the same direction (77 to 23 percent). For supervisors this factor seems to have little influence (54 to 46 percent). The total group, however, demonstrates a likelihood of 72 to 28 percent that those nominated #1 in technical skill will have a dominance in the upper left quadrant. This represents a ratio for the total group of 2.5 to 1.

In considering Position II which relates to one's ability to organize, manage and maintain the status quo, Chi Square analysis was not possible due to the sparseness of certain cells. When various groups are reviewed on the basis of percentages, however, the results support the expected result: superintendents 96 to 4 percent; principals 97 to 3 percent; supervisors 89 to 11 percent; and for the total group 94 to 6 percent.

Human relations skill, as measured by Position III, approaches significance for a left-brain dominance (codes 2 and 3). For superintendents and principals this difference is for a left-brain rather than a right-brain dominance is strong (superintendents 33 to 67 percent, principals 33 to 67 percent). Supervisors are 57 to 43 percent in favor of right-brain dominance for this skill, but the total group reflects a tendency for a left-brain dominance (42 to 58 percent).

The final quadrant, related to conceptual skill, appears more balanced among groups and produces no significant differences. The superintendent's group alone has some differential among percentages with the larger percent favoring left-brain dominance (37 to 63 percent). Other percentages include: principals 49 to 51 percent; supervisors 54 to 46 percent, total group 48 to 52 percent.

Question 4. Is there a difference between perceived innovation and a whole-brained/right-brained cognitive style?

In addressing this question, it was important to determine if a difference in creative leadership and cognitive styles existed not only for the total sample (N=103) but also for the groups: nominated superintendent (N=27); principal (N=39); supervisor (N=37); and for the supplemental group of random sample superintendents (N=12) as well. Creative management was investigated based on a ranking of the Total Score on the Perceived Innovation Questionnaire (PIQ) resulting in the following ranges: High - Above 182; Medium - 155 to 182; Low - Below 155.

These cut-off points were determined from a frequency distribution of all Total Scores to provide three groups of approximately equal size. The distribution indicated that of the 103 respondents 35 subjects (33 percent) scored equal to or below 155; 34 subjects (33 percent) scored between 155 and 182; and 34 subjects (33 percent) scored above 182.

For these categorical data a Chi Square analysis was used to analyze each administrative group divided into right-brained and left-brained categories in relation to the high, medium and low values of the questionnaire. The sample Chi Square In Table XV shows the pattern of the analyses. The χ^2 value for superintendents (N=27) was .44 (NS 2df); for principals (N=39) was .74 (NS 2df); and for supervisors (N=37) was .49 (NS 2df)

Table XVI presents the mean scores of the three nominated administrative groups and the random sample group on the PIQ (Perceived Innovation Questionnaire). As demonstrated, the mean score for each nominated administrative group respectively was within the medium range (i.e., 155 to 182) of the PIQ. The random sample group's was in the high range (198.75). The principals obtained the highest mean scores (176.56) on the PIQ of the nominated groups. The middle score (169.70) was made by superintendents who also had the lowest minimum score (65). The lowest group mean score (165.81) was obtained by the nominated supervisors who also had the lowest maximum score (259) of any group. Greatest variance within groups as shown by standard deviation was with the random sample and nominated superintendents.

TABLE XV

SAMPLE CHI SQUARE ANALYSIS FOR INNOVATION/ADMINISTRATIVE
GROUP IN TENNESSEE, 1984

*Score	Right Brain	Left Brain	Variables Were:
High	N	N	Nominated Superintendents
Medium	N	N	Principals
Low	N	N	Supervisors

*PIQ Score Range.

TABLE XVI
 MEANS, STANDARD DEVIATION, AND RANGE OF SCORES FOR TOTAL SCORE
 ON PERCEIVED INNOVATION QUESTIONNAIRE BY ADMINISTRATIVE
 GROUP IN TENNESSEE, 1984

Administrative Group	Number	Mean	Standard Deviation	Minimum	Maximum
Nominated Superintendents	27	169.70	37.52	65	269
Principals	39	175.56	35.50	116	270
Supervisors	37	165.81	33.12	108	259
Random Sample Superintendents	12	198.75	45.04	127	280
Nominated Group	103	170.52	35.12	65	270

The concept of brain dominance was addressed in two ways: (1) by dominance codes and (2) by left and right brain raw scores. All persons in the study were grouped into one of two clusters by dominance code: the whole-brained/right-brained cluster or the left-brained/limbic cluster. For convenience these are called the right-brained and the left-brained clusters. A whole-brained cognitive style was defined as any one of the following whole-brained dominance clusters as defined by Herrmann (1981):

1111	2111	1211	2121	1221
1112	1121	1221	1131	

A right-brained cognitive style included any one of the following right-brain clusters: 2211 or 3211. The whole-brain and right-brain clusters (N=60) represent 58 percent of the nominated groups (N=103).

A left-brained cognitive style was defined as any one of the following clusters: 1122, 1123, and 1132. Limbic style included 2112 and 2122. The total of these clusters represents 42 percent of the nominated group (N=103). Table XVII presents the frequency distribution of all administrators (N=103) who scored within the whole-brained dominance and right-brained dominance clusters (N=60 or 58 percent) and within the left-brained/limbic clusters (N=43 or 42 percent).

A frequency distribution (Table XVIII) of subjects by scores on the PIQ by brain dominance category (right/left) shows that subjects in all nominated groups of administrators who had the highest PIQ scores were right-brained over left-brained by at least a 2 to 1 ratio. As

TABLE XVII
 FREQUENCY DISTRIBUTION WHOLE-BRAINED/RIGHT-BRAINED VS. LEFT BRAIN/LIMBIC
 DOMINANCE PATTERNS FOR NOMINATED SAMPLE (N=103) IN TENNESSEE, 1984

Dominance Code	Frequency	Dominance Code	Frequency
<u>Whole Brained</u>		<u>Left Brain</u>	
1111	11	1122	29
1112	11	1123	1
1121	16	1132	1
1131	1		
1211	1		
1221	3	<u>Limbic</u>	
2111	11	2112	7
2121	4	2122	5
<u>Right Brained</u>			
2211	2		
Total	60 (58%)		43 (42%)

TABLE XVIII
PERCEIVED INNOVATION QUESTIONNAIRE SCORE RANGES (LOW, MEDIUM, HIGH)
FOR ALL ADMINISTRATIVE GROUPS IN TENNESSEE, 1984

Range	Whole/Right		Left/Limbic		Total	
	Number	Percent	Number	Percent	Number	Percent
<u>Superintendents (N=27)</u>						
Low	5	(19%)	5	(19%)	10	(37%)
Medium	4	(15%)	6	(22%)	10	(37%)
High	5	(19%)	2	(7%)	7	(26%)
Total	14	(52%)	13	(48%)	27	(100%)
<u>Principals (N=39)</u>						
Low	6	(15%)	5	(13%)	11	(28%)
Medium	7	(18%)	6	(15%)	13	(33%)
High	10	(25%)	5	(13%)	15	(38%)
Total	23	(59%)	16	(41%)	39	(100%)
<u>Supervisors (N=37)</u>						
Low	7	(19%)	7	(19%)	14	(38%)
Medium	11	(30%)	5	(14%)	16	(43%)
High	5	(14%)	2	(5%)	7	(19%)
Total	23	(62%)	14	(38%)	37	(100%)

demonstrated, the percents of the high PIQ scores in each dominance group (right or left) were: superintendents 19 to 7 percent, principals 26 to 13 percent, and supervisors 14 to 5 percent.

Those receiving the lowest scores on the PIQ were almost equally divided between right and left brain dominance. The percents of the low PIQ sample in each dominance group were: superintendents 19 to 19 percent; principals 15 to 13 percent, and supervisors 19 to 19 percent.

In addition to a dominance measurement based on selected codes, the relationship of perceived innovation to dominance based on a raw score measurement (left vs. right-brained score) as determined by the Herrmann Brain Dominance Instrument and raw score obtained on the PIQ was also investigated (Table XIX). A series of t-tests was used to determine if differences existed between dominance as measured by left/right brain score and perceived innovation as determined by the PIQ. Results of t-tests by respondent groups divided by brain dominance (right/left) on Total Score of PIQ yielded no significant differences for the three groups. The results for the total group approach significance ($p=.06$). Subtotal score of PIQ yielded significant results for total group ($p < .05$) and for supervisors ($p < .05$).

Question 5. Do differences exist between innovation/ leadership and brain dominance patterns by: sex, leadership, position, school system size, city or county system, doctorate or non-doctorate, and superintendent selection procedure?

TABLE XIX
t-TEST TOTAL SCORE/SUBTOTAL SCORE ON PERCEIVED INNOVATION QUESTIONNAIRE BY BRAIN DOMINANCE
(RIGHT/LEFT) FOR ADMINISTRATIVE GROUPS IN TENNESSEE, 1984

Score on PIQ	Number	Mean	Standard Deviation	Standard Error	Minimum	Maximum	t	Probability
<u>Total Group (N=103)/Total Score</u>								
Right	60	175.88	35.12	4.53	118	270	1.85	.06
Left	43	163.04	34.12	5.20	65	231		
<u>Nominated Superintendents (N=27)</u>								
Right	14	178.14	38.37	10.25	135	269	1.22	.23
Left	13	160.61	35.82	9.93	65	226		
<u>Principals (N=39)</u>								
Right	23	178.86	35.21	7.34	118	270	.68	.49
Left	16	170.81	36.50	9.12	116	231		
<u>Supervisors (N=37)</u>								
Right	23	171.52	34.14	7.11	122	259	1.40	.17
Left	14	156.42	30.20	8.07	108	218		
<u>Total Group (N=103)/Subtotal Score</u>								
Right	60	97.11	22.79	2.94	59	160	2.83	.005*
Left	43	84.91	20.90	3.18	44	140	2.79	
<u>Nominated Superintendents (N=27)</u>								
Right	14	92.78	25.48	6.81	66	160	1.41	.17
Left	13	80.53	19.35	5.36	55	123	1.39	
<u>Principals (N=39)</u>								
Right	23	96.65	19.96	4.16	74	159	1.12	.26
Left	16	88.50	23.59	5.89	44	140	1.16	
<u>Supervisors (N=37)</u>								
Right	23	100.21	24.27	5.06	59	160	2.14	.03*
Left	14	84.57	19.70	5.26	48	132	2.03	

*Significant ($p \leq .05$).

Sex. There were 70 male and 33 female subjects in this study. The distribution by sex was: nominated superintendents, 27 males, 0 females; principals, 28 males, 11 females; supervisors, 14 males, 22 females; and random sample superintendents, 11 males, 1 female.

Table XX presents frequency distributions and percentages for brain dominance and level of perceived innovation for both sexes. Brain dominance was measured by dominance code and innovation by both a total score on the PIQ and by placement in groups of high, medium or low on the PIQ. Of the 70 males in the study, 34 were right-brained and 26 of 33 females were whole-brained/right-brained. For females this represents a ratio of more than 3 to 1 in contrast to 1 to 1 ratio for males. Data in Figure 33 show that females were predominately right-brained (78 percent) and that males were approximately evenly distributed between right and left-brained (49 to 51 percent).

An almost equal percentage of right-brained/whole-brained males (19 percent) and females (21 percent) scored above 185 on the Perceived Innovation Questionnaire. Likewise, an almost equal percentage of right-brained females (18 percent) and males (17 percent) scored 155 or below on the PIQ. In the medium range (156 to 184), however, females exceeded males in right-brained dominance (males 13 percent; females 39 percent). A far higher percentage of left-brained males (20 percent) scored in the low level of the PIQ in contrast to 9 percent females. These data show a trend for right-brained females to score higher on this particular measurement of innovation (PIQ) than do right-brained males. Chi Square values, however, were not significant.

TABLE XX

FREQUENCY DISTRIBUTION AND PERCENTAGES BY SEX FOR BRAIN DOMINANCE AND LEVEL OF INNOVATION
AS DETERMINED BY PERCEIVED INNOVATION QUESTIONNAIRE (N=103) IN TENNESSEE, 1984

Innovation Level	Male (N=70)			Female (N=33)		
	Right Brain		Total	Right Brain		Total
	N	%		N	%	
<u>Low</u>	12		26	6		9
Percent of Total		17	20		18	9
Percent of Group		46	54		67	33
<u>Medium</u>	9		25	13		14
Percent of Total		13	23		39	3
Percent of Group		36	64		93	7
<u>High</u>	13		19	7		10
Percent of Total		19	9		21	9
Percent of Group		68	32		70	30
<u>Total</u>	34		70	26		33
	49		51		79	21
			100			100
	Chi Square 4.63 df=2 Probability .09			Chi Square 2.91 df=2 Probability .19		

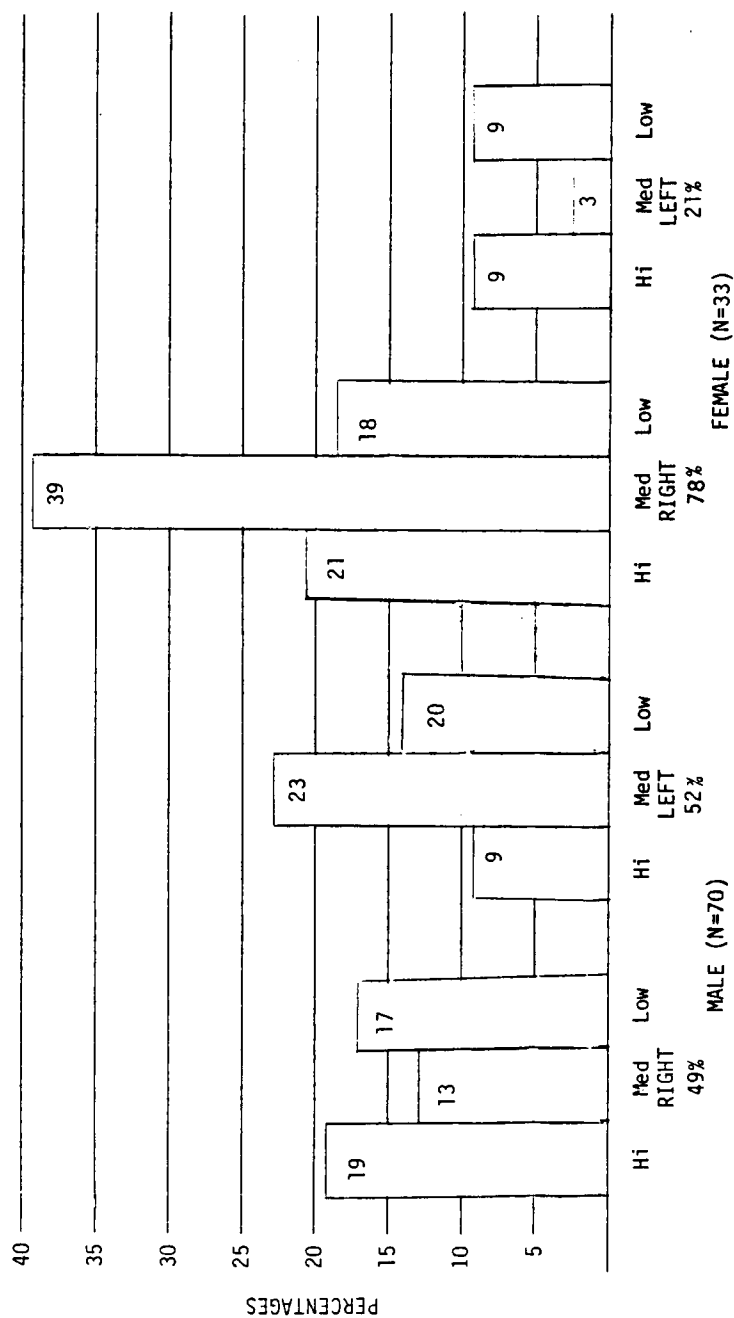


Figure 33. Frequency Distribution and Percentages of Male and Female Groups on Innovative Management Questionnaire by Brain Dominance.

Leadership position. In investigating differences between administrative groups, total score was considered by levels (high, medium, and low) and brain dominance was classified by dominance clusters (whole-brained/right-brained vs. left-brained/limbic). Figure 34 presents percentages based on these factors for all groups. As shown by Figure 34, the principals' group had the highest percentage of right-brained subjects scoring at the highest level of innovation (26 percent) in contrast to nominated superintendents (19 percent) and supervisors (14 percent). Data suggest that, for principals, innovative management depends more upon a right-brained orientation than for either of the other two groups. When considering the total range of scores on the questionnaire, supervisors tend to be whole-brained/right-brained dominant almost 2 to 1 (62 to 38 percent) in contrast to a 1 to 1 ratio for nominated superintendents (52 to 48 percent) and 1.5 to 1 for principals (59 to 41 percent).

School system size. Subjects in the study were classified into three groups according to school system size. The frequencies for these classifications included: large systems (10,000+ population) 25 subjects; medium systems (4,000 to 10,000 population) 32 subjects and small systems (less than 4,000 population) 46 subjects. In considering the variable, school system size, brain dominance was viewed as left/right dominance cluster and questionnaire score by range. Figure 35 presents the frequencies and percentages.

As demonstrated by the percentages representing the three levels of the PIQ Total Scores, there seems to be a trend to

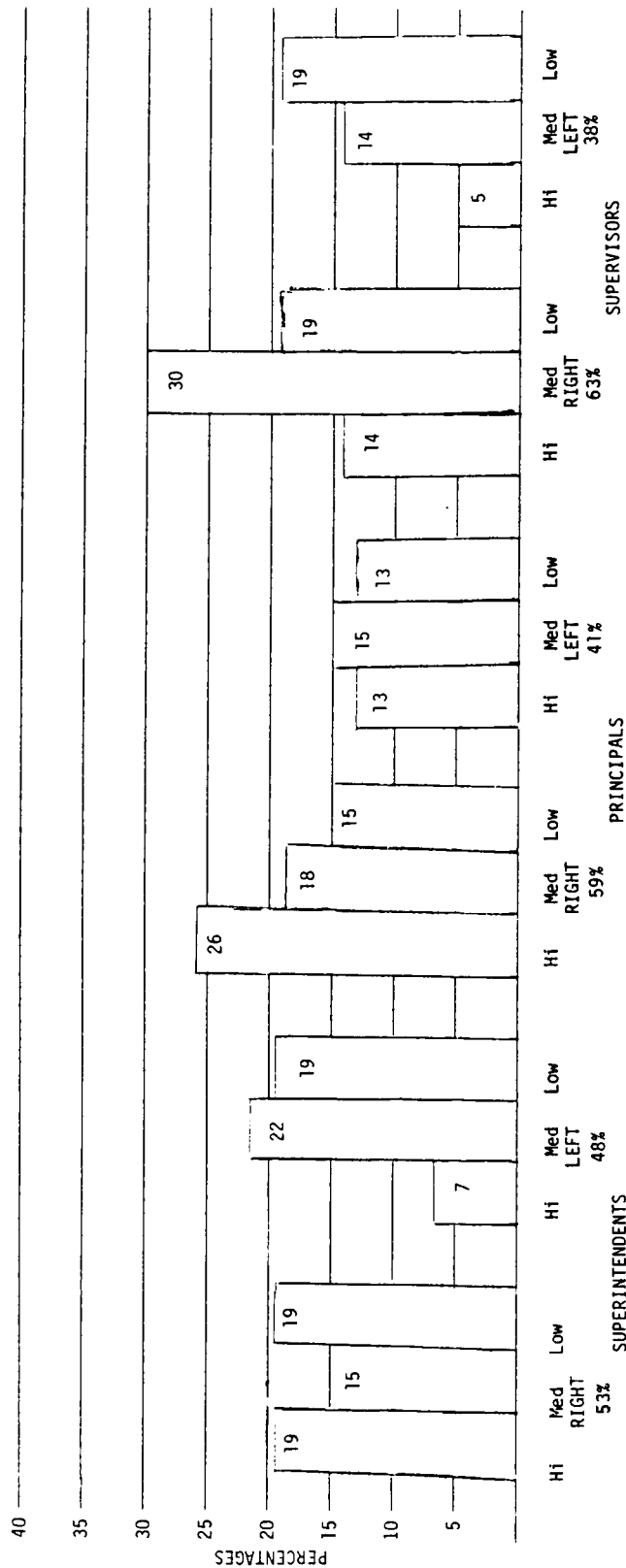


Figure 34. Perceived Innovation Questionnaire Score Ranges (Low, Medium, High) for all Nominated Administrative Groups by Right or Left Dominance.

NOTE: Due to rounding, groups may not equal 100%.

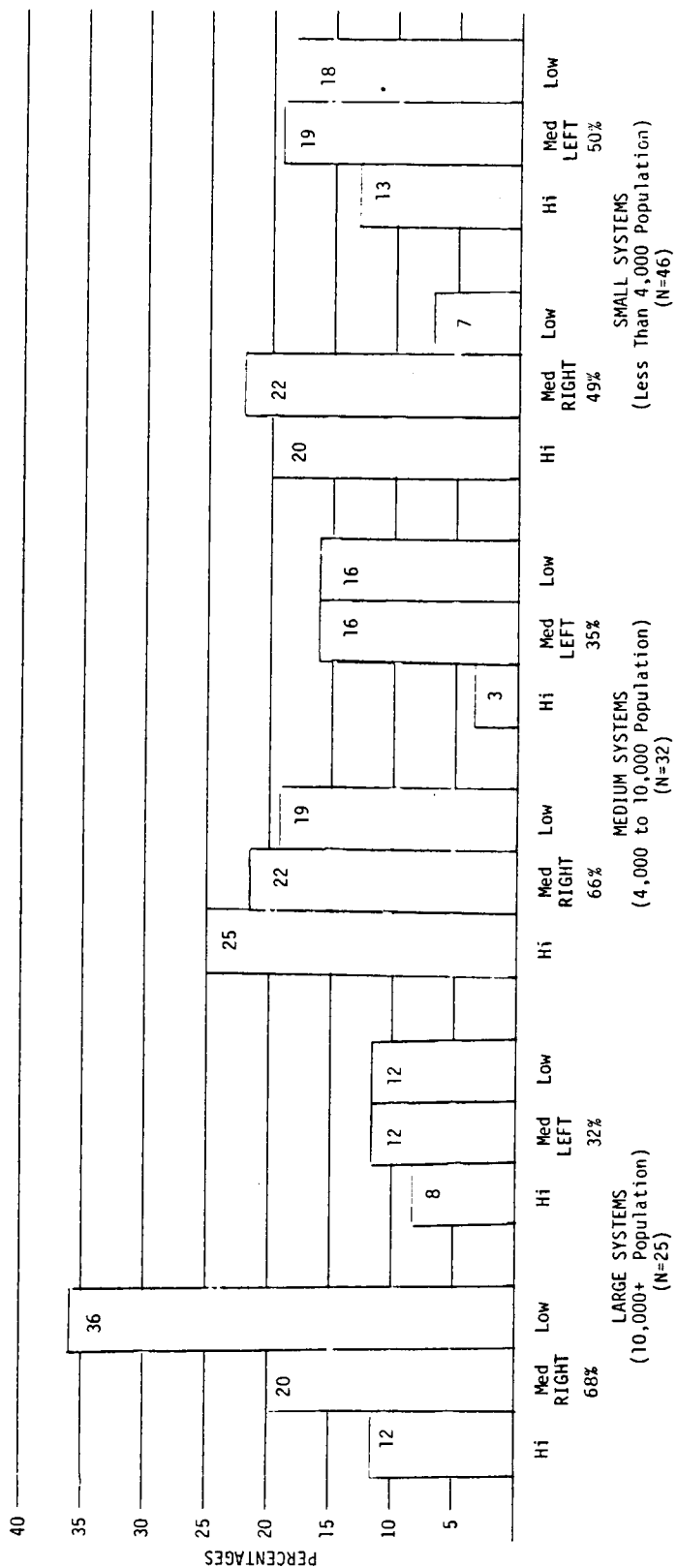


Figure 35. High, Medium and Low Score Ranges on Perceived Innovation Questionnaire by Brain Dominance (Right/Left) and System Size.

NOTE: Due to rounding, groups may not equal 100%.

move away from right-brain dominance as a system becomes smaller in size. In larger systems there is a 2 to 1 ratio of right-brained to left-brained people (68 percent to 32 percent); in middle sized systems it is almost a 2 to 1 ratio (66 percent to 34 percent); in small systems it is almost 1 to 1 (48 to 52 percent). When perceived innovation (PIQ) level is added, in systems a greater percentage of subjects scoring low on the PIQ are right brained (36 percent large to 19 percent for medium systems and 7 percent for small) than in the smaller systems..

City or county system/doctorate vs. non-doctorate. Frequency distributions and percentages were computed for these variables by considering perceived innovation as a high, medium or low score on the PIQ and viewing brain dominance as either one of the two clusters previously discussed (i.e., whole-brained/right-brained or left-brained/limbic). Figure 36 presents these data. Few differences exist between groups in relation to city/county status when comparing right or left dominance and percent scoring in high, medium or low categories.

As demonstrated in Figure 37, those right-brained subjects (with doctorates) who scored in the high level on the PIQ outnumbered left-brained subjects by over 3 to 1 (28 to 8 percent). For non-doctorate subjects this ratio is not quite 2 to 1 (17 to 9 percent). The percentages are near equal for both groups when considering low scores on the PIQ (i.e., for doctorates 16 to 16 percent; non-doctorates, 18 to 17 percent). When considering all these levels of PIQ score ranges, the totals for both groups represent a

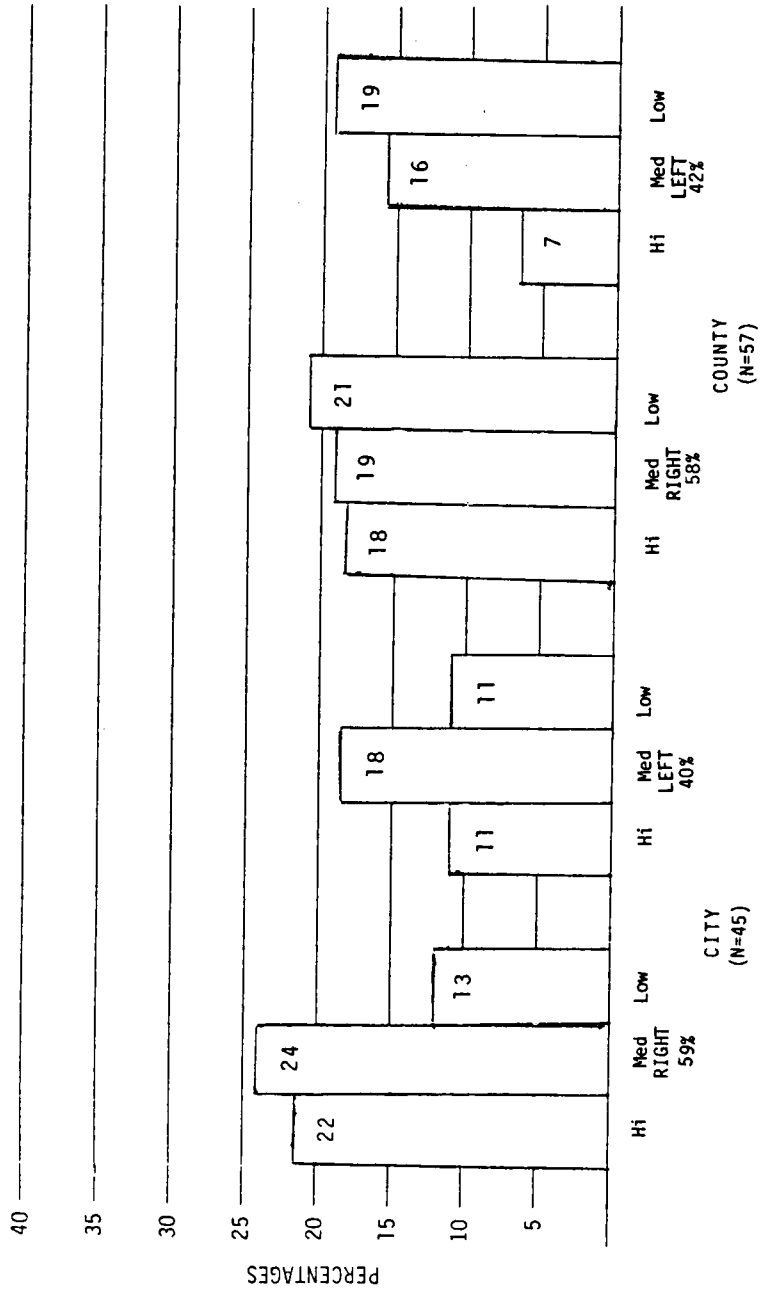


Figure 36. Percentages for Categories of City vs. County on High, Medium or Low Perceived Innovation Questionnaire Score Ranges by Brain Dominance.

NOTE: Due to rounding, groups may not equal 100%.

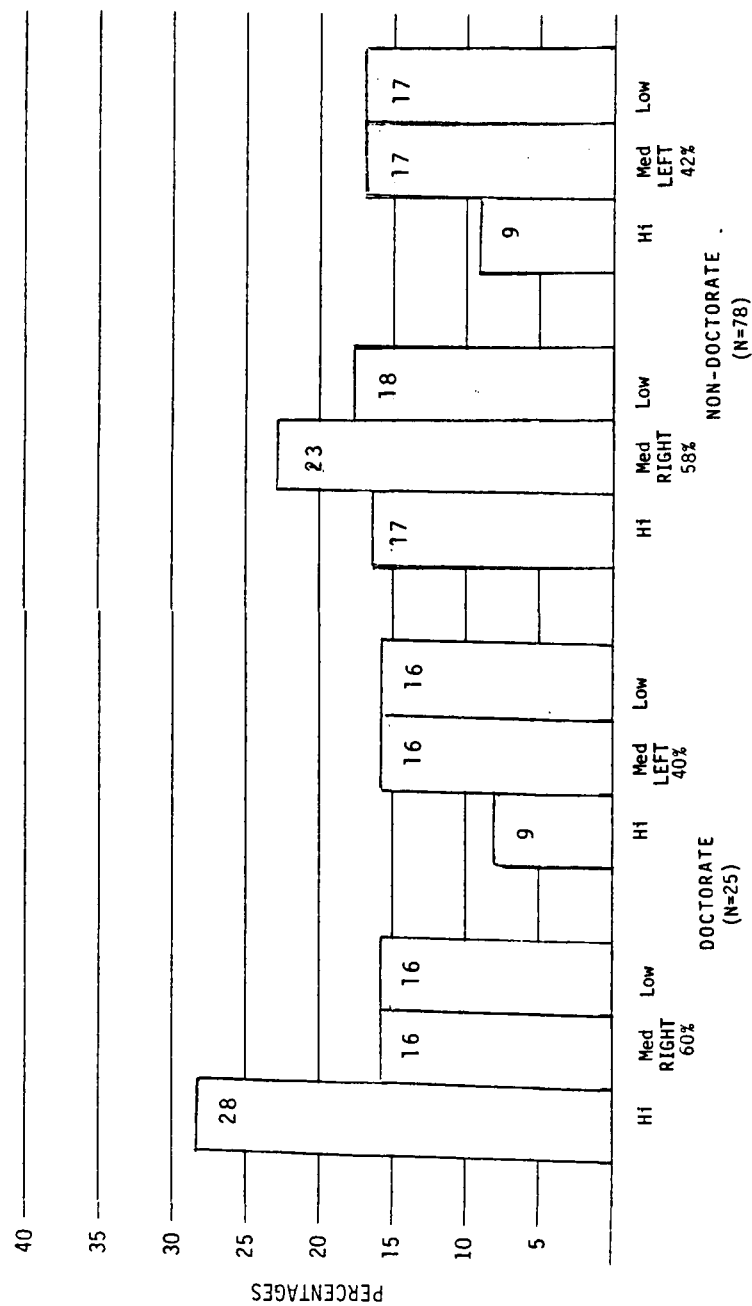


Figure 37. Percentages for Categories Doctorate vs. Non-Doctorate on High, Medium or Low Perceived Innovation Questionnaire Score Ranges by Brain Dominance.

NONE: Due to rounding, groups may not equal 100%.

ratio of 1.5 to 1 in favor of whole-brained/right-brained style (60 to 40 percent for doctorates; 58 to 42 percent for non-doctorates).

Elected/appointed superintendents. In analyzing this variable, the nominated superintendents were placed into one of two groupings: (1) elected or (2) appointed either by the school board or county court. Frequency distributions reveal that 16 superintendents were elected and 11 appointed. A t-test compared the left and right brain scores of all superintendents relative to the method of superintendent selection. Compared also was the Total Score on the PIQ. Table XXI presents the data from these analyses. As shown, elected superintendents did not significantly differ from appointed superintendents on any of the variables.

Question 6. Is brain dominance as measured by the Herrmann Brain Dominance Instrument related to perceived innovation as determined by responses to researcher-made questionnaire?

Pearson *r* Correlations were used to investigate the relationships between brain dominance and innovation/leadership. Brain dominance was defined by the subjects' right or left-brain score, whereas innovation/leadership was measured by the Total Score on the Perceived Innovation Questionnaire. This relationship was investigated for all administrative groups.

Correlation coefficients for the Total Score on the Perceived Innovation Questionnaire for all groups are presented in Table XXII. No significant correlations were found between perceived innovative management (as measured by the questionnaire) and brain dominance

TABLE XXI

t-TEST FOR ELECTED VS. APPOINTED SUPERINTENDENTS BY LEFT/RIGHT-BRAIN DOMINANCE AND INNOVATION AS MEASURED BY THE TOTAL SCORE OF PERCEIVED INNOVATION QUESTIONNAIRE (N=27) IN TENNESSEE, 1984

Superintendent Group	Number	Mean.	Standard Deviation	Standard Error	Minimum	Maximum	t ..	.df.	Probability	t
<u>Variable = Right Brain</u>										
Elected	16	77.12	18.27	4.57	49	121	-0.22	18.3	.82	ns
Appointed	11	79.00	22.90	6.90	45	112				
<u>Variable = Left Brain</u>										
Elected	16	128.00	8.80	2.20	113	142	-0.07	20.4	.94	ns
Appointed	11	128.27	9.59	2.89	114	141				
<u>Variable = Total Score</u>										
Elected	16	166.69	20.38	5.09	142	226	-0.43	11.9	.68	ns
Appointed	11	174.09	54.80	16.52	65	269				

TABLE XXII

PEARSON r CORRELATIONS BETWEEN LEFT/RIGHT BRAIN DOMINANCE SCORES AND
 TOTAL SCORE ON THE PERCEIVED INNOVATION QUESTIONNAIRE
 IN TENNESSEE, 1984

Administrative Group	PIQ Score with:		Significance
	Left Brain	Right Brain	
<u>Nominated Group</u>			
Total Group (N=103)	.04	.19	ns
Superintendents (N=27)	.04	.52	ns
Principals (N=39)	.02	.07	ns
Supervisors (N=37)	-.19	.28	ns
<u>Random Sample</u>			
Superintendents (N=12)	-.44	.36	ns

viewed as a left-brain or right-brain score on the Herrmann Brain Dominance Survey.

II. SUMMARY

This chapter presented the data collected from an analysis of the brain dominance styles of selected superintendents, principals and supervisors in the State of Tennessee. These data were analyzed along with the scores obtained by the groups on the Perceived Innovation Questionnaire. The respective group rankings on Katz's administrative skills: conceptual, human and technical were analyzed in terms of brain quadrant position value.

CHAPTER V

SUMMARY OF FINDINGS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

I. INTRODUCTION

A study of the nature and functioning of the human brain is a study of the nature of mankind himself. Through developing an enhanced understanding of human nature one becomes more cognizant of the thought processes demanded of those who would seek to lead others. Just as leadership is dependent upon a knowledge of mankind, likewise, a knowledge of human nature is gained as one develops a better perspective of the operation of the human brain. As we seek to understand one, we understand the other.

This exploratory study investigated leadership against a backdrop of current brain research by exploring the brain hemisphere dominance patterns of selected educational administrators within the State of Tennessee. Responses to a self-report, paper-and-pencil test, The Herrmann Brain Dominance Instrument, classified subjects on the basis of their dominance scores in each of four brain quadrants. This resulted in each subject receiving a dominance code of four digits (e.g., 1321) and a raw score measurement of both left-brain and right-brain dominance. In addition to classifying administrators on the basis of dominance patterns, the study also attempted to gain some measurement of their innovation/leadership through use of a

researcher-designed questionnaire which explored the perceived innovation of each subject as determined by the quantity of change attributed to that individual through his/her assigned leadership position. Several independent variables were analyzed to determine if these seemed important relative to brain dominance and innovation in leadership. These independent variables were: subject's sex, educational level and leadership position, size of school system of which subject was a member, and method of superintendent selection.

The study used 115 subjects: 103 nominated by various educational leadership groups throughout the state and 12 additional subjects randomly selected from among the remaining pool of superintendents in the state. The latter random sample group served to verify the nomination process and provide one random sample for comparison of study results. Subgroups of administrators within the total sample of 115 subjects included: 27 nominated superintendents, 12 random-sample superintendents, 39 nominated principals and 37 nominated supervisors. Among these groups were 81 males and 34 females; no females were in the nominated superintendents' group and only one was in the random-sample group.

The questions in this study were explored by analyzing brain dominance patterns, level of perceived innovative leadership, and level of Katz (1974) skills (i.e., technical, human, and conceptual) on the basis of frequency distributions, percentages and Chi Square

analyses. In addition, for certain analyses, t-tests and Pearson r Correlations were used. Brain dominance was considered in two ways: (1) by left and right brain dominance score and (2) by a dominance code (i.e., 1122) in which each quadrant of the brain was assigned a value from 1 to 3 as determined by a scaled score for that quadrant. (Dominance Codes are explained in detail in Appendix C.)

A measurement of perceived innovation was obtained by establishing cut off points (high, medium and low) derived from the Total Score on the Perceived Innovation Questionnaire. Finally, nominators ranked subjects on a scale of 1 to 3 on each of Katz's three administrative skills. Each subject received each ranking only once thereby creating a forced choice in which one skill was most predominant followed by a second and third choice.

A review of current literature related to brain hemisphere dominance, creative leadership and the educational change process was conducted as a basis for the exploratory research. Findings in this study are presented in two classifications: (1) those findings resulting from a review of the related literature (Chapter II) and (2) those findings resulting from an analysis of the data on individual hemisphere dominance and perceived innovation (Chapter IV). This chapter contains a summary of the findings from the review of literature, a summary of findings from the exploratory study, discussion, conclusions and recommendations for future studies.

II. SUMMARY OF FINDINGS FROM THE REVIEW OF LITERATURE

Hemisphere Dominance

Research on brain dominance revealed not only a dichotomy of left vs. right brain style but an interrelated brain unit consisting of the hemispheres of the cerebral cortex as well as the underlying hemispheres of the limbic system. This resulting brain model considered cognitive style to be a combination of dominance patterns from among the four main brain quadrants: upper left cerebral, lower left limbic; upper right cerebral and lower right cerebral.

Research demonstrated that aside from language, little is truly localized to one hemisphere. There is, nevertheless, a dominant form of cognitive processing that is hemispheristic and appears to be most compatible with one's style of problem solving. This established mode is either primarily sequential or simultaneous.

The left hemisphere employs a sequential, analytical mode where logic rules supreme in the cerebral quadrant and where a sense of safe-keeping and status-quo permeates the regions of the lower quadrant. The right hemisphere, by contrast, thinks in more simultaneous, holistic patterns; it conceptualizes and creates fresh approaches and operates from an intuitive base. In the lower regions of the limbic area the right hemisphere's emotional, empathic nature renders it compatible for dealing with human relations. Research seems to support the concept that there is no one best approach for all situations and that it is only as one begins to use the full power of a

whole-brained approach that he/she maximizes the inner potential to become a leader in the best sense of that concept.

Creative Leadership

Throughout the literature on creative leadership one overriding concern has been that those persons in strategically responsible positions should possess a style of leadership which allows them to lead intuitively as well as logically, to be creative and visionary as well as responsible to the maintenance and continuation of an existing order, appreciate human relationships as well as the task at hand and to be flexible and able to adjust to changing situations. The style of leadership is best characterized as whole-brainedness. Various studies stressed and demonstrated that this need becomes increasingly important as an individual reaches the highest echelons of an organization. Educational administration, in the embodiment of superintendents, principals and supervisors has been shown to require great flexibility, spontaneous decision making and human relations skills (Duignan, 1980; Willis, 1980; Martin and Willower, 1981). Such qualities of leadership have been attributed to a simultaneous style of problem solving more indicative of a right-brained style (Mintzberg, 1976; Suojanen, 1976; Taggart and Robey, 1981).

Education and the Process of Change

Educational change is possible to the extent that leaders develop a receptivity to change which allows them to accept new ideas

and fresh approaches. Such an openness is enhanced as one allows the right hemisphere to dominate and search for possibilities instead of answers.

Change in education likewise demands that there be leadership of vision which calls for a simultaneous right-brained mode of thought processing resulting in conceptualization. Conceptualization has been found to be of primary importance at the highest levels of leadership (Barnard, 1976; Mintzberg, 1976; Zalesnick, 1979).

Being creative or innovative in one's leadership requires not only the conceptualization of new ideas and directions (via the right brain processes of incubation and illumination), but demands equally those left-brained qualities of preparation and evaluation. Creativity is therefore a combination of process and product requiring not only conceptualization but implementation as well (Osborn, 1953 and Herrmann, 1982). "It is a whole brain process which brings results oriented leadership" (McKendrick, 1982).

Those leaders who are creative in this broader sense elicit a creative response among their subordinates for they value the development of the human resources within their organizations. It is these leaders who could become the true movers and shapers of a new educational order.

III. SUMMARY OF FINDINGS FROM EXPLORATORY RESEARCH OF HEMISPHERE DOMINANCE AND PERCEIVED INNOVATION

Introduction

In considering the findings of this study, several general hypotheses that guided the study should be reviewed; these are:

H₁ Leadership in education is characterized by a style predominately left-brained in orientation.

H₂ As level of educational position increases, so does the likelihood that leaders will be more narrowly left-brained in cognitive style.

H₃ Female administrators are more whole-brained oriented in cognitive style than are males.

H₄ Supervisors, whose duties are more "staff" than "line," exhibit a better balance in hemisphere dominance than do other administrative groups.

H₅ Conceptual skill appears less prevalent and technical skill is more prevalent among educational administrators at the highest administrative level (i.e., superintendency).

These hypotheses were investigated by exploring a series of questions designed to guide the study. Findings from this study are presented in conjunction with the question explored. Questions 1 and 2 are considered together, followed by questions 3-7 in sequence.

Questions and Findings

Question 1. What brain dominance patterns are most prevalent among the following groups of educational leaders: nominated

superintendents, principals and supervisors, and random sample superintendents?

Question 2. What are the differences among these groups in terms of dominance patterns?

Findings

The most prevalent dominance pattern found among educational administrators was the 1122 code characterized by a narrow left-brained focus. A total of 29 nominated subjects (representing 29 percent of the total group [N=103] had this dominance pattern). (See complete listing of all dominance codes in Chapter III, page 123.) The tendency for a strong left-brained orientation appeared most pronounced at the highest echelons of the organization (supporting H_2). Superintendents accounted for a total of 35 percent of the subjects with this left-brained dominance pattern. When considering the nominated sample of educational administrators as a total group there was a slight tendency for a higher percentage of administrators in the nominated sample (N=103) to cluster in the whole-brained/right brained patterns than in the left-brained limbic mode (58 percent - 42 percent).

Both the principals and supervisor were more holistic in dominance patterns than were either nominated or random sample superintendents. Data from the respective groups show: principals--59 percent right brained to 41 percent left brained; supervisors--63 percent right brained to 38 percent left brained; nominated superintendents--52 percent right brained to 48 percent left brained and random sample superintendents--33 percent right brained to 62 percent left brained. The distribution lends some credence to

nomination as a valid process to determine innovative administrators. Few predominately right-brained individuals were found among school administrators (6 percent); these were clustered primarily at the supervisory level (3 percent).

An analysis of the mean scores of left and right-brain dominance for each of the administrative groups revealed similar differences among the groups. When viewed on a continuum of left-brained and right-brained scores, random-sample superintendents are shown to have the highest mean left-brain score (131.83) followed by nominated superintendents with a left-brain nominated mean score of 128.11. The left-brained mean for principals was 118.67 and for supervisors, 105.46. Right-brain mean scores were highest for supervisor (97.95) followed by principals (88.69). Right-brain mean scores were lower for both nominated superintendents (77.89) and random sample superintendents (75.83). Results support H_2 .

There were differentials between left and right brain means for all groups. Nominated superintendents manifested a 50-point difference in right and left-brain mean scores in favor of a left-brain dominance (128 left to 78 right). A similar finding existed for random-sample superintendents (132 left to 76 right); this represented a difference of 56 points. Principals showed a 30 point difference in favor of a left-brain dominance (119 left to 89 right). Supervisors had 5 points difference in their left and right-brain mean scores (105 left to 100 right) which indicates considerable balance between their hemisphere styles. For total nominated group ($N=103$) there was a mean of 116.40

for left brain in contrast to 89.18 for right, representing a difference of 27 points in favor of a left brain dominance.

Question 3. Is there a difference among respective groups between brain dominance as measured by the Herrmann instrument and the Katz Skills of Management used in the nomination: conceptual, technical and human?

Findings

Nominators ranked subjects in the three administrative groups on the basis of the Katz Skills of Management (i.e., conceptual, technical and human). From these nominations superintendents received their highest ranking in technical skill (45 percent); principals were highest in conceptual skill (36 percent) and supervisors were highest in human skill (41 percent).

Among principals and supervisors the three skills had a fairly even distribution of top ranking. For principals, human skills received 34 percent of the top ranking and technical skill received 31 percent. In the supervisor's group conceptual skill was ranked first in 30 percent of the cases, and technical skill was first 30 percent of the time. Superintendents were nominated first in technical skill (45 percent), then 40 percent in human skill and only 15 percent in conceptual skill. (In addition 52 percent of the superintendents ranked lowest in conceptual skill.)

An analysis of the dominance patterns of administrators substantiates the validity of the nomination ranking assigned. Subjects who received a high ranking in conceptual skill were most

likely to be right brained ($p < .05$). Those receiving a high ranking in technical skill demonstrated a greater tendency to be left brained (although nonsignificant, $p = .07$).

A closer look at each of the four quadrants in the brain dominance pattern, as they relate to the Katz skill most characteristic of that quadrant, reveals the following:

1. The comparison of conceptual skill to position IV (1231) is significant ($p < .05$).

2. The tendency for those ranked number 1 in technical skill to be dominant in the upper left quadrant is predominate (although not significant: $p = .19$). A total of 72 percent nominated 1 in technical skill showed a dominance in the upper left quadrant and 28 percent did not.

3. The tendency for those ranked number 1 in human skill to be dominant in position III is also predominant (though nonsignificant $p = .15$).

4. The comparison of technical skill to position II (1231) could not be determined because of the sparseness of some cells in the Chi Square procedure. Examination of percentages, however, shows that those ranked 1 in technical skill also exhibited a dominance in the lower left quadrant (position II) by a high percentage (94 percent dominance to 6 percent nondominance in that quadrant).

Question 4. What differences exist between perceived innovation and brain dominance patterns in terms of the following

variables: (1) sex, (2) leadership position, (3) school system size, (4) city or county system, (5) doctorate vs. non-doctorate, and (6) method of superintendent selection.

Sex

No significant differences were found between brain dominance and degree of perceived innovation based on sex.

Leadership Position

An analysis of the Total Score on the Perceived Innovation Questionnaire shows the following percentage of each administrative group scoring at the highest level: nominated superintendents --26 percent (19 percent right brained and 7 percent left brained); principals--41 percent (26 percent right brained and 15 percent left brained) and supervisors--19 percent (14 percent right brained and 5 percent left brained).

School System Size

Subjects from larger systems (population over 10,000) were found to be more whole-brained/right brained than subjects from smaller systems (less than 4,000 population) (significance $p \leq .05$). When system size was considered in isolation, percentage differences showed 68 percent right brained to 32 percent left brained in larger systems in comparison to 48 percent right brained and 52 percent left brained in smaller systems. When the variable, level of perceived innovation was added, however, those with higher perceived innovation scores in small systems had a slightly higher percentage of right-brain dominance

scores than did those in larger systems. (Highest level of perceived innovation: 20 percent right to 13 percent left for small systems; 12 percent right to 8 percent left for large systems.)

City or County System/Doctorate vs. Non Doctorate

No significant differences were found between city/county subjects in terms of innovation and brain dominance. In relation to educational level, 60 percent with doctorates were found to have a right brain dominance in contrast to 40 percent of the non doctorates. When educational level was analyzed for left/right dominance differences (irrespective of level of innovation) no significant difference was found.

Among those who scored in the high range on the PIQ those with doctorates represented 28 percent right-brain dominance to 8 percent left-brain dominance. Non-doctorate subjects had 17 percent right dominance and 9 percent left dominance among those who scored in the high range on the PIQ.

Method of Superintendent Selection

No significant differences were found among the 16 elected and 11 appointed superintendents in the nominated sample (N=27) in regard to brain dominance and perceived innovation. There was an approximate difference of 10 points, however, between the mean scores of elected and appointed superintendents in Total Score on the Perceived Innovation Questionnaire. (Elected superintendents, mean: 167.68, SD: 20.38; appointed superintendents, 174.09, SD:54.80).

Question 5. Is there a difference between perceived innovation and a whole-brained/right-brained cognitive style?

Findings

The difference between perceived innovation and left/right dominance style was not significant for respective administrative groups based on a Chi Square analysis in which dominance was considered by cluster code. (See Chapter III, page 123). Likewise, when innovation was considered in comparison to Total Score on the PIQ and a left/right brain score, t-tests revealed no significant differences for the three groups. The results for the total group (N=103), however, did approach the significance level ($p = .06$). Mean scores on the PIQ for the respective nominated groups showed that principals had the highest mean score (175.56, SD: 35.50) followed by nominated superintendents (169.70, SD: 37.52). Supervisors ranked last with a mean of (165.81, SD: 33.12). Random-sample superintendents exceeded all groups with a mean of 198.75 (SD: 45.04). The mean for the total group was 170.52 (SD: 35.12). The ratios of right-brain dominance to left-brain dominance among all nominated groups scoring at the highest level of the PIQ were at least 2 to 1 (nominated superintendents 19 to 7; principals 26 to 13 and supervisors 14 to 5 percent).

When a Subtotal Score was used (in which the final section of the questionnaire having to do with quantity of change was eliminated), there were areas of significance for the various groups. These included:

Subtotal Score for Total Group (N=103) $p < .005$

Subtotal Score for Supervisors (N=37) $p < .03$.

Question 6. Is brain dominance as measured by the Herrmann Brain Dominance Instrument related to perceived innovation as determined by responses to researcher-made questionnaire?

Findings

No significant correlation was found to exist between perceived innovation and brain dominance as measured by these instruments when based on Total Score of the PIQ.

Hypotheses of Study

Based on the data presented in the preceeding summary of findings, the hypotheses of this study are addressed. They include:

H₁. Leadership in education is characterized by a style predominately left-brained in orientation.

This hypothesis is rejected for the total group of leaders. Based on code groupings, the administrators in this study demonstrated a 58 to 42 percent preference for the whole-brain pattern. When viewing these results based on right vs. left-brain score; however, all groups, with the exception of supervisors, are decidedly left-brained. Superintendents exhibit a decided preference for a left-brained orientation.

H₂. As level of educational position increases, so does the likelihood that leaders will be more narrowly left-brained in cognitive style.

This hypotheses is not rejected as shown by the superintendent's strong left-brained dominance patterns in contrast to more holistic patterns for principals and supervisors.

H₃. Female administrators are more whole-brained oriented in cognitive style than are males.

Results supporting this hypotheses are clearly in evidence in this study and impact upon H₄.

H₄. Supervisors, whose duties are more "staff" than "line" exhibit a better balance in hemisphere dominance than do other administrative groups.

Supervisors as a group showed a dominance profile of 1111, the most holistic of all dominance codes. In addition, an examination of their left vs. right-brain scores reveals only a 5 point difference in those means. The large percentage of women within this administrative group (who showed a 4 to 1 level in whole-brain dominance over males in this study) impacts upon the total results.

H₅. Conceptual skill is less evident and technical skill is more evident among educational administrators at higher administrative levels.

This hypotheses is supported by both the Katz skills ranking as well as the dominance measurements supporting these skills.

Superintendents were ranked third in conceptual skill (15 percent

received a #1 ranking in contrast to 52 percent who received a ranking of #3). In the area of technical skill 45 percent of the group ranked #1. Few superintendents in this study had a dominance in the upper right-brain quadrant (which significantly relates to conceptual ability). In contrast, the two left-brain quadrants (indicative of more technical skill) were clearly in evidence among this group.

IV. DISCUSSION

An important finding in this study is that the office of school superintendent is occupied predominately by those leaders who exhibit a strong left-brained nature and who, in the opinion of their nominators, are more highly capable in technical skill than they are in conceptualization. (A total of 58 percent were ranked highest in technical skill in contrast to only 15 percent in conceptual ability). The whole-brained/right-brained vs. left brained/limbic nature of these groupings, based on dominance codes, shows a 52 percent to 48 percent difference in favor of a whole-brained style. However, when viewed on a continuum of left-brained and right-brained scores, nominated superintendents are shown to have the highest mean left-brain score (128.11) and the lowest right-brain score (77.89) of any other nominated group. A study of the frequency distributions of their dominance codes reveals that the Code 1122 (the most pronounced left-brain code) is the most frequently occurring one for this

administrative group (37 percent) with code 1112 (although more whole-brained, still quite lacking in a dominance in the upper right quadrant responsible for creative, conceptual thought) next at 19 percent. The third most common code was the completely whole-brained code: 1111; however, only 12 percent of this group demonstrated this dominance pattern. This percentage represents only 3 individuals in the entire study!

Comparison of Results of This Study to Coulson's Recent Research: Superintendents

Findings of this study support the research by Coulson (1983) in which his Chief Executive Officers (CEOs) were compared against school superintendents (see Chapter II, page 56). Figure 38 compares the nominated superintendents in the current study with Coulson's superintendents. Using Coulson's same CEO profiles for comparison, the profiles of superintendents in this study (Figure 39) show even greater differences in cognitive style when compared with CEOs than did the superintendents in Coulson's study. (See Chapter II, page 56, Figure 12).

The most pronounced difference among these groups when comparing their profiles is in the upper left quadrant represented by logical analytical thought processes. CEOs, when compared with the nominated superintendents in this study, are highly intuitive-conceptual as measured by the scaled scores (SS) in the upper right

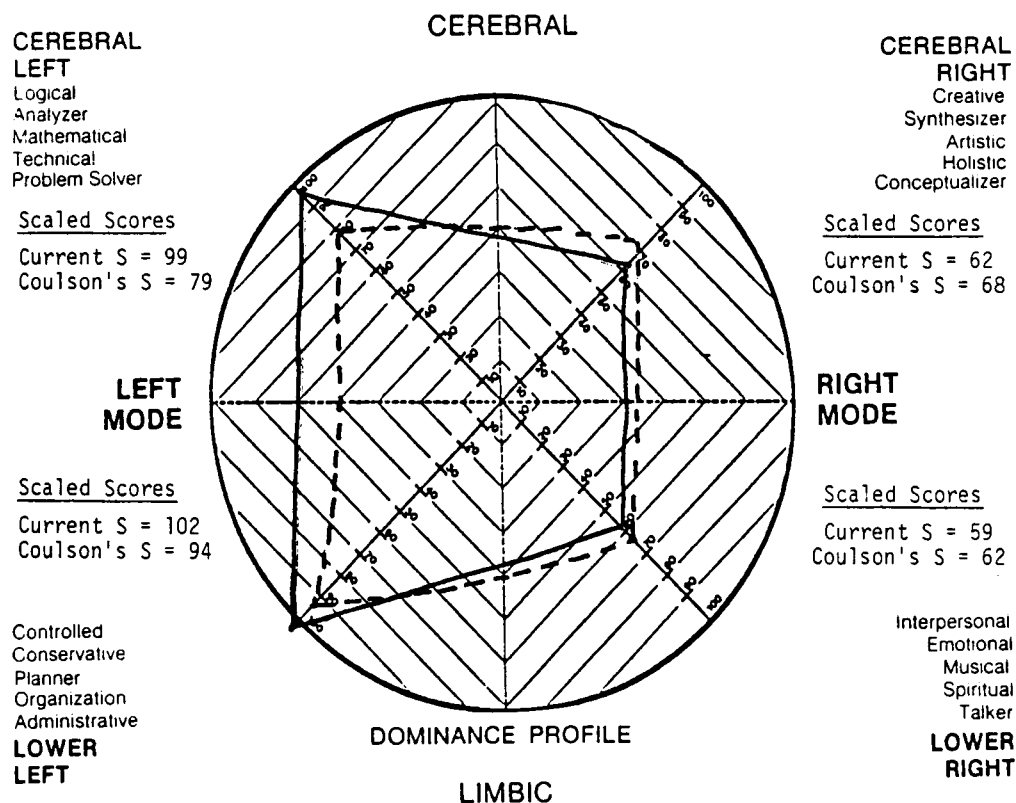


Figure 38. Dominance Profiles of School Superintendents in Current Study and School Superintendents in Coulson Study.

Coulson's S = Superintendents in Coulson's Study.-----
 Current S = Nominated Superintendents in Current Study. _____

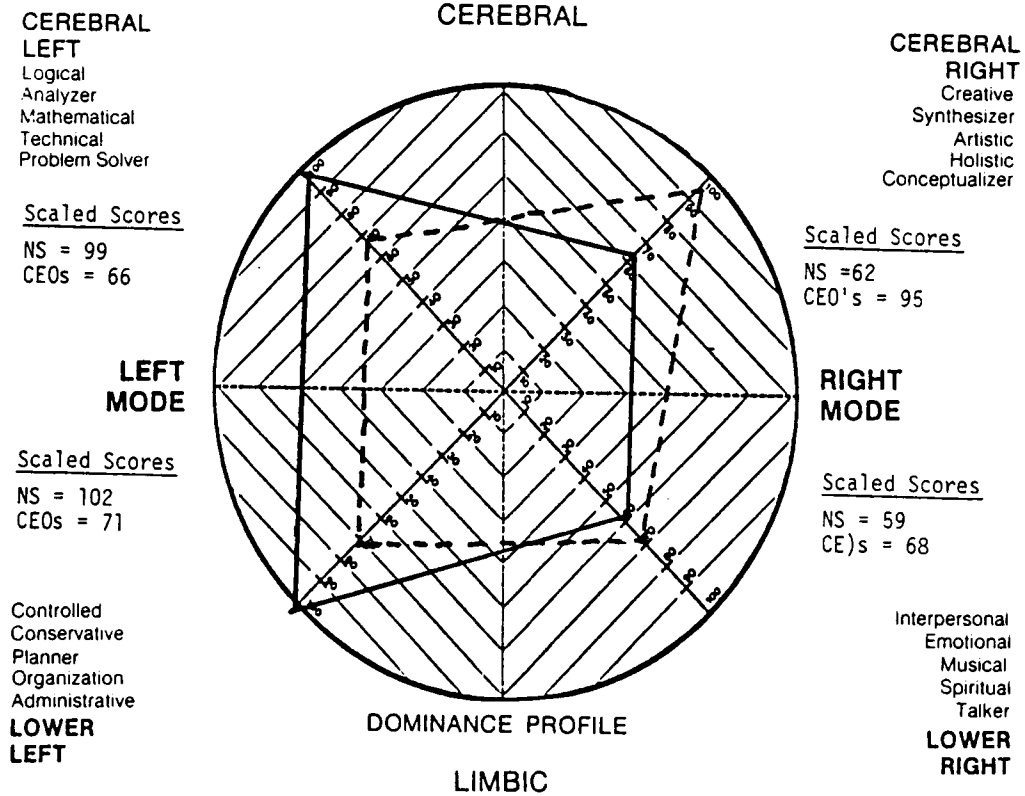


Figure 39. Dominance Profiles of School Superintendents and Chief Executive Officers.

NS = Nominated Superintendents in Current Study. ———
 CEOs = Chief Executive Officers--Coulson's Study: - - - - -

brain quadrant (95 right SS--66 left SS). In contrast, nominated superintendents are highly logical and analytical (99 left SS--62 right SS) as shown by the upper left quadrant. The superintendents are strong in the controlled, conservative, administrative quadrant of the lower left hemisphere (102 left SS--59 right SS) and the CEOs show an almost equal balance between both hemispheres in the limbic area (71 left SS--68 right SS). In neither case for the CEO's does this represent a dominance in the limbic area.

What we see reflected in this study among the superintendents who were selected by a nomination process as being the most effective in the state, is a group of administrators of an established order rather than visionary leaders of a new age. These are persons who will base decisions on calculated facts and details with very little of the intuitive feeling of what is appropriate to the situation.

Random-sample superintendents likewise appear quite dissimilar to Coulson's CEOs in both cerebral quadrants (Figure 40). They are quite similar to this study's nominated superintendents except for very slight differences in three of the four quadrants. As shown in Figure 41 they show a slightly greater dominance in the lower left quadrant than do the nominated group (Random Sample Superintendents Mean SS=107; nominated Superintendent's Mean SS=102). Figure 41 shows that both groups exhibit equal dominance in the lower right quadrant (Random Sample Superintendents mean SS=59; Nominated Superintendent's mean SS=59). The random-sample group shows slightly less dominance in the

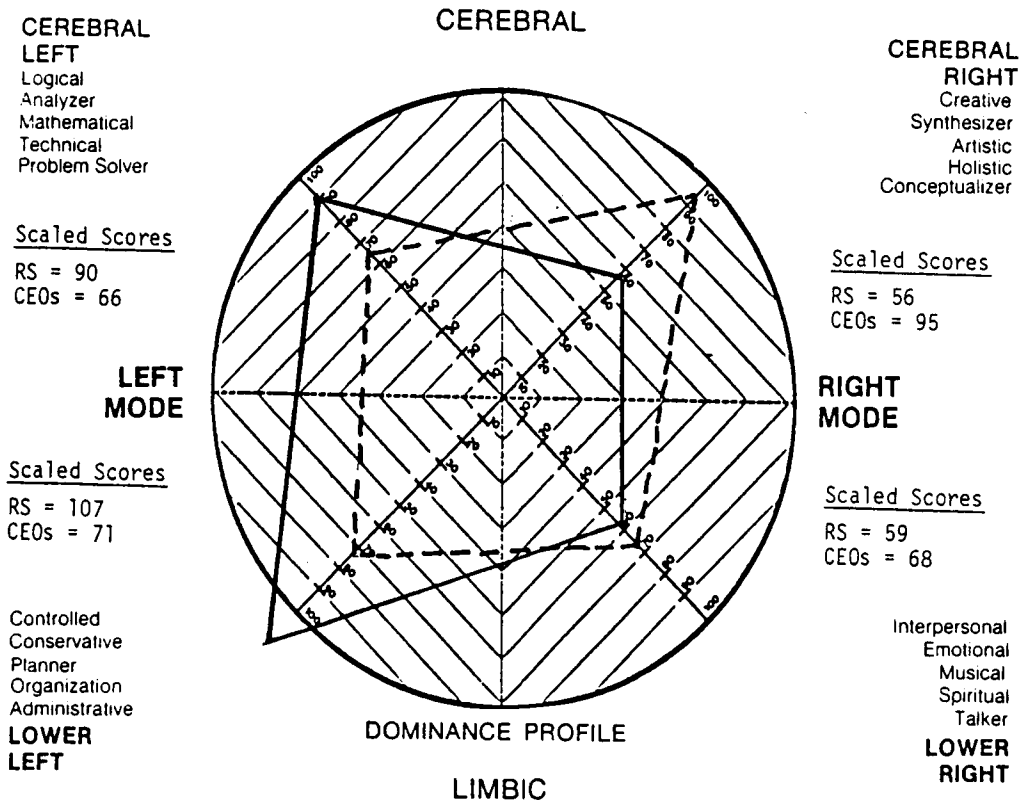


Figure 40. Dominance Profiles of Random Sample School Superintendents and Chief Executive Officers.

CEOs = Chief Executive Officers in Coulson's Study.-----
RS = Random Sample Superintendents in Current Study.——

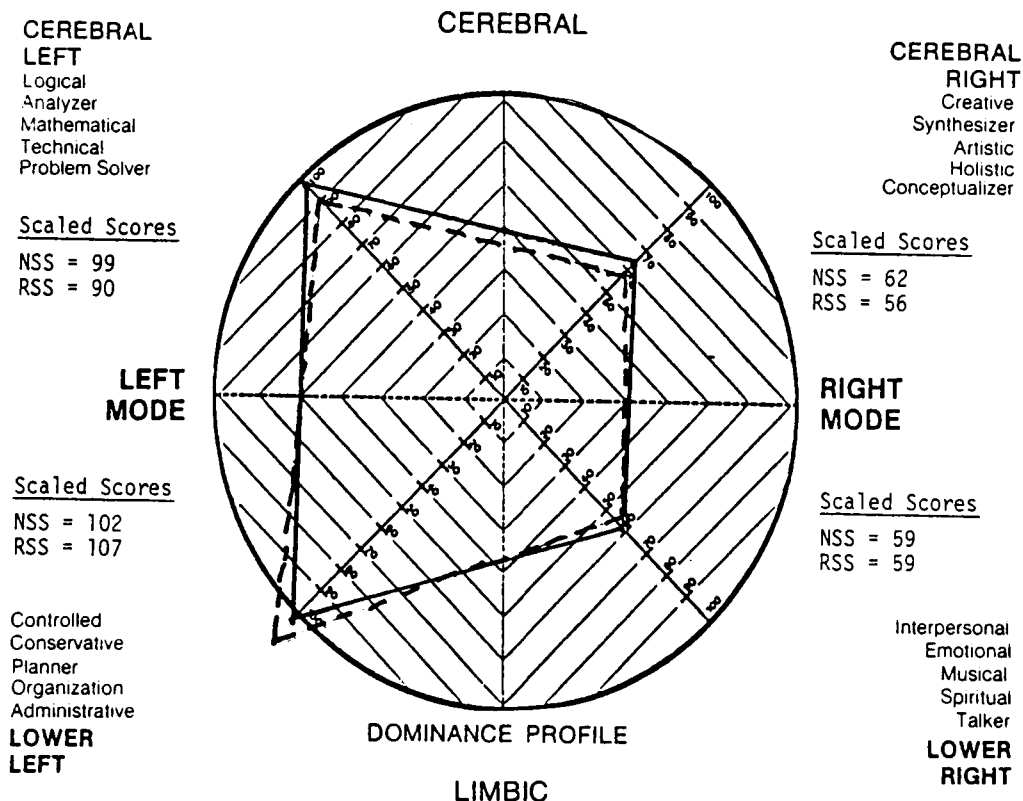


Figure 41. Dominance Profiles of Random Sample and Nominated Sample Superintendents (N=27).

RSS = Random Sample Superintendents in Current Study.----
NSS = Nominated Sample Superintendents in Current Study.——

upper right (Random Sample SS=56; Nominated Superintendent SS=62) than does the nominated group.

From these comparison the random sample of superintendents appears slightly more conservative and status quo in thinking style and a little less strong in the conceptualizing mode than do the nominated sample superintendents. This finding which confirms the comparison of left to right brain percentages among the groups (Nominated Sample: 52 percent right brained--48 percent left brained; random sample: 33 percent right brained--62 percent left brained), adds support to the nomination process.

Principals

For the group of principals, at least, the situation appears more positive (Figure 42). In an age where greater emphasis is being placed on the principal as an agent for school change, this is especially important. Although 29 percent of the principals in this study did exhibit a dominance code of 1122 (left-brained) 23 percent had a dominance code of 1121 and 13 percent a dominance code of 1111. Both of these codes (36 percent of the sample) are whole-brained and have the additional advantage of a strong conceptual component in the upper right quadrant. This finding is confirmed by the nomination rankings for this group, where conceptual skill was the highest quality ranking. Thirty-six percent of this group had the highest ranking (1) for conceptual skill. In contrast only 15 percent of the superintendents received a top ranking (1) for conceptual skill.

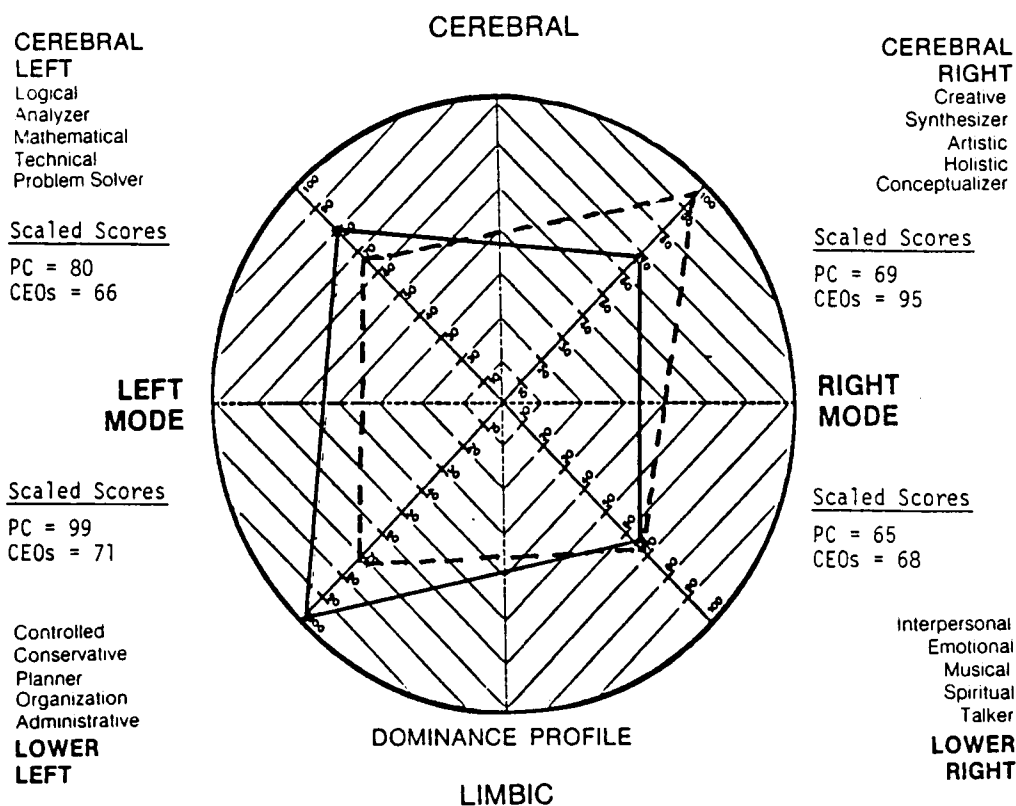


Figure 42. Dominance Profiles of School Principals and Chief Executive Officers.

CEOs = Chief Executive Officers in Coulson's Study. ----
 PC = Principals in Current Study. —

A comparison of the profiles of principals in this study to Coulson's CEOs shows that while the principals are not as creative-conceptual (as measured by the upper right quadrant) as the CEO's, they do exhibit a healthier balance between the logical, analytical nature of the cerebral left hemisphere and the creative right hemisphere than do either of the superintendent's groups.

These findings are important in view of the newest emphasis on the principal as educational leader. Such results suggest that while principals may not be as visionary as would be the ideal, neither do they rely in problem solving solely on logical solutions based on an accumulation of facts.

Supervisors

Very similar patterns and styles exist for supervisors as for principals. There is, however, a much stronger tendency for supervisors to manifest a higher mean score in right-brain dominance and a high percentage of respondents with a whole-brained/right-brained style when viewed by dominance codes (62 percent right to 38 percent left).

Supervisors, whose job it is to conceptualize system needs from a global perspective, appear slightly stronger than any other educational group in their capacity to conceptualize as reflected by their higher right brained scores. In terms of the lower right hemisphere characterized by interpersonal style, they exceed the other two educational administrator groups as well as the CEOs (see

Figure 43). This finding is supported by the high ranking they received from their nominators in human skills (41 percent received a top ranking, 1, in this skill). This is significant in terms of their need to work with others in instructional development and staff improvement.

Total Nominated Sample

Some interesting similarities are revealed among the three nominated groups, (i.e., superintendents, principals and supervisors) as shown in Figure 44. First, as a group these administrators appear quite similar in the degree of conceptual-creative style that they display. The scaled score mean for each nominated group falls between 62 and 72. A similar finding appears in the lower left quadrant representing organizational ability and status quo orientation where the mean scaled scores for all groups fall between 71 to 99 points.

Figure 45 represents a composite profile of all administrators in the nominated sample (N=103). This composite places the administrators in this study into the 1121 dominance cluster characterized by not only a strong left-brain dominance (which reflects logical analytical skills as well as organizational ability) but also a dominance in the upper right brain quadrant (which is necessary for conceptualized thinking and intuitive response).

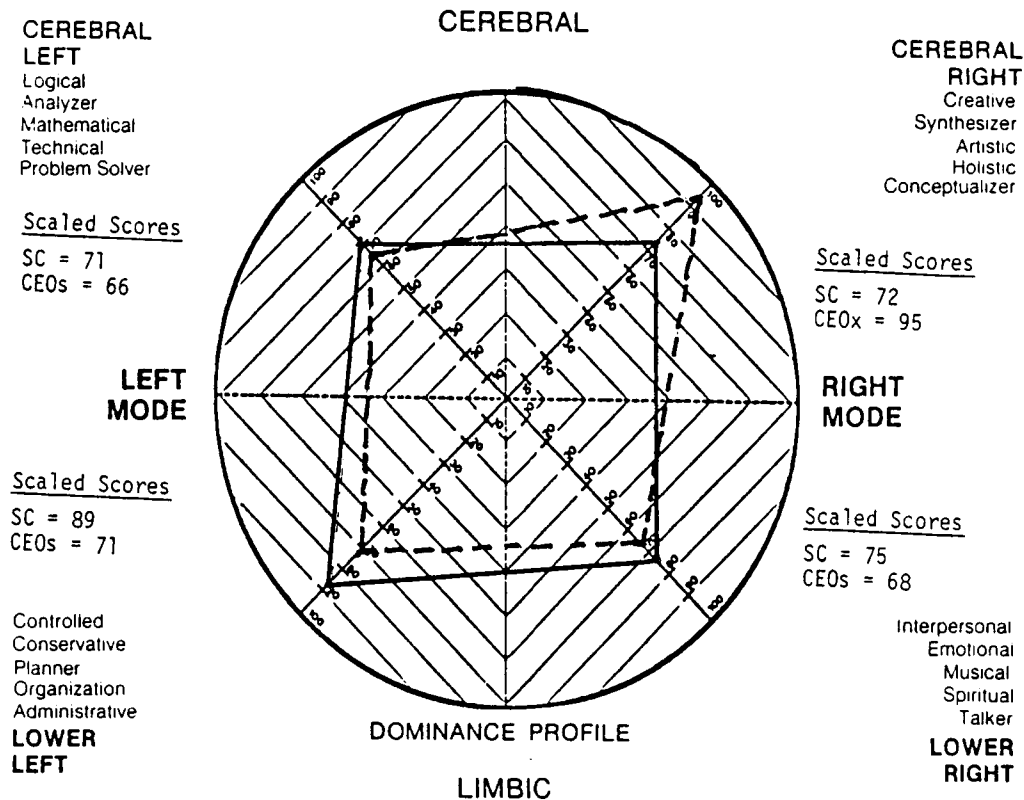


Figure 43. Dominance Profile of Nominated School Supervisors and Chief Executive Officers.

CEOs = Chief Executive Officers in Coulson's Study. ----
SC = Supervisors in Current Study. —

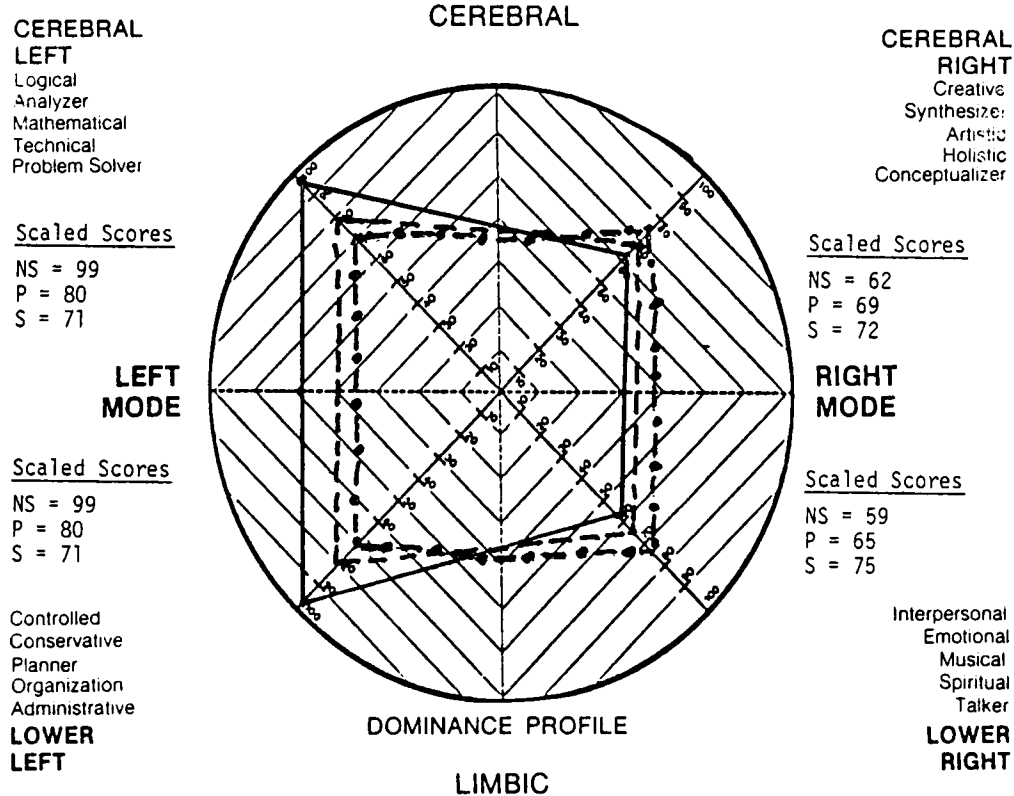


Figure 44. Profiles of Nominated Superintendents, Principals and Supervisors.

NS = Nominated Superintendents. —
P = Principals. - - - - -
S = Supervisors. - . . . -

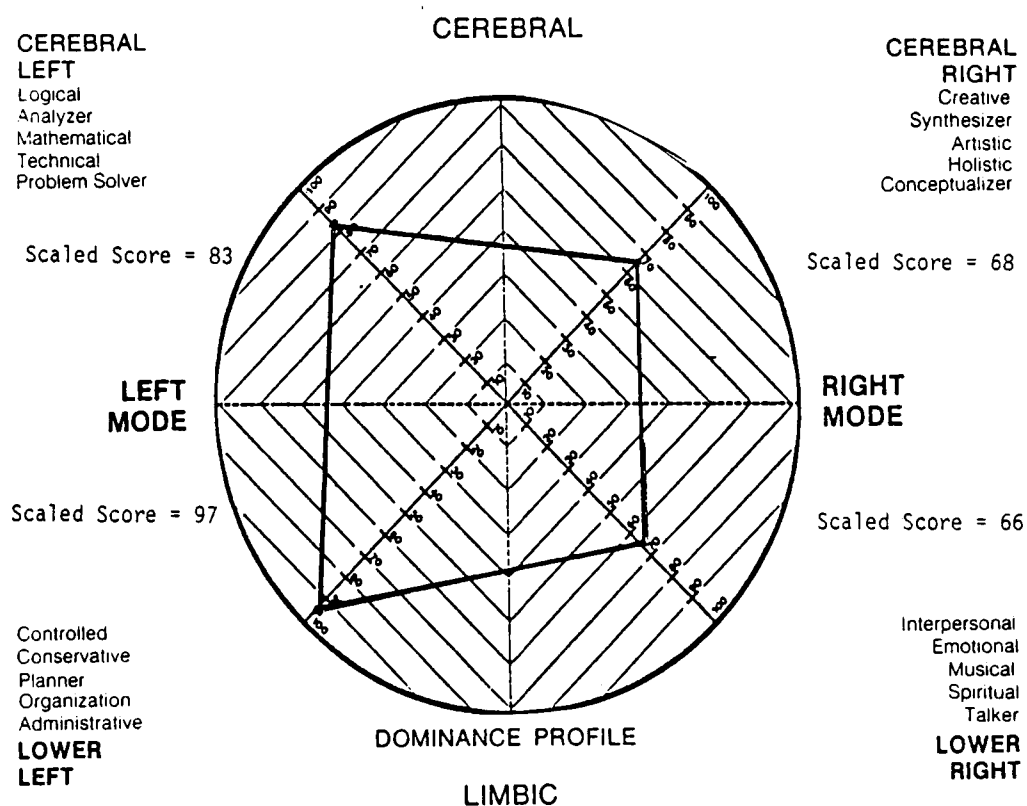


Figure 45. Composite Profile of School Administrators--Code 1121, (N=103).

Sex Differences

Based on ratios, females are more whole-brained/right-brained than are males in this study (4 to 1). Of the respondents in the total study (N=115) who possessed the most characteristically left-brained code (1122) only 3 were female. In contrast, the whole brained/right brained codes, representing a total of 60 subjects, were obtained by 26 females (out of the 33 females in the study). This number represents 79 percent of the female subjects who are more right brained than left brained.

There are no females in the nominated superintendent's group and only 11 among the principals group (30 percent of the principals). In contrast, there are 23 female supervisors (62 percent of the supervisor's group). These data pose a question as to the impact of sex on the proportionate ratios of right to left brain dominance within groups. (Both principals and superintendents show an approximate 50 percent right to 50 percent left proportion in dominance style in contrast to a 62 percent right to 38 percent left for supervisors).

The impact of sex as a variable in relation to the brain dominance of respective groups should be further explored. The previously presented data suggest that interpretation of the dominance patterns among groups might be different if groups were first differentiated on the basis of male and female.

Nomination Rankings: Katz Skills

An analysis of the dominance patterns of educational administrators in terms of their nominated characteristics substantiates the

validity of the rankings assigned. As demonstrated, those most likely to receive a high ranking in conceptual skill were right brained. (Superintendents were predominately left brained and nominated relatively low in conceptual skill). Those most likely to receive a high ranking in technical skill were predominately left brained. Principals, who were more characteristically whole brained than other groups ranked highest in conceptual skill.

A brief glance backward at the work of Katz (1974) suggests that conceptual skill should be the most pronounced quality of leadership at the highest administrative level. Next in importance is human skill and finally technical skill. Guglielmino (1979) found this same situation to be true in his study of administrative skills in Fortune 500 Companies (see Chapter II, page 51). The data from this present study of educational administrators indicate that only in the realm of human skills are the nominated skills most characteristic of those suggested for the particular level of leadership found.

A close examination of educational leadership level suggests that the school principal's role differs from the typical mid-management role found in most organizations. This is true particularly in view of the new emphasis being placed on the principal as an instructional leader and guide for educational purpose and school climate. Based upon this emerging leadership role, the higher scores in conceptual skill given principals in the study seem appropriate. Similarly the higher emphasis on human relations skills among

supervisors is needed if they are to serve as developers of human resources. But where will our educational vision originate if those who lead us (i.e., superintendents) are so sadly lacking as a group in conceptualization?

Line vs. Staff Position

The differences in innovation/brain dominance seem to parallel distinctions between line and staff positions. There appears to be a job-related difference in style needed to be innovative. Among superintendents there is a wide difference between the mean scores of their left-brain dominance and the mean scores of their right dominance; the left-brain dominance is higher by a total of 50 points. This fact suggests that for superintendents very little innovation in the form of conceptualization is taking place as reflected by their right-brain score and lower scores on the PIQ. Of the 26 percent of the superintendents' scoring in the high range on the PIQ, 19 percent were right-brained dominant in contrast to only 7 percent who were left brained. Superintendents in this study do not appear to function appropriately as generators of system ideas; neither do they conceptualize new avenues for change.

Principals manifest 30 points difference in their left and right-brain mean scores. Although this swing is to the left, it is important to note that in the high range of innovation as measured by the PIQ principals as a group had the highest percentage of

innovators (41 percent) as well as the highest percentage of right-brained subjects at this level of innovation (26 percent). The principal must have a balance in dominance characteristics in order to bring about not only the creation of the idea (i.e., process) but also its fullest implementation (product).

More principals scored in the high range on the PIQ than did supervisors. A possible explanation for this is that from their positions they are quantifiably able to affect more changes than are supervisors. Because of the nature of their line positions principals can exert more administrative control in seeing that implementation of their ideas takes place. They have more control over product rather than just the process in the change.

Supervisors failed to score high on the PIQ even though as a group they manifested the highest right brain score and best balance between the two hemispheres (only 5 points difference between their mean left and right brain scores). Indicators suggest that their style is suitable for a change orientation related both to process as well as product. Due to the nature of their staff positions, however, this may not always be reflected in a quantifiable measurement of changes that occur. Because of the central office characteristics of their positions, much of what is conceptualized by the supervisor must ultimately be implemented at the building level and depends upon the building level principal's receptivity to that idea and support in its implementation.

The Relationship of Innovation to Brain Dominance

There are several explanations as to why only a low or moderate correlation was found between the variables of innovation (scores on PIQ) and brain dominance. These are:

1. The Perceived Innovation Questionnaire is based heavily on quantity of change rather than quality of change. Often as one "spreads himself thin" the real significance of change does not take place. A few well developed and implemented changes are often more effective than a large number which are merely set in motion.

This conjecture is supported by the random sample superintendents. Although they are the most pronounced left-brained group, they exhibit a higher degree of innovation, as measured by the PIQ, than any other administrative group. Analysis of their brain dominance pattern by quadrants shows that only 1 out of the 12 had upper right quadrant dominance which has been demonstrated to rank significantly with conceptualization. Even so, on questions 20 and 16 of the PIQ (which asked for an estimate of the number of changes which the subject affected) the mean response for the random-sample group was greater than the mean response of the nominated-sample superintendents.

2. The design of the scoring procedure forced all groups into one pattern which may not have clearly differentiated the innovation among respective levels. In retrospect the questionnaire seems more appropriate for those in line positions (particularly principals and superintendents) who are in positions to control change situations. Likewise, this procedure might penalize supervisors who, although they may perceive needs and conceptualize solutions, lack the line authority

to insure that effective implementation takes place. They must often depend upon the vision and follow through of those in principal's positions to assist with the actual implementation of their ideas.

3. The questionnaire leaves something to be desired in terms of scoring procedures (i.e., assigning of values and computing of total scores). This is a factor which bears further investigation for possible reanalyzation of this particular component of the study at a later time.

4. Data should possibly be reanalyzed using the Subtotal rather than Total Score of the PIQ since it appears to relate more significantly with brain dominance style.

V. CONCLUSIONS

From a synthesis of current research on creative leadership, brain hemisphere dominance and the change process, as well as through an analysis of the data presented in this study, several conclusions have been reached. These include:

1. Superintendents in this study are characterized by a brain dominance style more indicative of an analytical left-brained mode than an intuitive, simultaneous, right-brained one. They have been ranked by their nominators as highly technical and less adept in the processes of conceptualization.

Research suggests that, particularly at the superintendent's level of administration, there is a need for leadership that can visualize images of the future. What is needed seems to be directly opposite to what exists in terms of thinking processes. Based on this research several solutions might be considered.

a. Boards of education, departments of educational administration and independent search firms should, in view of this research, carefully consider applicants for superintendency positions. A careful screening of such candidates should include, along with an assessment of their analytical logical skills, equal emphasis on the intuitive, conceptual ability which they display.

b. Consideration should be directed toward giving current superintendents an opportunity to pair with creative, right-brained conceptualizers who would share the duties of an administrative team.

c. More emphasis should be given in departments of educational administration to the theory of administration rather than to the practicalities more associated with the technical aspects of administration.

d. Advanced programs in educational administration should include courses outside the education department which are designed to broaden the scope or perspective of administration. These would include such areas as: literature, the arts, and music.

e. Based on the results of this study, which show superintendents to be lower in conceptual creative style than in the analytical mode of operation, educational leadership departments should study the feasibility of extending their curriculums to involve courses in creative thinking and intuition as viable means of helping administrators operate in an ever changing educational environment.

f. Superintendent's associations, State Departments of Education and local school boards should consider adding to inservice

components of their training programs, some sessions in creativity and intuitive decision making.

g. Leadership preparation programs should begin at an early age with emphasis toward holistic approaches via gifted programs in school settings.

2. Based on an analysis of brain dominance patterns women in this study surpassed men in the holistic approach which they bring to educational leadership. Although females represent 32 percent of the nominated sample in this study, they account for 44 percent of the whole-brained leadership displayed. In addition they account for a high percentage of those subjects who had a specific dominance in the upper right brain quadrant which significantly relates to conceptual ability ($p < .05$). Women also represent 70 percent of the supervisors whose Subtotal Scores on the PIQ significantly related to right-brain dominance ($p < .05$). Women's Subtotal Scores on the PIQ suggest that there is potential for innovation/leadership; however, the Total Score which incorporates the quantity of innovation limited their ranking on the PIQ.

The majority of women in educational leadership positions are placed in supervisory positions where they are limited in the follow through which they can bring to bear upon these changes which are conceptualized. This is due in large part to the nature of staff positions which do not have "line authority." In this study, among the nominated sample, women represented only 17 percent of the subjects in line positions, yet, ultimate implementation of new ideas is at the discretion of line administrators.

Several conclusions address this problem:

a. Women should be given greater opportunities to exercise their whole-brained leadership qualities through leadership positions with line authority.

b. Organizations representing superintendents, executive search firms and boards of education should closely study the current route to the superintendency via the principalship. Much potential for holistic leadership appears to be present among women at the supervisory level as well.

c. Supervisory organizations such as ASCD should concentrate their efforts on training women to move beyond the current limits of some staff positions in making an impact on education.

d. Internships for women in administration should be offered at the superintendency level by local school systems in conjunction with university departments of educational leadership.

3. Principals exhibit a better balance between the analytical and conceptual modes of thought than do superintendents. These combined qualities suggest that they have the potential for conceptualization as well as the skills to insure that the implementation of ideas takes place. Their ability to do this is confirmed by their highest ranking on conceptual ability, among the three groups studied, as well as by their highest ranking Total Score on the Perceived Innovation Questionnaire. In addition, principals had the largest number of high scorers (PIQ) who were also right brained. These findings parallel the most recent research findings on the principal's role in promoting effective schools.

At the same time that the principal's capacity for conceptualization and change is present, there is an equal force for maintenance which they also display. There is some question, based on the results of this research (i.e., high scores in lower left-brain quadrant), if principals will allow their creative potential to develop if outside pressures from superintendents, school boards and others suggest that "refinement" of the established order is more appropriate. The following cpmc;isopms see, warranted:

- a. School boards should encourage autonomy of the principalship in terms of programming and instructional leadership.
- b. Merit pay for principals should be tied to what they are able to accomplish rather than maintain.
- c. Opportunities for creative development should be encouraged and financially subsidized by local school boards and State Departments of Education.
- d. Educational administration departments should balance their teaching staff with "movers" and shapers as well as administrators.

VI. RECOMMENDATIONS FOR FURTHER STUDY

This final section presents recommendations for future study in the areas of brain hemisphere dominance and creative leadership. The first section considers refinements of the present study and the next suggests areas of future study.

Refinements of Present Study

1. The Perceived Innovation Questionnaire leaves something to be desired in terms of scoring procedures (e.g., assigning of values and computation of total scores). This is a factor which bears further investigation for possible reanalysis of this particular component of the study at a later time.

2. A different innovation questionnaire should be developed for each administrative group which would be more in keeping with the specific nature of that level of administration.

3. The concept of innovation should be addressed more from a qualitative rather than a quantitative basis. This is suggested since quantity is not necessarily an indicator of effective change.

4. Data should be analyzed for all statistical procedures on the basis of male/female as well as by administrative groups.

Recommendations for Future Study

1. Now that the hemisphere styles of educational leaders at the respective levels of administration have been explored, the actual leadership qualities demanded of persons in these positions should be investigated and correlated with the Herrmann Model. Discrepancies found between what is needed for effective management and what, in fact, exists could further pinpoint specific areas of curriculum concentration for departments of educational administration.

2. A job analysis of each educational administration leadership position should be adapted to the Herrmann Dominance Model. The resulting position profiles, used in conjunction with the Herrmann

Brain Dominance Instrument, would serve as appropriate selection/ placement devices to insure a more effective person-job fit. Such a combination of assessment profiles and position models would enhance career guidance and placement of individuals in the appropriate areas of study within the educational administration field.

3. Experimental research should be conducted related to the effects of creativity training and/or training and intuitive decision making on the dominance profiles of selected administrators.

4. Selected male/female principals of effective schools should be analyzed for brain dominance style to determine the dominance patterns most compatible with effective leadership.

5. A case study of selected administrators from this study who exhibited the strongest (1) left brain, (2) right brain, and (3) whole-brain dominance should be conducted for the purpose of exploring the effectiveness of the leadership exhibited by each dominance style.

6. The following question seems most worthy of study: Is there a style of brain dominance that seems to be related to a "best" type of educational administration?

LIST OF REFERENCES

LIST OF REFERENCES

- Achilles, C. M. "Quo Vadis? (Quo voduisti vodesque?)," Some Approaches to the Use of the Humanities in Leadership Preparation Programs. A paper prepared for Division A of AERA Invited Symposium. Los Angeles, 1981.
- Achilles, C. M. and Douglas Norman. "Communication and Change in Education." Planning and Changing, Fall 1975, 5, 138-142.
- Barnard, Chester I. Functions of the Executive. Cambridge, Mass: Harvard University Press, 1968.
- Barnard, Chester. "Mind in Everyday Affairs" (a Cyrus Fogg Bracket Lecture before the Engineering Faculty and Students of Princeton University, March 10, 1936). In Chester Barnard. Functions of the Executive. 2nd edition. Cambridge, Mass: Harvard University Press, 1976, 302-322.
- Barrett, Leverne A. and Edgar P. Yoder. "Are you an Administrator or a Leader." NAASP Bulletin, December 1980), 64(2), 44-66.
- Beck, Robert E. Career Patterns: The Liberal Arts Major in Bell System Management. Speech presented on March 4, 1981, as part of a conference on "Quality in Liberal Learning and How to Improve it," sponsored by the Association of American Colleges.
- Blakeslee, Thomas R. The Right Brain: A New Understanding of the Unconscious Mind and Its Creative Powers. New York: Anchor Press, 1980.
- Bogen, Joseph E. and Glenda M. Bogen. In Albert Rothenburg and Carl Housmon (eds.), The Creativity Question. Durham, NC: Duke University Press, 1976, 256-261.
- Bogen, Joseph E. "The Other Side of the Brain: An Oppositional Mind." Bulletin of the Los Angeles Neurological Society, 1969, 34, 135-162.
- Bruner, Jerome S. On Knowing: Essays for the Left Hand. New York: Atheneum, 1982.
- Bunderson, C. V., J. A. Olsen, and Ned Hermann. "Patterns of Brain Dominance and Their Relationship to Tests of Cognitive Processing, Personality, and Learning Style." General Electric, 1981.

- Burke, W. Warner. "Leadership: Is There One Best Approach?" Management Review, November 1980, 69(11), 54-56.
- Burns, James McGregor. "Decision and Change." Leadership. New York: Harper and Row, 1978, 401-442.
- Callen, Mary Frances and others. "Practical Applications of Research." Phi Delta Kappan Newsletter: Center of Evaluation, Development and Research, March 1983, 5(3), 1-4.
- Carlson, Richard O. Adoption of Educational Innovations. Eugene, Oregon: University of Oregon, 1965.
- Chin, Robert and Kenneth D. Benne. "General Strategies for Effecting Changes in Human Systems." In The Planning of Change. New York: Holt, Rinehart and Winston, 1967, 22-28.
- Cohen, Gillian. "Comment on 'Information Processing in the Cerebral Hemispheres: Selective Activation and Capacity Limitations' by Hellige, Cox and Litvac." Journal of Experimental Psychology: General, September 1979, 108(3), 309-315.
- Cone, W. Henry. "Brain Research Findings May Improve Decision Making." NAASP Bulletin, February 1982, 66(451), 67-72.
- Cox, Allan. "U. S. Business Leaders are Out of Touch with Society." U. S. News and World Report, December 13, 1982, 93(12), 89.
- Crockett, William J. "The Emerging World of the Manager." Training and Development Journal, April 1981, 35(4), 76-85.
- Culbertson, Jack. "Educational Leadership, The Uses of Adversity." Theory Into Practice, October 1976, 15, 253-259.
- DeBono, Edward. Lateral Thinking for Management. England: American Management Association, 1971.
- Dede, Christopher and Dwight Allen. "Education in the 21st Century: Scenarios as a Tool for Strategic Planning." Phi Delta Kappan, January 1981, 62(5), 362-366.
- Doktor, Robert and David M. Bloom. "Selective Lateralization of Cognitive Style Related to Occupation as Determined by EEG Alpha Asymmetry." Management Science, July 1977, 19(2), 385-387.
- Doktor, Robert H. and William F. Hamilton. "Cognitive Style and the Acceptance of Management Science Recommendations." Management Science, April 1973, 19(8), 884-894.

- Drucker, Peter. The Practice of Management. New York: Harper & Row Publishers, Inc., 1954.
- Duigan, Patrick. "Administration Behavior of School Superintendents: A Descriptive Study." The Journal of Educational Administration, July 1980, 28(1), 5-25.
- Dumas, R. and A. Morgan. "EEG Asymmetry as a Function of Occupation, Task and Task Difficulty." Neuropsychologia, 13, 219-288.
- Dyer, Frederick and John M. Dyer. Bureaucracy vs. Creativity. Coral Gables: University of Miami Press, 1965.
- Eccles, John Carew. The Understanding of the Brain. New York: McGraw-Hill, 1973.
- Editorial Staff. "Mastering Management in Creative Industries." Business Week, May 29, 1978, 2536, 86-88.
- Edwards, Betty. Drawing on the Right Side of the Brain. Los Angeles: J. P. Tarcher, 1979.
- Enochs, James C. "Up From Management." Phi Delta Kappan, November 1981, 63(3), 175-182.
- Fiedler, Fred E. "Style or Circumstance: The Leadership Enigma." Psychology Today, 1969, 2(10), 38-43.
- Firestone, William A. "Participation and Influence in the Planning of Educational Change." Journal of Applied Behavioral Science, 13, 1977, 167-183.
- Froiland, Paul. "The Gray Matters." Passages, August 1981, 23-28.
- Galín, David and Robert E. Ornstein. "Lateral Specialization of Cognitive Mode: An EEG Study." Psychophysiology, 1972, 9(4), 412-418.
- Gallagher, Art. "Directed Change in Formal Organizations: The School System." In Richard O. Carlson, Change Processes in the Public Schools. Oregon: University of Oregon Press, 1965, 37-51.
- Gardner, Howard. "The Music of the Hemispheres." Psychology Today, June 1982, 91-92.
- Gazzaniga, Michael S. "The Split Brain in Man." Scientific American, August 1967, 217(2), 24-29.

- Gazzaniga, Michael S. and Joseph E. LeDoux. "Cerebral Lateralization and Hemispheric Specialization." In The Integrated Mind. New York: Plenum Press, 1978, 45-72.
- Gerado, Rivera and others. "Managerial Information Processing: A Research Review." Administrative Science Quarterly, March 1981, 26, 116-138.
- Graham, Elizabeth. "Educational Leaders Need the Humanities." Educational Leadership, December 1980, 38(3), 235.
- Greenleaf, Robert. Servant Leadership. New York: Paulist Press, 1977.
- Grossnickle, James. "Educational Impact Statement: An Aid to Planning Innovations." Educational Technology, May 1980, 20(5), 16-20.
- Guglielmino, Paul J. "Developing the Top Level Executive for the 1980's and Beyond." Training and Development Journal, April 1979, 33(4), 12-14.
- Guilford, J. P. The Nature of Human Intelligence. New York: McGraw Hill, 1967.
- Hall, Gene E., William L. Rutherford and Tereza H. Griffin. "Three Change Facilitator Styles: Some Indicators and a Proposed Framework." Research and Development Center for Teachers, University of Texas, Austin. R & D Report No. 3134. Paper presented at the annual meeting of the American Educational Research Association, New York City, 1982.
- Harris, Ben M. and Leonard A. Valverde. "Supervisors and Educational Change." Theory Into Practice, October 1976, 15(4), 70.
- Hart, Leslie. "Brain, Language, and New Concepts of Learning." Educational Leadership, March 1981, 38(6), 443-445.
- Havelock, Ronald G. The Change Agent's Guide to Innovation in Education. New Jersey: Educational Technology Publications, 1973.
- Heichberger, Robert L. "Toward a Strategy for Humanizing the Change Process in Schools." In Ray Eiben and Al Milliren (eds.), Educational Change: A Humanistic Approach. New York: Holt, Rinehart and Winston, 1976, 112-120.

- Henderson, John C. and Paul C. Nutt. "The Influence of Decision Style on Decision Making Behavior." Management Science, April 1980, 4, 371-386.
- Herrmann, Ned. "The Creative Brain." Training and Development Journal, July-December 1981, 35(2), 12-16.
- Herrmann, Ned. "Creativity Seminars Use Collective Whole Brain." Brain and Mind Bulletin, Aug. 24, 1981, 6(14), 83.
- Herrmann, Ned. Personal interview. "The Brain: New Insights." General Electric Monograph, March-April 1977, 30-31.
- Herrmann, Ned. "The Creative Brain Part II." Training and Development Journal, December 1982, 36(12), 75-88.
- Herrmann, Ned. 20 Questions and Participant Survey. General Electric Management Education Office, 1979.
- Hersey, Paul and Kenneth H. Blanchard. Management of Organizational Behavior: Utilizing Human Resources. Englewood Cliffs, NJ: Prentice Hall, 1982.
- Houge, Jerry and Mary Kluender. "Style and Engineering in Educational Change." Educational Technology, 1980, 20(1), 27.
- House, Ernest R. The Politics of Educational Innovation. Illinois: University of Illinois Press, 1974.
- Jago, Arthur G. and Victor H. Vroom. "Hierarchical Level and Leadership Style." Organizational Behavior and Human Performance, Vol. 18, pp. 131-145.
- Janago, Mary Renck. "Change in Schools: Recidivism or Dynamism." Educational Technology, June 1978, 18(6), 36-39.
- Jung, Carl G. Psychological Types. New York: Harcourt Brace and World, 1923.
- Katz, Robert L. "Skills of an Effective Administrator." Harvard Business Review, September-October 1974, 52(5), 90-102.
- Kerlinger, Fred N. "Ex Post Facto Research." Foundations of Behavioral Research. New York: Holt, Rinehart and Winston, Inc., 1964, pp. 359-391.

- Kimura, D. "The Asymmetry of the Human Brain." Scientific American, 1973, 228(3), 70-78.
- Kimura, D. "Functional Asymmetry of the Brain in Dichotic Listening." Cortex, 1967, 3, 163-178.
- Kinsbourne, Marcel. "Direction of Gaze and Distribution of Thought Processes." Neuropsychology, 12(2), 279-281.
- Kinsbourne, Marcel. "Hemispheric Specialization and the Growth of Human Understanding." American Psychologist, April 1982, 37(4), 411-420.
- Levine, Arthur. "Wanted New Leaders for America's Colleges." Academe, January-February, 1982, 68(1), 31.
- Levitt, Theodore. "Creativity Is Not Enough." Harvard Business Review, May-June 1963,
- Levy, Jerre. "Cerebral Asymmetry and the Psychology of Man." In M. C. Witrock (ed.), The Brain and Psychology. Los Angeles: University of California, 1980.
- Levy, Jerre. "Human Lateralization from Head to Foot: Sex Related Factors." Science, June 1978, 200(16), 1291-1292.
- Levy, Jerre. "Lateralization and Its Implications for Variation in Development and Review." Developmental Psychology, Series 1981, 175-228.
- Likert, Rensis. New Patterns in Management. New York: McGraw Hill, 1961.
- Lim, Howard. "A Japanese Agenda for Management Development." Training and Development Journal, March 1982, 36(3), 62-67.
- Lindsay, William M. and Leslie W. Rue. Environmental Complexity in Long Range Planning. Oxford, OH: Planning Executives Institute, 1976, 32-43.
- Maccoby, Michael. The Leader. New York: Ballantine Books, 1981.
- Maccoby, Michael. "Who Will Lead This New Breed of Americans?" U. S. News and World Report, March 15, 1982, 92(3), 80-81.
- Manasse, A. Lorri. "Principals as Leaders of High-Performing Systems." Educational Leadership, February 1984, 41(5), 42-46.
- Martin, William J. and Donald J. Willower. "The Managerial Behavior of High School Principals." Educational Administration Quarterly, Winter 1981, 69-70.

- Maslow, Abraham. "Toward a Psychology of Being." In Albert Rothenburg and Carl Housman (eds.), The Creativity Question. Durham, NC: Duke University Press, 1976, 296-305.
- McCarthy, Martha and Amy Zent. "School Administrators: A Profile." The Educational Digest, March 1982, 47(7), 28-31.
- McGregor, Douglas M. The Human Side of Enterprise. New York: McGraw Hill, 1960.
- McKendrick, Joseph. "The Office of 1990: Human Resources." Management World, January 1982, 11(1), 15-24.
- McLean, Paul D. "A Mind of Three Minds: Educating the Truine Brain." In Education and the Brain: The Seventy-Seventh Year-Book of the National Society for the Study of Education. Chicago: University of Chicago Press, 1978, 308-342.
- Messick, Samuel and Ferdinand J. Fritzky. "Dimensions of Analytic Attitude in Cognition and Personality." Journal of Personality, September 1963, 31(3), 346-367.
- Miles, Matthew B. "Planned Change and Organizational Health: Figure and Ground." In Richard O. Carlson (ed.), Change Processes in the Public Schools. Oregon: University of Oregon Press, 1965, 11-33.
- Miles, Raymond E. "Human Relations or Human Resources?" Harvard Business Review, August 1965, 43.
- Mintzberg, Henry. "Planning on the Left Side and Managing on the Right." Harvard Business Review, July-August 1976, 54(4), 49-58.
- Mintzberg, Henry. "Patterns in Strategy Formation." International Studies of Management and Organization, Fall 1979, 9(3), 67-86.
- Mintzberg, Henry. "The Manager's Job: Folklore and Fact." Harvard Business Review, July-August 1975, 53(4), 49-61.
- Mitchell, Terence R. and Robert J. House. "Path-Goal Theory of Leadership." Journal of Contemporary Business, 1974, 3(4), 81-97.
- Morphet, Edgar L. and Charles O. Ryan. Planning and Effecting Needed Changes in Education. New York: Citation Press, 1967.
- Myers, Isabel Briggs and Peter B. Myers. Gifts Differing. Palo Alto, CA: Consulting Psychologists Press, 1980.

- Nebes, Robert D. "Man's So-Called Minor Hemisphere." In The Human Brain. New Jersey: Prentice-Hall, 1974.
- Oates, D. "Striking a Balance Between Opposites." International Management, August 1979, 34(6), 42-49.
- Ohmae, Kenichi. "The Secret of Strategic Vision." Management Review, April 1982, 71(4), 9-13.
- Orlasky, Donald and Othaniel Smith. "Educational Change: Its Origins and Characteristics." Phi Delta Kappan, March 1972, 53(7), 412-414.
- Ornstein, Robert and Paul Brandwein. "The Duality of the Human Mind." Instructor, January 1977, 86(1), 54-58.
- Ornstein, Robert E. The Psychology of Consciousness. San Francisco: W. H. Freeman & Co., 1972.
- Osborn, Alex F. Applied Imagination. New York: Charles Scribner's Sons, 1957.
- Ouchi, William G. Theory Y: How American Business Can Meet the Japanese Challenge. New York: Avon Books, 1981.
- Owens, Robert G. and Carl R. Steinhoff. Administering Change in Schools. New Jersey: Prentice Hall, 1976.
- Owens, Robert G. Organizational Behavior in Schools. New Jersey: Prentice Hall, 1970.
- Pascale, Richard Tanner and Anthony G. Athos. The Art of Japanese Management. New York: Simon and Schuster, 1981.
- Paulson, Robert D. "The Chief Executive as Change Agent." Management Review, February 1982, 71(2), 25-42.
- Peters, Thomas J. "Leadership: Sad Facts and Silver Linings." Harvard Business Review, November-December 1979, 57(6), 164-172.
- Peters, Thomas J. and Robert H. Waterman. In Search of Excellence. New York: Harper and Row, 1982.
- Pondez, Lewis. Leadership, Where Else Can We Go? Edited by Morgan W. McCall, Jr. and Michael M. Lombardo. Durham, NC: Duke University Press, 1978.

- Raudsepp, Eugene. "Can You Trust Your Hunches?" Administrative Management. October 1981, 42(10), 34-36.
- Reddin, W. J. "The 3-D Management Style Theory." Training and Development Journal, June 1979, 33(6), 62-67.
- Rennels, Max R. "Cerebral Symmetry: An Urgent Concern for Education." Phi Delta Kappan, March 1976, 57(7), 471-472.
- Restak, Richard. The Brain: The Last Frontier. New York: Doubleday and Company, 1979.
- Restak, Richard. Keynote Address NASSP Conference on Brain Research, New Orleans, 1981.
- Robey, Daniel and William Taggart. "Measuring Manager's Minds: The Assessment of Style in Human Information Processing." Academy of Management Review, 1981, 6(3), 375-383.
- Rogers, Carl. "Toward a Theory of Creativity." In Albert Rothenburg and Carl Housman (eds.), The Creativity Question. Durham, NC: Duke University Press, 1976, 296-305.
- Rogers, Everett M. "What are Innovators Like?" In Richard O. Carlson (ed.), Change Processes in the Public Schools. Oregon: University of Oregon, 1965, 50-60.
- Rowan, R. "Those Business Hunches are More Than Blind Faith." Fortune, April 23, 1979, 99(8), 110-114.
- Rutherford, William. "Madness of Educational Change." Educational Technology, June 1978, 18(6), 14-27.
- Samples, Bob. "Educating Both Sides of the Human Mind." The Science Teacher, January 1975, 42(1), 21-23.
- Samples, Robert. The Metaphoric Mind. Reading, MA: Addison-Wesley Publishing, 1980.
- Schkade, Lawrence L. and Alfred R. Potvin. "Cognitive Style, EEG Waveforms and Brain Levels." Human Systems Management Journal, 1981, 2(4), 329-331.
- Schneider, Joseph E. "Roadblocks to Reform." D/R Report by Council for Educational Development and Research, April 1973, 2(3), 3-5.
- Selznick, Philip. Leadership in Administration. New York: Harper and Row, 1957.

- Sheehy, Gail. PathFinders. New York: William Morrow and Company, 1981.
- Sperry, Roger W. "The Great Cerebral Commissure." Scientific American, 1964, 210(1), 42-52.
- Sperry, Roger W. "Left Brain-Right Brain." Saturday Review, August 9, 1975, 2(23), 30-33.
- Steiner, Gary A. (ed.). The Creative Organization. Chicago: University of Chicago Press, 1969.
- Suojanen, W. W. "Creativity, Management, and the Minds of Man." Human Resource Management, Spring 1976, 15(1), 19-27.
- Taggart, William and Daniel Robey. "Minds and Managers: On the Dual Nature of Information Processing and Management." Academy of Management Review, 1981, 6(2), 187-195.
- Tannenbaum, Robert and Warren H. Schmidt. "How to Choose a Leadership Pattern." Harvard Business Review, 1958, 36(2), 95-101.
- Trevarthen, Cowlyn. "Functional Organization of the Human Brain." In M. C. Wittrock (ed.), The Brain and Psychology, 1980, 33-88.
- Trotter, Robert J. "The Other Hemisphere." Science News, April 3, 1976, 109(14), 219.
- Wallas, Graham. "Stages in the Creative Process." In Albert Rothenburg and Carl R. Housman (eds.), The Creativity Question. Durham, NC: Duke University Press, 1976, 69-73.
- Weick, Karl E. "Administering Education in Loosely Coupled Schools." Phi Delta Kappan, 1982, 63(10), 673.
- Weisenberg, P. and L. W. Grunfield. "Relationships Among Leadership Dimensions and Cognitive Style." Journal of Applied Psychology, October 1966, 50(5), 392-395.
- Whitteson, S. F. "Sex and the Single Hemisphere: Specialization of the Right Hemisphere for Spatial Processing," Science, July 30, 1976, 193(4251), 425-427.
- Wilkins, A. and A. Stewart. "The Time Course of Lateral Asymmetries in Visual Perception of Letters." Journal of Experimental Psychology, 1974, 102, 905-908.
- Willis, Quentin. "The Work Activity of School Principals: An Observational Study." The Journal of Educational Administration, July 1980, 28(1), 26-53.

- Witkin, H. A. "Origins of Cognitive Style." In Scheere (ed.), Cognition: Theory, Research, Promise. New York: Harper and Row, 1964, 172-205.
- Zaleznick, Abraham. "Managers and Leaders: Are They Different?" Harvard Business Review, May-June 1977, 55(3), 67-78.
- Zaleznick, Abraham. "Managerial Behavior and Interpersonal Competence." Behavioral Science, April 1964, 9(2), 155-166.
- Zoffer, H. J. "Restructuring Management Education." Management Review, April 1981, 70(4), 37-41.

APPENDIXES

APPENDIX A

NOMINATION MATERIALS

NOMINATION LETTER

Dear

Current editions of practically every educational publication contain articles on the implications of brain research for curriculum development and teaching-learning styles. It would seem that the area of educational leadership and administration would benefit equally from new discoveries concerning brain processing, and yet little is written connecting this pioneer field to educational administration. For the past two years I have been actively engaged in such research, particularly as it concerns effective leadership styles among educational administrators. I now need your assistance in identifying effective leaders for my study.

Using a reputationl nomination process, I will select a group of 20 superintendents, 20 principals and 20 supervisors as subjects for my study. I am requesting that the organizations who represent or have direct knowledge of these groups submit lists of nominees whom they judge to be among the most effective leaders throughout the state. Final selection of the individual as a participant in the study will depend upon the frequency of his/her nomination. All nominating groups are encouraged to consider effectiveness in the context of the leadership that an individual has exhibited in his/her assigned position. Groups are requested, also, to use Katz Model in ranking each individual nominee according to the degree in which he/she exemplifies each skill listed. (See attachment.)

Your cooperation in supplying me with a list of nominees will be greatly appreciated, as will your efforts in submitting nominees at your earliest convenience. I believe that the results of this study will be of considerable value to the general field of educational administration.

Thank you for consideration of this request. Should you desire to talk with me by phone, I may be reached at 745-2863.

Respectfully,

Cynthia Norris

PRINCIPAL
LEADERSHIP
NOMINATION FORM

Directions: Using the numerals 1,2,3, rank each nominee according to: technical, human, and conceptual skill. (Use each numeral only once).

NAME	T.	H.	C.	SCHOOL SYSTEM
1. _____	_____	_____	_____	_____
2. _____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____
5. _____	_____	_____	_____	_____
6. _____	_____	_____	_____	_____
7. _____	_____	_____	_____	_____
8. _____	_____	_____	_____	_____
9. _____	_____	_____	_____	_____
10. _____	_____	_____	_____	_____
11. _____	_____	_____	_____	_____
12. _____	_____	_____	_____	_____
13. _____	_____	_____	_____	_____
14. _____	_____	_____	_____	_____
15. _____	_____	_____	_____	_____
16. _____	_____	_____	_____	_____
17. _____	_____	_____	_____	_____
18. _____	_____	_____	_____	_____
19. _____	_____	_____	_____	_____
20. _____	_____	_____	_____	_____

RATING DEFINITIONS

SKILLS OF AN EFFECTIVE ADMINISTRATOR

Adapted From:

Katz, Robert L. "Skills of an Effective Administrator,"
Harvard Business Review, Sept-Oct., 1974, Vol. 52, No. 5, 90-102.

Technical Skill: Having analytical skill and knowledge within a specialized field, and being able to incorporate the tools and techniques representative of that field.

Human Skill: Being able to work with people in a perceptive, empathetic manner. Having sensitivity to the needs of others within the organization and taking action in consideration of those needs.

Conceptual Skill: Having the ability to sense the organization as a whole and to perceive the total situation relative to it. The ability to visualize and to creatively move the organization forward.

APPENDIX B

REQUEST FOR SUBJECTS FOR STUDY

REQUEST FOR SUBJECTS FOR STUDY

Dear

You have been nominated by professional organizations as one of the most effective *superintendents in the state. Will you assist me in a doctoral study of innovative management style and its relationship to brain hemisphericity?

If you are willing to become a participant, please do the following:

1. Complete the Herrmann Brain Dominance Survey, which identifies an individual's particular brain hemisphere dominance and provides a profile of unique style differences.
2. Answer the Management Questionnaire which establishes the degree of innovation that one exhibits in his/her assigned position.

As a participant the results of this study will be shared with you, and you will be provided with a copy of your own individual Brain Dominance Assessment and Analysis. All individual test data and evaluation forms will be maintained in a highly confidential manner.

This study should have significant implications for future selection and training of educational administrators and should impact upon the curriculum content and design of educational administration programs. Your cooperation in assisting me with this research will be deeply appreciated.

If you have questions concerning the surveys, or if I can further clarify my purpose in this study, please call me at 615-745-2863.

Thank you for your cooperation and willingness to be a part of this project.

Sincerely,

Cynthia Norris
Coordinator of Special Education

*Used same letter for principals and supervisors, only the position designation was changed.

APPENDIX C

BRAIN DOMINANCE MATERIALS

HERRMANN PARTICIPANT SURVEY FORM

© 1981 Ned Herrmann

DIRECTIONS: Answer each question by writing the appropriate words or marking in the box or space provided. If an answer sheet is provided, use the answer sheet to record your answers for items 5 to 99.

I. BIOGRAPHICAL INFORMATION

1. Name _____ 2. Sex: Male _____ Female _____

3. Educational Focus or Major _____

4. Occupation or Job Title _____

Describe the nature of your work _____

II. HANDEDNESS

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



6. Strength and direction of your handedness: Mark A, B, C, D, or E.

A ☐
Primary LeftB ☐
Primary Left
Some RightC ☐
Both Hands
EqualD ☐
Primary Right
Some LeftE ☐
Primary Right

III. BEST/WORST SUBJECTS

Thinking back to your best/worst subjects in elementary or secondary school please rank the following subjects with a 1, 2, or 3 on the basis of how well you did. Rank all three subjects; 1 is best, 2 is second, 3 is third best. Record your ranks in the boxes, and on the answer sheet, if it is provided.

☐ 7. Math☐ 8. Foreign Language☐ 9. English

IV. WORK ELEMENTS

Indicate your response to each of the work elements below using the following key:

5 = Work I do best of all

3 = Neutral

2 = Work I do poorly

4 = Work I do well

1 = Work I do worst of all

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

V. KEY DESCRIPTORS

Select the eight adjectives which best describe the way you see yourself and mark a "2" by each. Then change a single "2" to a "3" for the adjective which best describes you. Mark the seven "2's" and one "3" on your answer sheet, if it is provided.

26. ___ Logical

27. ___ Creative

28. ___ Musical

29. ___ Sequential

30. ___ Synthesizer

31. ___ Verbal

32. ___ Conservative

33. ___ Analytical

34. ___ Detailed

35. ___ Emotional

36. ___ Spatial

37. ___ Critical

38. ___ Artistic

39. ___ Spiritual

40. ___ Rational

41. ___ Controlled

42. ___ Mathematical

43. ___ Symbolic

44. ___ Dominant

45. ___ Holistic*

46. ___ Intuitive

47. ___ Quantitative

48. ___ Reader

49. ___ Simultaneous

50. ___ Factual

* (Can see the forest as contrasted with the trees)

Brain Dominance Scoring Worksheet

	Left L	Lower Left LL	Lower Right LR	Right R
<u>Scores Using Overlay Scoring Keys</u>				
Side 1 PS				
Side 2 PS				
20 Questions	X		X	
<u>Scores Using Tables 1, 2, and 3</u>				
Best/Worst Subj. (10 pts.)				
Occupation (8 points)				
Educ. Major (6 points)				
Raw Score Totals (Sum numbers in columns)				
Scaled Score (Multiply Raw Score Total by 1.5, or see Table 4)				
Profile code (e.g. 1232) from scale scores				
67 to 100 = 1; 34 to 66 = 2 2 to 33 = 3				
Total Left and Right				
Total Left Score (Left Plus Lower Left Raw Score)				
Total Right Score (Right Plus Lower Right Raw Score)				
MEMO CAPTURE of ADJECTIVE PAIR DATA				

NAME _____ ADDRESS _____

HERRMANN BRAIN DOMINANCE
CONSOLIDATED SCORE SHEET
©1981 by Ned Herrmann

GROUP _____ OCCUPATION _____

MALE _____ FEMALE _____

100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Left Hemisphere Dominance

Right Hemisphere Dominance

KEY DESCRIPTORS

Analitic	Logical	Mathematical	Rational	Critical	Quantitative	Factual
Conservative	Controlled	Sequential	Detailed	Dominant	Verbal (Articulate)	Reader (Technical)
Reader (Personal)	Verbal (Talker)	Intuitive (Feelings)	Symbolic	Spiritual	Musical	Emotional
Spatial	Simultaneous	Synthesizer	Holistic	Intuitive (Solutions)	Artistic	Creative

WORK ELEMENTS

Analitic	Technical Aspects	Problem Solving	Financial Aspects	Organization	Planning	Administrative	Implementation
Teaching/Training	Writing	Expressing Ideas	Interpersonal Aspects	Integration	Conceptualizing	Creative Aspects	Innovating

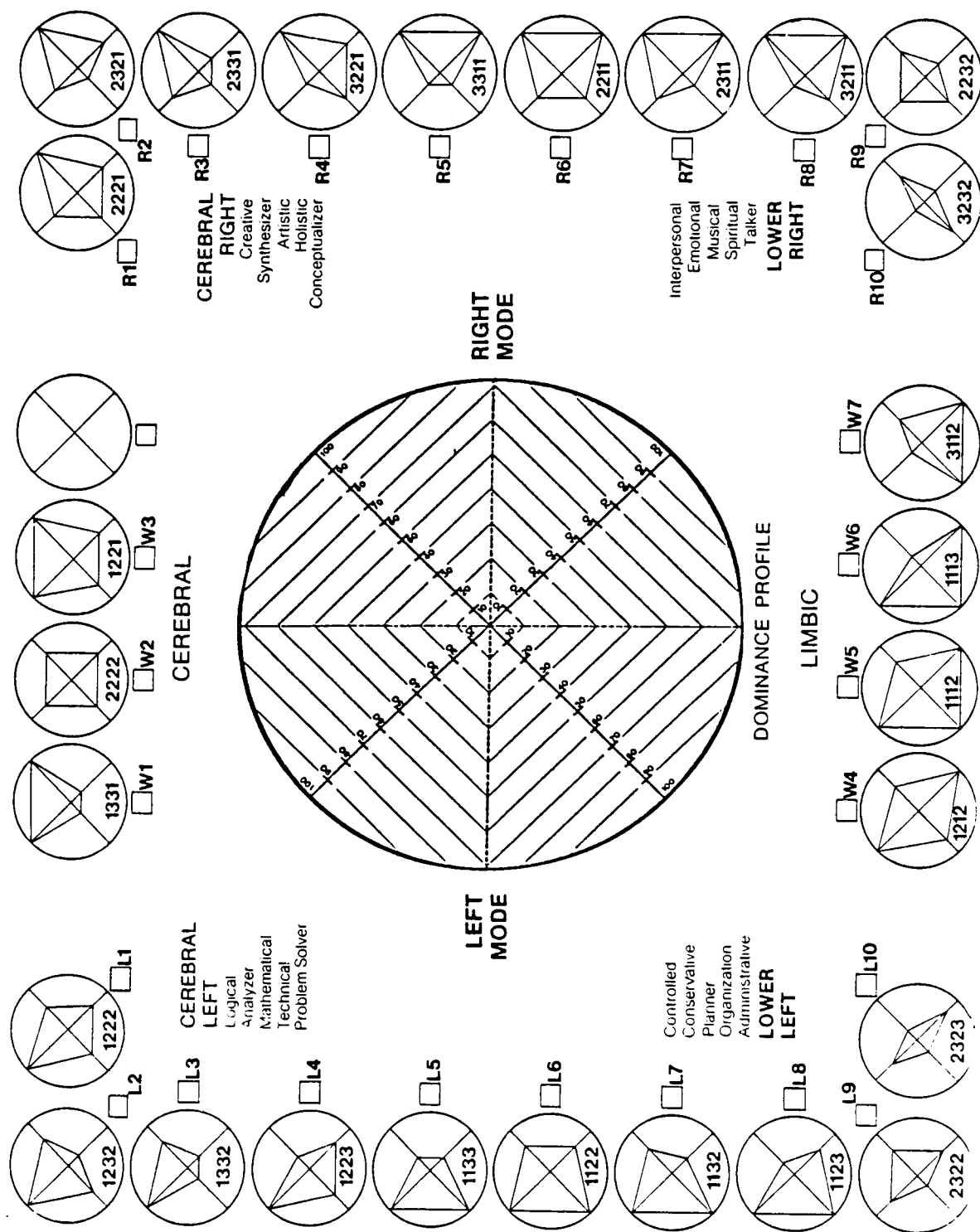
BEST / WORST SUBJECTS

	Math	Math / Foreign Language	Foreign Language	English / Foreign Language	English
EDUCATIONAL MAJOR	L	LL	C	LR	R
OCCUPATION	L	LL	C	LR	R
HOBBIES	L	LL	C	LR	R
LANGUAGE CENTER	Left ☐	Distributed ☐	Right ☐		
HANDEDNESS	Strong Right	Strong Right / Some Left	Mixed	Strong Left / Some Right	Strong Left
MOTION SICKNESS	I	II	III	IV	V
ENERGY LEVEL	Day	Equal	Night		
ADJECTIVE PAIRS	Left ☐	Lower Left	Lower Right	Right ☐	
TOTAL SCALE SCORES	☐	☐	☐	☐	☐

INTROVERT / EXTROVERT

Introvert ☐

Extrovert ☐



HERRMANN BRAIN DOMINANCE INSTRUMENT

SUMMARY OVERVIEW OF BRAIN PROFILE CLUSTERS

1-2-2-2
1-2-3-2
1-3-3-2
1-2-2-3

All these profiles would be logical, analytic, factual, rational, "number" oriented people, such as people involved in accounting, finance, and engineering, such as electrical and nuclear. Out of that group of profiles, 1-3-3-2 would likely be the more creative type.

1-1-3-3
1-1-2-2
1-1-3-2
1-1-2-3

These profiles feature multiple primaries in the left mode and the dominance would be "inner-hemispheric". They would be characterized by a combination of logical, analytic, rational, factual thinking and controlled, conservative, structured, planned, and organized approaches. In summary, quite rational and safe-keeping in behavior. Frequently, persons with these profiles are technically oriented with occupations in both the engineering and manufacturing functions, as well as financial and administrative occupations. This cluster of profiles would be typical of middle managers in American industry, particularly those that have a technical or hardware orientation. These profiles would show a capability for logical, rational problem solving and for orderly, planned administrative capabilities.

1-2-1-1
1-1-2-1
1-1-1-2
2-1-1-1
1-1-1-3
3-1-1-1

These profiles all have the common characteristic of three primaries and/or "inter-hemispheric" dominant. They are differentiated primarily by the quadrant that does not exhibit a

primary. For example, the principle difference between 1-2-1-1 and 1-1-2-1 is that the difference between a secondary in the safe-keeping quadrant or a secondary in the emotional quadrant. But on the whole, these two profiles represent good balance across the brain dominance spectrum.

1-1-1-2
2-1-1-1

These "inter-hemispheric" profiles are mainly characterized by a lower preference in the area of integrating, synthesizing, intuitive, insightful, holistic processing compared with a lower preference for logical, analytic, rational, factual thinking. But again, these two profiles would exhibit excellent balance across the spectrum with one being somewhat more experimental and the other one being somewhat more safe-keeping.

1-1-1-3
3-1-1-1

As opposed to the profiles 1-1-1-2 and 2-1-1-1, these "inter-hemispheric" profiles would show a distinct deficit in the cerebral quadrants. In practical terms, essentially the absence of any preference for synthesizing, integrating, conceptualizing and creative thinking for 1-1-1-3, and in the case of 3-1-1-1, an almost total absence of preferences for logical, analytical, factual modes of thinking.

1-1-1-1

This "inter-" and "inner-hemispheric" profile stands by itself, the only profile with primaries in all four quadrants. Frequently, because the total intensity of preference is shared in the four quadrants, this profile has primaries in the 70-90 range, as opposed to those that might be over 100. In general, the lower the numeric score in any quadrant, the less visible, and therefore, less obvious, the preference for the mode of thinking represented by that quadrant.

1-2-2-1
1-3-3-1

These "inter-hemispheric" profiles have a common characteristic of double primaries in the cerebral quadrants. This would be characterized by preference for more cognitive, intellectual modes as contrasted with the more visceral, emotional modalities

of the two limbic quadrants. The principle difference between the level of secondary or tertiary preference for the two limbic quadrants in the profile 1-2-2-1 would be quite balanced in terms of the whole spectrum and be quite functional in limbic left and limbic right. The profile, 1-3-3-1, would show very little, if any, preference for the two limbic quadrants and thus would be not nearly as balanced.

1-1-1-1 ✓
1-2-2-1 ✓

These profiles are frequently the profiles of presidents and chief executive officers, as well as executive secretaries. This is also true, but to a somewhat lesser extent for profiles 1-2-1-1, 1-1-2-1, 1-1-1-2, and 2-1-1-1.

1-2-1-2
2-1-2-1

These "inter-hemispheric" profiles are characterized by primaries in the diagonal relationships between the cerebral and limbic quadrants. Profile 1-2-1-2 would feature a duality between logical, analytic, rational, factual thinking and emotional, interpersonal, spiritual preferences. This could be almost a dichotomy for the individual and representing a struggle as to which is the most appropriate for any given situation. This general concept also applies to the profile 2-1-2-1 which exhibits a duality between safe-keeping and experimental as contrasted with facts and feelings with 1-2-1-2. The principle issue with the duality of safe-keeping and experimental is the struggle between the need for structure and the desire for openness and no structure. The limbic left representing a very conservative, organized, planned mentality as contrasted with cerebral right which is intuitive, insightful, imaginative, and unplanned or spontaneous.

2-2-2-1
2-3-2-1
2-3-3-1
3-2-2-1

All these profiles exhibit a strong preference for cerebral right thinking modes. This is characterized by integrative, synthesizing, intuitive, insightful, conceptual, holistic thinking, frequently with artistic, imaginative, innovative qualities. The principle difference between these profiles is the degree of secondary or tertiary preferences. Profile 2-2-2-1 is the most balanced of the four and 2-3-3-1, least balanced due

to the clear lack of preference in the two limbic quadrants. All four profiles are typical of entrepreneurs and artists and frequently the profile of people who are thought of as imaginative, creative, innovative people.

3-3-1-1
2-2-1-1
2-3-1-1
3-2-1-1

These "inner-hemispheric" profiles all are featured by double primaries in the right mode. A special characteristic of this cluster of profiles is that above and beyond the specialized qualities of cerebral right and limbic right quadrants, the combination of primaries enhances the intuitive, insightful capabilities of individuals with these profiles, both in terms of feelings and the intuitive approach to problem solving. The principal differences between the profiles in this cluster are the secondaries and tertiaries in the left mode. Profile 3-3-1-1 is almost entirely right brained in its preference with little evidence of logical, analytic, rational processing or controlled, structured, organized mental activities. Profile 2-2-1-1 is the most balanced of the four in terms of moderate, but quite functional left mode processing. All four of these profiles are exhibited by entrepreneurs, artists, and people generally characterized as innovative, imaginative, and creative. Of the four profiles, 2-2-1-1 is the most frequent followed closely by 3-2-1-1.

On an overall summary basis, there are several significant sets of dominance arrangements. In terms of single dominant modes, there are four basic possibilities -- primary cerebral left, primary limbic left, primary limbic right, and primary cerebral right. Persons with these single primaries would be very different from each other in visible ways.

In terms of multiple dominance, there are several sets. There is double dominance in the left mode which consists of primary cerebral left and primary limbic left and there is double dominance in the right mode, consisting of primary cerebral right and primary limbic right. Persons with these two dominance arrangements would be very different from each other and could be found in mirror image occupations, such as middle managers, representing the left mode primaries and entrepreneurs representing the right mode primaries.

Another set of double primaries are those representing the two cerebral quadrants and the two limbic quadrants. The differences between these two is the same order of magnitude as the difference between left mode and right mode with the cerebral

representing the more cognitive, intellectual qualities and the limbic, the more structured, visceral, emotional characteristics. The third set of double dominant are those on the diagonals. In one case, the duality between facts and feelings with a cerebral left, limbic right preference and the other, the difference between safe-keeping and experimental, which characterizes limbic left and cerebral right. In both cases, these profiles are characterized by a duality of essentially equal primaries, pulling in opposite directions.

Another cluster of dominance arrangements involves three primaries. These, on an overall basis, are quite balanced with the imbalance or deficit being represented by the quadrant being least preferred. The final category stands by itself. This is the quadruple primary which represents the most balanced arrangement in terms of the preferences across the brain dominance spectrum.

These 29 profiles represent the highest frequency of profiles out of the theoretical total of 81 possible combinations. Out of this group of 29 profiles, the highest frequency of profiles in the left mode are 1-2-2-2, 1-1-2-2, 1-1-3-2. Similarly, the highest frequency profiles in the right mode are 2-2-2-1, 2-2-1-1, and 2-3-1-1. The highest frequency profiles in the interhemispheric mode are 1-2-2-1, 2-1-1-2, 1-1-1-2, 2-1-1-1, and 2-1-2-1, and 1-2-1-2.

Based on over 6,000 pieces of data, there have not been any profiles without at least one primary in one of the four quadrants. Therefore, one can conclude that individuals do have preferred modes of thinking and that these are frequently represented by primaries with multiple dominance characteristics.

APPENDIX D

PERCEIVED INNOVATIVE MATERIALS

PERCEIVED INNOVATION QUESTIONNAIRE

NAME _____ POSITION _____

This questionnaire is designed to evaluate the management styles of three separate groups: superintendents, principals and supervisors. Please answer each question in relation to your particular position.

PLACE THE NUMERAL PERTAINING TO THE APPROPRIATE RESPONSE ON THE BLOCK ON THE RIGHT.

1. a) Indicate the size of your school system.

- 1 = 1,000 - 4,000
- 2 = 4,000 - 10,000
- 3 = 10,000 - 40,000
- 4 = over 40,000

a) _____

b) How many teachers and/or administrators do you supervise?

- 1 = less than 50
- 2 = 50 - 200
- 3 = over 200

b) _____

THE FOLLOWING QUESTIONS REFER TO SIGNIFICANT CHANGES WHICH HAVE OCCURRED IN YOUR SCHOOL SYSTEM DURING THE PAST FIVE YEARS. A SIGNIFICANT CHANGE IS DEFINED AS AN ALTERATION OF, ELABORATION OF, OR COMPLETELY NEW POLICY, PROCEDURE, OR PROGRAM WHICH HAS IMPACTED UPON AN AREA OF EDUCATIONAL CONCERN WITHIN YOUR LEA.

2. a) Have such changes occurred in your system?

- 1 = yes 2 = no

a) _____

b) How many changes have occurred?

- 1 = 1 - 3
- 2 = 3 - 5
- 3 = 6 - 8
- 4 = 9 - 11
- 5 = more than 12

b) _____

c) How many were the result of your own "visionary planning", or ability to conceptualize and establish goals?

- 1 = none
- 2 = 1 - 3
- 3 = 3 - 5
- 4 = 6 - 8
- 5 = 9 - 11
- 6 = more than 12

c) _____

(1)

- d) Estimate the number of significant changes which resulted from your subordinates ideas.

1 = none
 2 = 1 - 3
 3 = 3 - 5
 4 = 6 - 8
 5 = 9 - 11
 6 = more than 12

d) _____

3. Do your subordinates work with you in formulating an operational plan for the area you supervise?

1 = yes 2 = no

4. Indicate which of the following are included by design and budget in your operational plan.

1 = included 2 = not included

- a) hiring & training of new personnel
 b) plant expansion
 c) curriculum development
 d) new equipment purchases
 e) training & development in new methods/materials
 f) population expansion (i.e. pre school, adult education)
 g) public relations

a) _____
 b) _____
 c) _____
 d) _____
 e) _____
 f) _____
 g) _____

5. In assisting the organization in formulating new goals and directions which of the following do you attempt to identify?

1 = identified 2 = not identified

- a) population trends
 b) economic conditions
 c) political developments
 d) educational trends
 e) funding sources
 f) social trends
 g) research breakthroughs
 h) other, specify _____

a) _____
 b) _____
 c) _____
 d) _____
 e) _____
 f) _____
 g) _____
 h) _____

6. a) In determining new directions, on which of the following do you rely? (List all that apply).

1 = formal needs assessment
 2 = intuitive sense of what is needed
 3 = recommendations of personnel closest to contemplated change
 4 = other, specify: _____

a) _____

- b) Which of the above do you consider of most importance?

b) _____

7. What percentage of your operating budget is devoted to the following? (Use the indicated scale for all categories).
- 1 = 0 - 5%
 2 = 6 - 10%
 3 = 11 - 16%
 4 = 17 - 22%
 5 = over 23%
- a) new projects
 b) consultants
 c) travel
 d) inservice training
- a) _____
 b) _____
 c) _____
 d) _____
8. a) Do you encourage the use of outside consultants to stimulate new ideas?
- 1 = yes 2 = no
- a) _____
- b) If yes, what is your primary consultant source?
- 1 = state department personnel
 2 = university staff
 3 = consulting organizations
 4 = free-lance individuals
- b) _____
9. a) Do you provide opportunities for your staff to share ideas with individuals in similar positions in other localities?
- 1 = yes 2 = no
- a) _____
- b) If yes, which ranges of peer contact do you encourage?
- 1 = county wide
 2 = state wide
 3 = national
- _____
- _____
- _____
10. a) Are you an active member of professional growth organizations?
- 1 = yes 2 = no
- a) _____
- b) If yes, to how many local and state organizations do you belong?
- 1 = 1 - 3
 2 = 4 - 6
 3 = 7 or more
- b) _____
- c) To how many national organizations do you belong?
- 1 = 1 - 2
 2 = 3 - 4
 3 = 5 or more
- c) _____

11. a) Do you encourage professional membership among your subordinates?
 1 = yes 2 = no a) _____
- b) Estimate the percentage of your subordinates who belong to more than three state and national organizations.
 1 = less than 25%
 2 = 25% - 50%
 3 = more than 50% b) _____
12. At the time of hiring, what percentage of your current staff, for whom you made employment decisions, were local residents?
 1 = 50% or less
 2 = 60% - 70%
 3 = 80% - 90%
 4 = 100% _____
13. How long have you been in your current position?
 1 = 0 - 2 years
 2 = 3 - 5 years
 3 = 6 - 8 years
 4 = 9 - 12 years
 5 = 13 years or more _____
14. How would you describe your particular management style?
 1 = more innovative than conservative
 2 = more conservative than innovative _____
15. How would your peers and/or subordinates describe your management style?
 1 = more innovative than conservative
 2 = more conservative than innovative _____

16. Consider the school system, building, or department under your direct supervision. What significant changes (as defined in page one of this questionnaire) have occurred there as the direct result of your initiatory efforts? Indicate the degree of change that has resulted in each area listed below by placing a numeral (3-0) under the column marked "change". Signify the importance of each change to you by placing a numeral (3-0) under the column labeled "importance".

Response	3	2	1	0
<u>Change</u>	Significantly Changed	Moderately Changed	Slightly Changed	No Change
<u>Importance</u>	Extremely Important	Moderately Important	Slightly Important	No Importance

I. External Environment

	Change	Importance
Parental Involvement	_____	_____
Community Relations	_____	_____
Media Support	_____	_____
Interagency Cooperation	_____	_____
Industrial Coordination	_____	_____
Support of Professional Groups	_____	_____
Funding Sources	_____	_____
Relationships with State & Federal Agencies	_____	_____

II. Curriculum Content

Basic Skill Acquisition	_____	_____
Higher-Level Thinking Processes	_____	_____
Affective Development	_____	_____
Social Responsibility	_____	_____
Futuristics/Problem Solving	_____	_____

III. Educational Process

Teaching/Learning Styles	_____	_____
Instructional Technology	_____	_____
Student Evaluation & Accountability	_____	_____

IV. Professional Growth

Staff Development	_____	_____
Professional Standards	_____	_____
Wage & Salary Considerations	_____	_____
Opportunities for Advancement/Significant Contributions	_____	_____

General Comments: _____

References

Perceived Innovation Questionnaire

Sources Used in the Development of the Questionnaire

Question I:

Classification only.

Question II a and b:

Owens (1970); House (1974); Harris (1976); Firestone (1977); Hall (1982); Hodgkinson (1982); Paulson (1982).

Question IIc:

Culbertson (1976); Zaleznick (1977); Mintzberg (1975); Ouchi (1981); Pascale and Athos (1981); Peters (1981).

Questions II d and III:

Osborn (1957); Morphet (1967); Heichberger (1976); Hertzbert (1971); Burns (1978); Maccoby (1981).

Question IV:

Survey of Tennessee public school's educational budget categories.

Question V:

Argyris (1957); Lewin (1958); Gallaher (1965); Zander (1966); Chin and Benne (1967); Owens (1970); Jalango (1978); Bateman (1980).

Question VI:

Rowan (1979); Raudsepp (1981); Dede and Allen (1981).

Question VII:

Refer to question #IV.

Question VIII a and b:

Lippitt (1958); Havelock (1973); Achilles and Norman (1975).

Question IX:

Rogers (1965); Jalango (1978).

Questions X and XI:

Carlson (1965).

Question XII:

Carlson (1965); Rogers (1971).

Section IV, Items 1-4:

Miles (1965); Klein (1967); Watson (1967); Chin (1967); Orlasky and Smith (1972); Rutherford (1978); Dede and Allen (1981).

SCORING KEY

I. Innovation in current position

Question	High (3)	Flexible (2)	Moderate (1)
2(c)	answers 4,5,or 6	2 or 3	1
4	all items	5 - 7	less than 5 items = 1
5	7 or 8 items	5 or 6 items	less than 5 items = 1
6(a)	3 - 4 items	2 - 4 items	less than 2 items
(b)	#2	#1 and 3	#1 only
7(a)	#4 - 5	#2 - 3	#1
(b)	2 - 5		#1
(c)	4 - 5	#2 - 3	#1
(d)	4 - 5	#2 - 3	#1
8(a)	#1		#2
(b)	#3 or 4	#2	#1
9(a)	#1		#2
(b)	#1,2,3	#1,2	#1
11(a)	#1		#2
(b)	#3	#2	#1
12	#1	#2 or 3	#4
15	#1		#2

II. Involvement of others in the
organization in innovation and
new directions

Question	(20 points) HIGH	(10 points) FLEXIBLE	(5 points) MODERATE
2(d)	#3 - 6	#2	#1
3	#1		#2
6(a)	#1, 3, 2	#1 + 3	#1
(b)	#3	2	#1
9(a)	#1		#2
(b)	#3 must be included	#1 and 2	#1
11(a)	#1		#2
(b)	#3	#2	#1
III. Innovative "tone" in personality	(20 points) HIGH	(10 points) FLEXIBLE	(5 points) MODERATE
6(a)	#2	#1 or 3	#1
(b)	#2	#3	#1
10(a)	#1		#2
(b)	#3	#2	#1
(c)	#3	#2	#1
13	#1 or #2	#3 or #4	#5
14	#1		#2

IV. Innovative Results

Question 16(a): Amount of Change

3 points HIGH	2 points FLEXIBLE	1 point MODERATE	0 points IMPOVERISHED
------------------	----------------------	---------------------	--------------------------

score

TOTAL

(b) Personal Importance
attached to change

3 points HIGH	2 points FLEXIBLE	1 point MODERATE	1 point IMPOVERISHED
------------------	----------------------	---------------------	-------------------------

score

TOTAL

APPENDIX E

LETTER TO RANDOM SAMPLE SUPERINTENDENTS

LETTER TO RANDOM SAMPLE SUPERINTENDENTS

Dear

Will you assist me in a doctoral study of educational management style and brain hemisphericity? Your name was one of the 20 selected by a random sampling of all superintendents in the State of Tennessee.

As one of the 20 selected superintendents, will you complete the Herrmann Brain Dominance Survey? This survey identifies an individual's particular brain hemisphere dominance and provides a profile of unique style differences related to one's dominance.

Your individual test data will be maintained in a highly confidential manner. As a participant, the results of this study will be shared with you, and you will be provided with a copy of your own individual Brain Dominance Assessment and Analysis.

In light of recent brain research and the implications for education, this study should have significant value, and your cooperation in assisting me will be greatly appreciated. Should you not wish to be a part of this study, please signify by return of these forms. If the forms are not returned, I will assume you plan to participate. If you have questions concerning the test or its directions, please call me at 745-2863.

Thank you for your cooperation and willingness to be a participant in this study.

Sincerely,

Cynthia Norris
Coordinator of Special Education

VITA

Cynthia Jeanette Norris, daughter of David and Juanita Hudson, was born on July 7, 1937 in Chattanooga, Tennessee. She attended Ooltewah Elementary School and Ooltewah High school where she graduated in May, 1955. During the period from 1955 to 1967, she briefly attended Carson Newman College in Jefferson City, Tennessee, married Joseph Leon Norris and had two daughters: Sherry and Dayna.

In 1967 she graduated with a Bachelor of Science degree in elementary education from Tennessee Wesleyan College in Athens, Tennessee. She taught in the public schools of Athens and Chattanooga for a period of ten years.

In August, 1975 she received her Master of Science degree in Special Education from The University of Tennessee, Knoxville. Emphasis in the areas of learning disabilities and gifted education enhanced both her knowledge as well as interest in brain functions and the development of human capabilities.

In 1974 she became Director of Special Education for the Athens City Schools where she served for ten years and was instrumental in creating and developing a comprehensive special education program in a system where there had not previously been such a program. During this time she authored several federal grants including: (1) a project in gifted education, LIVE (Leaps Into Vital Environments) which emphasized right brain approaches to the development of creative potential among the academically gifted and (2) SKIP (Strengthening

Kindergarteners via Intervention Procedures) designed to identify and remediate developmental weaknesses among kindergarten students.

In 1980 the author entered the doctoral program in the Department of Educational Leadership at The University of Tennessee, Knoxville. She served an internship in the fall of 1981 with the Tennessee Valley Authority where she surveyed the management development process among industrial engineers. This experience served to reinforce a collateral in the Department of Industrial Management. She received the Doctor of Education with a major in Educational Administration and Supervision in August, 1984.

In July 1984 she was named Principal of the Westside Elementary School in Athens becoming the first woman to serve as a principal in the school system in over 40 years.

The author is a member of Phi Kappa Phi, Phi Delta Kappa, American Society for Training and Development, Association for Supervision and Curriculum Development, and the National Association of Elementary School Principals.