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A Study of Field Dependence-Independence, Selected Curricular Choices and Preferred Guidance Strategies of Adult, Evening College Students

Richard Donald DeCosmo

Loyola University Chicago

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A STUDY OF FIELD DEPENDENCE-INDEPENDENCE, SELECTED CURRICULAR CHOICES AND PREFERRED GUIDANCE STRATEGIES OF ADULT, EVENING COMMUNITY COLLEGE STUDENTS

by

Richard D. DeCosmo

A Dissertation Submitted to the Faculty of the School of Education of Loyola University of Chicago in Partial Fulfillment of the Requirements for the Degree of Doctor of Education

January

1977
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To my wife, Jane, and all my children I owe a special thanks for their support, tolerance and encouragement over these many years.

To Ethel Henderson, my secretary, I would like to express my thanks for her dedication and perseverance.

Finally, I owe a debt to many friends who have encouraged and supported me in this endeavor.
VITA

Richard Donald DeCosmo, the author, was born on January 13, 1934, in Detroit, Michigan to Alice and Dominic DeCosmo. He attended elementary and secondary schools in the public schools system of that same city and graduated from Edwin Denby High School in January, 1952. He entered the University of Detroit in January, 1952, and graduated cum laude with a Bachelor of Philosophy degree in January, 1956. His undergraduate major was political science. In 1958, he earned a Master of Arts degree from the University of Detroit with a major in Political Science. In 1967, he won a National Defense Educational Act Grant to attend an institute in community college student personnel work at California State University at Los Angeles. In 1969, he was accepted into the doctoral program in the guidance and counseling department at Loyola University of Chicago. There he studied student personnel work in higher education with additional studies in counseling, measurement and evaluation, documentary research and the philosophy of education.

Mr. DeCosmo began his career by teaching in the public school system in East Detroit, Michigan from 1956 to 1958. In 1958, he was hired to teach political science at Macomb County Community College, Warren, Michigan. He was appointed director of admissions in 1961, and dean of student services in 1964 and held that position until March, 1968 at that same college. In 1968, he was employed as the
first dean of student personnel services at Moraine Valley Community College. From 1974 to the present, he has been the executive vice president at Moraine Valley Community College.

Mr. DeCosmo has been actively involved in several professional organizations. He has been a member of Commission XI of the American College Personnel Association, regional representative of the Commission for Student Development of the American Association of Junior and Community Colleges, and vice president and president of the Illinois Association of Community College Administrators.

Mr. DeCosmo is married to Jane, and they have six children: Christine, Janice, Marian, Paul, Carolyn, and Joseph.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>ii</td>
</tr>
<tr>
<td>VITA</td>
<td>iii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td>CONTENTS OF APPENDICES</td>
<td>ix</td>
</tr>
<tr>
<td>Chapter</td>
<td></td>
</tr>
<tr>
<td><strong>I. THE PURPOSE OF THE STUDY</strong></td>
<td>1</td>
</tr>
<tr>
<td>Study Objectives</td>
<td>12</td>
</tr>
<tr>
<td>Definitions</td>
<td>15</td>
</tr>
<tr>
<td>Study Limitations</td>
<td>19</td>
</tr>
<tr>
<td>Assumptions</td>
<td>19</td>
</tr>
<tr>
<td>Summary</td>
<td>20</td>
</tr>
<tr>
<td><strong>II. REVIEW OF THE LITERATURE</strong></td>
<td>21</td>
</tr>
<tr>
<td>Learning Behavior</td>
<td>22</td>
</tr>
<tr>
<td>Educational-Vocational Choice</td>
<td>33</td>
</tr>
<tr>
<td>Field Dependence-Independence, Age and Sex</td>
<td>42</td>
</tr>
<tr>
<td>Summary</td>
<td>46</td>
</tr>
<tr>
<td><strong>III. PROCEDURES</strong></td>
<td>48</td>
</tr>
<tr>
<td>Population and Sample</td>
<td>48</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>53</td>
</tr>
<tr>
<td>Data Analysis Procedures</td>
<td>58</td>
</tr>
<tr>
<td>Summary</td>
<td>64</td>
</tr>
<tr>
<td><strong>IV. ANALYSIS OF DATA</strong></td>
<td>66</td>
</tr>
<tr>
<td>The Sample Group</td>
<td>66</td>
</tr>
<tr>
<td>Tests of Hypotheses</td>
<td>69</td>
</tr>
<tr>
<td>Summary</td>
<td>101</td>
</tr>
</tbody>
</table>
V. SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS... 103

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Methodology</td>
<td>103</td>
</tr>
<tr>
<td>Study Results</td>
<td>105</td>
</tr>
<tr>
<td>Conclusions</td>
<td>109</td>
</tr>
<tr>
<td>Implications</td>
<td>114</td>
</tr>
<tr>
<td>SELECTED BIBLIOGRAPHY</td>
<td>118</td>
</tr>
<tr>
<td>APPENDIX A</td>
<td>123</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Classes in Each Program Area</td>
<td>50</td>
</tr>
<tr>
<td>2. Validity Coefficients (GEFT)</td>
<td>56</td>
</tr>
<tr>
<td>3. Classifiable and Unclassifiable Subjects by Program Area</td>
<td>68</td>
</tr>
<tr>
<td>4. Age Distribution by Sex</td>
<td>69</td>
</tr>
<tr>
<td>5. Age and Sex</td>
<td>72</td>
</tr>
<tr>
<td>6. Age and Cognitive Style</td>
<td>73</td>
</tr>
<tr>
<td>7. Sex and Cognitive Style</td>
<td>74</td>
</tr>
<tr>
<td>8. Three Variable Combination Table: Age, Sex and Cognitive Style</td>
<td>75</td>
</tr>
<tr>
<td>9. Age and Cognitive Style for Subjects Indicating a Curricular Preference</td>
<td>78</td>
</tr>
<tr>
<td>10. Age and Curricular Preference</td>
<td>79</td>
</tr>
<tr>
<td>11. Comparison Table Using Ryan's Procedure for Age and Curricular Preference</td>
<td>81</td>
</tr>
<tr>
<td>12. Age and Curricular Preference</td>
<td>83</td>
</tr>
<tr>
<td>13. Cognitive Style and Curricular Preference</td>
<td>84</td>
</tr>
<tr>
<td>14. Comparison Table Using Ryan's Procedure for Cognitive Style and Curricular Preference</td>
<td>86</td>
</tr>
<tr>
<td>15. Cognitive Style and Curricular Preference</td>
<td>87</td>
</tr>
<tr>
<td>16. Three Variable Combination Table: Age, Cognitive Style and Educational-Vocational Program</td>
<td>88</td>
</tr>
<tr>
<td>17. Age and Decision Status</td>
<td>90</td>
</tr>
<tr>
<td>18. Cognitive Style and Decision Status</td>
<td>91</td>
</tr>
<tr>
<td>19. Cognitive Style and Age for All Subjects</td>
<td>92</td>
</tr>
<tr>
<td>Table</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>20.</td>
<td>Three Variable Combination Table: Age, Cognitive Style and Decision Status</td>
</tr>
<tr>
<td>21.</td>
<td>Age and Choice Satisfaction for Decided Students</td>
</tr>
<tr>
<td>22.</td>
<td>Cognitive Style and Choice Satisfaction for Decided Students</td>
</tr>
<tr>
<td>23.</td>
<td>Age and Most Preferred Strategies for Undecided Students</td>
</tr>
<tr>
<td>25.</td>
<td>Age and Least Preferred Guidance Strategies for Undecided Students</td>
</tr>
<tr>
<td>APPENDIX A</td>
<td>Personal Data Blank</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER I

THE PURPOSE OF THE STUDY

Within higher education today there is a growing awareness of the presence and importance of adult students who are beyond the age of the traditional undergraduate students of the past. As this awareness creeps into the consciousness of colleges and universities, they expand the educational opportunities for this growing segment of their enrollment. Perhaps colleges and universities have been spurred on by declining enrollments of traditional college age students, or, perhaps these expanded opportunities are an altruistic attempt to respond to the numerous educational needs of adults within a rapidly changing society. But for whatever the reason, they are responding to the need to retrain, refresh and prepare adults in occupational areas as well as the need to help members of the society use leisure time more constructively as work weeks shorten and life-span increases. There is a growing recognition that "Learning in the society at large is a way of life, all through life, and will become more so. Continuing adaptation to ever-evolving conditions is increasingly necessary." ¹

This awareness led the National Advisory Council on Adult Education\textsuperscript{2} to recommend that the federal government should encourage the expanded use of educational facilities and programs for adults, and the establishment of programs of substance for senior citizens.

Feeling these needs, adults beyond the conventional college age are enrolling in ever increasing numbers. In 1972 the American Council on Education stated that "... most students in many institutions are over the age of legal majority and carry all responsibilities."\textsuperscript{3} Mayhew\textsuperscript{4} has estimated that evening, adult enrollment in many colleges is larger, sometimes twice as large, as the day enrollment of the more "typical" college student. The picture can be more fully seen if one examines the results of a special nationwide survey of adults. This study revealed that some thirty-two millions of them participated in some formal learning experiences during the study year. In addition it was projected that eighty million adults wanted to participate in some type of formal learning.\textsuperscript{5} While many of these adults were


\textsuperscript{5}Abraham Carp, Richard Peterson and Pamela Roelfs, "Adult Learning Interests and Experiences," Planning Non-Traditional Programs, p. 49.
enrolled, or will enroll, in programs outside of higher education, growing number of them will enroll in colleges and universities. As this age group becomes fertile ground for colleges whose old fields are worn out, their presence in institutions of higher education will increase even more rapidly.

While many segments of higher education are seeking and enrolling adult students, community colleges are doing so as part of their very reason for existence. Across the country community colleges have experienced great numbers of adults who wish to return to the classroom. O'Bannion estimated that over thirty percent of the entering community college students were beyond the traditional age for undergraduates. Ruyle and Geiselman found in a national survey of colleges and universities that "Nineteen out of every twenty community colleges report seeking adult students--more than any other type of institution." There is no doubt that the enrollment of this portion of the community will continue to increase in community colleges across the nation.

Nevitt Sanford has predicted that "... by 1980, counselors, deans and other specialists in student personnel will have discovered that one of the best things to do about students--singly or in the

---


7 Janet Ruyle and Lucy Ann Geiselman, "Non-Traditional Opportunities and Programs," Planning Non-Traditional Programs, p. 53
mass—is to study them." This prediction and admonishment by Sanford takes on added significance for the older community college student. Few studies have been done which describe adult students enrolled in community college programs.

Most of the research found by this author relates to adult college students enrolled in four year colleges. Those studies which do exist on community college adult students tend to focus on their service needs rather than on substantive needs or personality characteristics. These latter topics could be useful in planning programs, developing teaching and counseling strategies or improving administrative policies for their benefit. In reference to adult learners Comfort found that the extent of hard research was minimal. Also, "Community colleges attract a higher proportion and a greater diversity of older students than any other type of institution in the educational core..." 10

As a result of these factors counselors have little to work with in helping adult students select appropriate programs, courses


and vocational goals. The traditional tools used by community college counselors have not been adequately tested for their applicability to older students. Eason found that in trying to predict performance "Traditional admission criteria related to high school and prior college performance were non-valid predictors of the adult students performance."11

While some interest inventories have promise for use with adult students, research on their applicability is necessary. Andrews, for example, found in a study of adult part-time community college students that Holland's theory of personality and vocational choice was supported for this age group. "From the personality-job comparisons, significant results were obtained to support Holland's premise that people search out environments and, hence, vocations that are compatible with their personalities."12 Traditional college ability tests are all normed on younger students who fit the more conventional college age group (17-22). For a variety of reasons these tests may not be useful predictors of older students' performance. Because the norms for these tests are based on young adults, they are not properly applied to older adults. Further, many older adults are very unfamiliar


with this type of testing, whereas younger adults have taken many similar tests throughout their schooling. Finally, the most commonly used tests depend heavily on knowledge and skills which are directly school related. Older adults who have been away from school for some period of time are "rusty" in those two areas. They may have similar ability as the younger students but need "refreshment" before they can compete on the same basis.

Mastery learning and cognitive style.

In relation to the present movement toward mastery learning techniques and concepts within the community colleges, tests of ability, intelligence, or aptitudes do not appear to be particularly helpful. In speaking of tests of general ability, intelligence, and aptitude, Glaser states that they "... are not designed to determine the different ways in which different students learn best, to measure the basic processes that underlie various kinds of learning, nor to assess prerequisite performance required for learning a new task."\(^{13}\)

For these reasons, there has been increasing interest in the notion of cognitive style. Glaser maintains that "Current lines of research indicate that a fruitful approach is the conceptualization of individual difference variables in terms of the process constructs of contemporary theories of learning, development, and human

performance."\textsuperscript{14} This approach is what has come to be called cognitive style. Cross notes that even though research on cognitive style is twenty-five years old, "... its application to education is quite new and frankly experimental."\textsuperscript{15} She sees it as another dimension of the current interest in mastery learning: "There are at least two major approaches to our latest frank acceptance of individual differences in learning. One acknowledges differences in the amount of time required by individual learners; the other recognizes differences in learning styles."\textsuperscript{16}

Mastery learning projects have taken away time constraints and are beginning to vary modes of instruction. Cognitive style research can be useful in planning alternate learning strategies. The results of research in this area have given evidence of its potential usefulness in education. Witkin asserts that:

The past two and a half decades have seen a vast amount of research on what have come to be known as "cognitive styles." While relatively little research has been done, compared to what is possible and needed, it is already clear that cognitive style is a potent variable in students' academic choices and vocational preferences; in students' academic development through their school career; in how students learn and teachers teach and in how students and teachers interact in the classroom.\textsuperscript{17}

\begin{flushleft}
\textsuperscript{14}Ibid. p. 91.
\textsuperscript{16}Ibid. p. 7.
\end{flushleft}
The term "cognitive style" has been variously defined by many researchers in the field. Witkin has defined it as "... characteristic modes of functioning that we show throughout our perceptual and intellectual activities in a highly consistent and pervasive way."¹⁸ Messick defines it as "unconscious habits that represent an individual's typical modes of perceiving, thinking, remembering, and problem solving."¹⁹

Kagan, Moss and Sigel believe that cognitive styles are "stable individual preferences in mode of perceptual organization and conceptual categorization of the external environment."²⁰ While their definitions differ in exact wording, they do have common elements. They all reflect a stability and pervasiveness over time and behavior. Each definition also includes the element of individual preferences or tendencies in information processing. Related to these definitions of cognitive styles is the position taken by such researchers as Witkin, Messick and Kagan that cognitive style is distinguished from ability. Specifically, Messick²¹ claims a difference in emphasis, polarity, stability, and consistency.

¹⁸Ibid. p. 7.


and intellectual origins.

**Emphasis:** Cognitive style emphasizes typical behavior while the measurement of ability emphasizes problem solving under optimum conditions.

**Polarity:** Ability dimensions are unipolar, but cognitive style dimensions are bi-polar.

**Value:** Ability dimensions are heavily value laden but cognitive styles have value differentiation only as a function of situation and task.

**Intellectual Origins:** The concept of ability has come out of education; a relationship between the measurement of abilities and the application of ability measurement in education. Cognitive styles have come out of the psychological laboratories from concepts of personality theory.

The studies done by many different researchers within this framework have led to the following dimensions of cognitive style:

1. Field independence versus field dependence: A global versus articulated continuum
2. Scanning
3. Breadth of Categorizing
4. Conceptualizing Styles
5. Cognitive Complexity versus simplicity
6. Reflectiveness versus impulsivity
7. Leveling versus sharpening
8. Constricted versus flexible control
9. Tolerance for incongruous or unrealistic experiences

**Field dependence-independence.**

The most widely researched dimension of cognitive style is the field dependent-independent dimension identified by Witkin and his
colleagues. The early research methods used to assess this construct consisted of the rod and frame test (RFT) and the body adjustment test (BAT). The rod and frame test consisted of a "square frame, coated with luminous paint, and a rod, pivoted at the same center as the frame, also coated with luminous paint." The subject is placed in a darkened room and the rod and frame are tilted. The subject is asked to return the rod to an upright position with the frame remaining in the tilted position. In the body adjustment test the subject is seated on a chair in a room. The chair and room can be tilted in the same fashion as in the RFT. The subject is asked to adjust his body to the upright position. In both cases the researchers found marked differences in individual performance. Further, individuals were consistent in their performance over several trials. Some individuals consistently approximated the upright position regardless of the tilt of the frame or room, others could not. A third method used to assess this characteristic was the embedded figures test (E.F.T.). The E.F.T. presents a simple figure to each subject who must find that simple figure in a complex design. "For some people, the sought-after simple figure more or less 'pops out' of the complex design, whereas others are not able to find it in the three minutes allowed for search." Witkin reports that if "the same subjects are tested in these three situations, we find that the person who tilts


23 Ibid. p. 4.
the rod far toward the tilted frame is likely to be the person who
tilts his body far toward the tilted room, and he is likely to be the
person who takes a long time to find the simple figure in the complex
design. Presently, there is available a group form of the Embedded
Figures Test which makes testing on a large scale practical for further
research.

The extensive research using these various tests and ones similar
to them has led Witkin to assert:

There is now a good deal of evidence that this style extends
into other psychological domains, beyond cognition. Persons who
are relatively field dependent or field independent are also
different in important personal characteristics. For example,
the person who, in the laboratory, is strongly influenced by the
immediately surrounding visual framework in his perception of an
item within it, is also likely, in social situations, to use the
prevailing social frame of reference to define his attitudes,
his beliefs, his feelings, and even his self-view from moment
to moment. So, if you substitute for the square wooden frame a
social frame of reference, and for the stick an attribute of the
self, such an attitude or a sentiment, then indeed there is con­
tinuity in what a person is likely to do, across both laboratory
perceptual situations and social situations.25

There is a growing amount of evidence which indicates that this
dimension of cognitive style has specific behavioral correlates impor­
tant to educators. This study will explore a few of these cor­
relates in relationship to the growing numbers of students aged 22
and older enrolled in a community college.

24 Ibid. p. 5.

25 Ibid. p. 8.
Study Objectives

Colleges are experiencing an increase in older adult students and are particularly interested in attracting this age group. Coupled with this trend is a growing interest in implementing the concepts associated with mastery learning. Since cognitive style research is particularly related to mastery learning, research findings in this area may have implications for both teaching-learning and guidance strategies. However, little research has been done to determine the applicability of cognitive style for this population.

The specific purposes of this study are to determine the relationship of field dependence-independence to the curricular choices, choice satisfaction and the most/least preferred guidance strategies of older adult students enrolled in evening classes in a community college. If a strong relationship is found, then recommendations can be made for both teaching and counseling strategies. If a strong relationship is not found, then the significance of this dimension of cognitive style can be questioned in relation to the population being studied.

Specific objectives.

In order to meet these basic purposes, the following are the specific objectives of this study:

1. Previous research has suggested that there is a relationship between field dependence-independence and sex and age. This study
will determine whether a relationship exists between these variables. If sex or age are related to field dependence-independence, this finding will be taken into account in the analysis of the data related to the remaining objectives.

2. Research by other investigators has indicated that the choice of certain courses and educational programs is related to the cognitive styles of field dependence-independence for other populations. This investigation will determine whether this is true for older adult community college students enrolled in evening credit courses.

3. In previous studies undecided students have been found to be more field dependent than decided students. Another objective of this study is to determine if this also holds true for the population proposed here.

4. While no previous study has asked about the satisfaction of students in relation to their educational decision, there is some evidence that field-independent students make more realistic choices. This could lead to greater dissatisfaction for field dependent students with their curricular choice. This study will determine if there is a relationship between satisfaction or dissatisfaction and field dependence-independence in regard to educational choice for the older adult student.

5. There are a number of studies which illustrate the relationship of the learning environment and learning for field dependent-independent subjects. Since guidance strategies related to educational choice are essentially teaching-learning strategies, this
study will determine the relationship of field dependence-independence and preference for selected guidance strategies among undecided students within the group being studied.

**Hypotheses.**

The hypotheses of this study are based upon the earlier research from other populations. They are stated as null hypotheses.

1. No association will be found for the characteristics of field dependence-independence as measured by the GEFT in relation to sex and age in this population.

2. No association for the characteristics of field dependence-independence as measured by the GEFT and curricular preference will be found in the population being studied.

3. No association for the characteristics of field dependence-independence as measured by the GEFT will be found in relation to decided or undecided subjects in regard to curricular preference in the population being studied.

4. No association for the characteristics of field dependence-independence and satisfaction-dissatisfaction with curricular choice will be found in the population being studied.

5. No association for the characteristics of field dependence-independence and most/least preferred guidance strategies will be found among undecided students in the population being studied.
Definitions

This study uses a number of different terms and procedures. The following list is designed to acquaint the reader with these terms and their definitions.

Cognitive style. "Unconscious habits that represent an individual's typical modes of perceiving, thinking, remembering, and problem solving." 26

Field independence. On the articulated-global continuum, this represents the articulated extreme. Those who experience in an articulated fashion are more able to perceive items as discrete from their prevailing field. Further, they are able to impose structure on a field that has little inherent structure. 27 Therefore, the person is less dependent on the prevailing field. This has led some researchers to conclude that field independent persons are aware of a greater differentiation between self and non-self, and possess a more internal frame of reference than those at the opposite end of the continuum. 28


For the purposes of this study, high scoring subjects on the group form of the Embedded Figures Test (GEFT) will be classified as field independent. Based on the norm tables in the manual, males who score 16-18 and females who score 15-18 are high scoring (4th quartile) and will be classified as field independent.\(^{29}\)

**Field dependence.** In contrast to field independence, this is the global extreme of the articulated-global continuum. Those who experience in a more global fashion are less able to perceive items as discrete from their background. They also use fewer mediators such as analysis or structuring. Therefore, persons at this end of the continuum are more dependent on the surrounding field. As a result researchers believe that they have a self less differentiated from non-self, and have a more external frame of reference than those at the opposite end of the continuum.\(^{30}\) Low scoring (1st quartile) subjects on the GEFT will be classified as field dependent. According to the norm tables in the manual, males who score 0-8 and females who score 0-9 are in the 1st quartile and will be classified as field dependent in the study.\(^{31}\)

**Adult evening students.** Persons enrolled in college credit programs who are 22 years of age or older and who are registered for


classes starting at 5:00 p.m. or later at Moraine Valley Community College will make up the population for this study.

Curricular preferences. Curricular preferences will be identified according to the names used in the Moraine Valley Community College catalog. These preferences will be collapsed into eight categories as follows:

1. Business Management (2 year occupational program)  
   Business Mid-Management  
   Marketing Mid-Management
2. Business-Technical (1 & 2 year occupational programs)  
   Accounting & Computing  
   Data Processing
3. Mechanical & Engineering Technologies (1 & 2 year occupational programs)  
   Electronics  
   Drafting & Machine Design  
   Power Machine Technology
4. Public Service - Education & Social Science Related (1 & 2 year occupational programs)  
   Child Care  
   Exceptional Education  
   Human Services  
   Teacher Aide
5. Public Service - Public Safety Related (2 year occupational programs)  
   Police Science  
   Fire Science
6. Science (1st 2 years of 4 year program)  
   Majors in biology, chemistry, physics, mathematics, engineering, pharmacy, pre-medicine, nursing and related fields.
7. Liberal Arts (1st 2 years of 4 year program)  
   Majors in social sciences, humanities, speech, elementary education, pre-law, pre-social work and related fields.
8. Business (1st 2 years of 4 year program)  
   Majors in accounting, management, personnel, finance and other related fields.
Three-way chi-square. The three-way chi-square is a test of association for three independent variables. The procedure examines the total association of these variables and also the association between the three possible two-way combinations. Two different three-way chi-squares are used in this investigation. The first is a 2x2x2 design. There are three variables with two levels of each. The second is a 2x2xa design. In this design, two variables have two levels, and the third variable has more than two levels. The advantage of this procedure is that the interaction of the three variables is studied.

Yules Q. This statistical measure is used to determine the strength of the association found between two independent variables with two levels of each variable. There are conventions for Yules Q which make it convenient to use in determining the strength of an association between two variables. In this study, Yules Q was used when a 2x2 chi-square was found to be significant at the .05 level of probability.

Ryan's Procedure. A statistical procedure which allows pairwise comparisons in a 2xa chi-square design. It is used when the overall chi-square in a 2xa design is significant. This statistical procedure is useful in determining which classificatory variables of the independent variable with more than two levels are contributing most to the finding of significance.
Study Limitations

There are several factors which will serve to limit the findings of this study. First, the data will only be applicable to the older adult evening students at Moraine Valley Community College during the 1975-76 academic year. Younger two-year college students may differ from the group being studied. No extension of these results to other community college sub-populations can be made. Further, no extensions can be made to populations enrolled in other types of institutions of higher education.

No effort was made to control for race, religion, or socio-economic status. The generalizability of this study to situations or groups not characterized by similar background is not as sound as the generalizability of the study to representative groups of similar background.

Also, the population and sample was limited to eight curricular areas. Results should not be generalized to other curricular areas not represented in this study.

Assumptions

For the purposes of this study the investigator has made three assumptions. First, the subjects will answer the questions on the personal data blank carefully and honestly. Second, the subjects will do as well as they can on the group form of the Embedded Figures Test (GEFT). Third, the GEFT accurately measures field dependence-independence.
Summary

Adults 22 years of age and older are enrolling in increasing numbers in community colleges. In addition, community colleges are becoming more and more involved in learning paradigms based upon mastery learning concepts. Cognitive style is closely related to mastery learning theory. This study investigated the association of the cognitive style of field dependence-independence to curricular choice, satisfaction with curricular choice and the most/least preferred guidance strategies for undecided students.

Chapter two will report studies representative of those related to learning, educational-vocational choice, sex and age. Chapter three will outline the procedures followed in conducting this investigation. The analysis of the data will be presented in chapter four. Finally, chapter five presents a summary of the findings, conclusions and recommendations.
CHAPTER II

REVIEW OF LITERATURE

The cognitive style dimension of field dependence-independence has been the subject of much research by Herman Witkin and his colleagues over the past thirty-five years. In addition, many other researchers have investigated the relationship of this cognitive style and an extensive list of other aspects of human behavior. In a bibliography compiled by Witkin, et al,\(^1\) over 1,500 such studies are listed. Among these studies are many that have examined educational correlates to this cognitive style dimension.

Perhaps the most promising and exciting prospects for a cognitive-style approach lie in the field of education. While relatively little research has been done, compared to what is possible and needed, it is already clear that cognitive style is a potent variable in students' academic development through their school career; in how students learn and teachers teach, and in how students and teachers interact in the classroom.

While it is beyond the scope of this study to review all of the studies related to these educational correlates, it is important to review the


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findings of: (1) studies illustrative of those related to learning behavior, (2) studies dealing with educational-vocational choice and (3) related studies which could effect the outcome of this investigation. These latter findings relate to the association of field dependence-independence, sex and age.

Learning Behavior

Social Content.

Many studies have investigated the association of field dependence-independence and the ability to learn material with social content. The findings of several of these studies indicate that field dependent subjects are more attentive to the social surroundings than are field independent subjects. In testing this hypothesis several studies used an incidental learning paradigm. The design of these studies indicated that the subjects were not to be instructed to learn the desired material. The material to be learned was part of the social surroundings of the subjects but not relevant to the task they were performing at the time the social material was present. Crutchfield, et al, using such a paradigm found that field dependent army officers were better at remembering the faces of fellow officers at an army assessment

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center who were with them for a few days than were field independent officers. Messick and Demarin\(^4\) also used a similar incidental learning design. Field dependent subjects recalled significantly more faces than field independent subjects. The subjects used in this study were 40 students enrolled at a large metropolitan university. However, Adcock and Webberley\(^5\) found that when subjects were instructed to learn faces beforehand there was no significant difference between field dependent and independent subjects. On the basis of the evidence, then, learning faces was not a function of greater ability to do so, but a function of greater attention to the social surroundings.

Within another incidental learning design Fitzgibbons, Goldberger and Eagle\(^6\) found similar results with 30 female college students when they measured the recall of words with social content. Subjects in the study were asked to perform a specific task by one of the experimenters. While performing this task, a "plant" on the other side of a screen called out a series of words with social or neutral content. In the absence of prior directions to do so, field dependent subjects recalled significantly more words with social content than did field


independent subjects. However, in the recall of words with neutral content there was no significant difference between the two groups.  

Ruble and Nakamura measured the effects on learning of social cues among 7 to 10 year old children. The social cue consisted of the experimenter looking repeatedly at and leaning slightly toward the card containing the correct answer. In one trial both the social cue and directions were relevant in determining the correct answer. In another trial only the social cue was given, and in a third trial only the directions were given. When both cues were present, they found no significant difference between the performance of field dependent and field independent subjects. When only the social cue was given, field dependent children did significantly better. In another part of this study the children were asked to assemble an object. The experimenter assembled the object after the directions were given and left it assembled for a brief period of time. Glancing behavior of the children during the task was measured. Significant difference between the glancing behavior of field dependent and field independent subjects was found. Field dependent children looked more often at the experimenter himself while field independent children looked more often at the assembly of the object. Once again this study confirmed the greater attentiveness of field dependent subjects to the social surroundings.

In reviewing the results of these studies, it is easy to agree with Witkin that:

The implications of these findings for the classroom are apparent. Because of their social orientation relatively field-dependent children are apt to be particularly adept at learning and remembering materials that have social content.

However, when the material is brought to the level of awareness through the directions of the experimenter, the advantage held by field dependent subjects appears to be reduced. It would appear that once teachers could be made aware of this phenomenon they could easily compensate for it in the teaching-learning process.

Reinforcement.

Witkin's description of field-dependent persons, or persons with a more global cognitive style, as being more dependent on external referents for self definition anticipates the findings concerning social content. It also leads to the prediction that field dependent subjects will respond more to social reinforcement than will field independent subjects:

On this basis we may expect that field dependent students would be more likely to require externally defined goals and reinforcements than field-independent students who tend to have self-defined goals and reinforcements.

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9 Ibid. p. 29.
Several studies have explored the effects of reinforcement on subjects with each of these cognitive styles. Some of these studies concerned approval or disapproval as forms of reinforcement. Konstadt and Forman 10 determined that both field dependent and field independent children did significantly poorer on a task under conditions of disapproval than under approval. Further, a significant difference was found between the children of differing styles under the disapproval conditions. Field dependent subjects were hindered more by disapproval than were field independent ones. In fact, field dependent children scored significantly poorer on a second trial in spite of practice on the task if disapproval followed approval. This was not found in the results for field-independent children. However, in a study of high school juniors Fitz 11 found that field dependent subjects did better when censured than they did with praise or under control conditions. He explained that this was probably due to the field dependent subjects greater desire to please the experimenter and receive praise from him.


Ferrell\textsuperscript{12} found that candy and verbal punishment significantly increased the performance of negro pre-school children in an experimental group over that of a control group. He also found that field dependent children were more responsive to the effects of reinforcement. Field independent children did better than field dependent ones prior to the onset of reinforcement. However, once reinforcement began the field dependent children caught up and surpassed the response rates of field independent subjects.

In still another study of the effects of reinforcement on children, Steinfeld\textsuperscript{13} discovered that abstract rewards produced the best results for field independent subjects. They performed significantly better with an abstract reward than they did with either praise or a material reward. Further, they performed significantly better under the abstract reward condition than did field dependent subjects.

The results of a study by Paclisanau\textsuperscript{14} with 1st, 2nd and 3rd

\begin{itemize}
  \item \textsuperscript{12}Jack G. Ferrell, "The Differential Performance of Lower Class Pre-School, Negro Children as a Function of the Sex of E, Sex of S, Reinforcement Condition, and the Level of Field Dependence," \textit{Doctoral Dissertation Abstracts International}, 32, 30288-3029B.
  \item \textsuperscript{13}Stephanie L. Steinfeld, "Level of Differentiation and Age as Predictors of Reinforcer Effectiveness," \textit{Doctoral Dissertation}, Hofstra University, 1973. \textit{Dissertation Abstracts International}, 34, 2912B-2913B.
  \item \textsuperscript{14}Marianne I. Paclisanau, "Interacting Effects of Field Dependence, Stimulus Deprivation and Two Types of Reinforcement Upon Problem-Solving in Elementary School Children," \textit{Doctoral Dissertation}, Temple University, 1969, \textit{Dissertation Abstracts International}, 31, 2290B-2291B
\end{itemize}
grade children indicated that the field dependent subjects could only learn the task within the experiment when an extrinsic social reward was present. The effect of stimulus deprivation was also studied and the experimenter concluded that stimulus deprivation, or stress, accentuated the characteristic cognitive style of a subject under the reinforcement condition congruent to that style. An extrinsic social reward, however, produced better results for both field dependent and independent subjects.

Whatever the effect, negative or positive, the studies mentioned above give evidence that praise, criticism or other forms of external social reward or punishment have a significantly greater effect on field-dependent than on field-independent subjects. Field independent subjects performed better with intrinsic non-social rewards than did field dependent subjects. In addition to these studies of reinforcement, other studies have examined different programmed learning reinforcement techniques to determine if they also have a differential effect.

Renzi\textsuperscript{15} predicted that feedback and field dependency would interact to produce differential effects on performance achievement. The subjects of this study were urban eastern liberal arts and education college students. He found that the performance of field independent subjects was not influenced significantly by the presence or absence

of feedback. However, field dependent subjects did significantly better when feedback was provided in the programmed text. Schwen, in a slightly different version of this same type of study, used a "large-step" programmed text and a "small-step" branching version of the same text with a sample group of college students. He found that when the large-step version was used field independent subjects performed significantly better than field dependent ones. In this version, the subjects were left to monitor their own learning. However, no significant difference was found between field dependent subjects and field independent subjects when the small-step, branching program containing feedback was used. In this version, the programmed text monitored the learning through the tests at the end of each small-step.

All of these studies support the conclusion that reinforcement does have a differential effect on the performance of persons who are field dependent or independent. While the studies described differ on whether praise or criticism produce more achievement, they are consistent in pointing out that field dependent subjects do better with external social reinforcement than do field-independent subjects. Further, feedback within the context of programmed learning seems to produce more learning for field dependent subjects than they achieve without such feedback.

However, many of the studies involve young children. Therefore, a ready application to college students is not possible. Older subjects might not be as affected by praise or criticism for example as are younger subjects. More research to support or reject the findings of these studies needs to be done with college students of all ages.

**Use of mediators in learning.**

The investigations which focused on programmed learning by Renzi and Schwen also relate to another issue in the learning behavior of field dependent-independent subjects. Witkin maintains that field independent persons make use of mediators such as structuring and analysis in the learning process:

Frequently in learning, the materials to be learned lacks clear inherent structure, creating the requirement that the learner himself provide organization as an aid to learning. Field-dependent persons are likely to have greater difficulty in learning such material compared to field-independent persons who are more likely themselves to provide the mediating structural rules that are needed to facilitate learning. On the other hand when the material to be learned is presented in an already organized form, so that structuring is not particularly called for, field-dependent and field-independent people are not likely to differ in their learning.

In the Renzi and Schwen studies, the programmed learning text was most effective for field dependent subjects when it was the most organized. Field independent subjects did better when they were called upon to supply their own organization to the material presented.

In another investigation Fleming, et al.\textsuperscript{18} included trials in which the material to be learned was either structured or unstructured. He found that when the structure was absent from the beginning field independent subjects recalled significantly more words than did field dependent subjects. When the words to be learned were structured from the beginning, there was no significant difference in the recall of field dependent and field independent subjects.

Koran, Snow, and McDonald\textsuperscript{19} conducted an interesting experiment using 121 teacher interns in the Stanford Teacher Education Program as subjects. They used video-modeling of desired teaching behavior with one group, written-modeling with the next and no modeling with a control group. With field dependent and independent subjects, both the written and video modeling produced significantly better results than did no modeling. Further, the video-modeling produced significantly better results than did the written-modeling procedure. However, field independent students did as well with either video or written modeling techniques. Field dependent students, on the other hand, learned the desired skills better with the video-modeling than with the written-modeling procedure. The authors explained these last results by stating that the video modeling procedure was a


\textsuperscript{19}Mary Lou Koran, Richard E. Snow, Frederick J. McDonald, "Teacher Aptitude and Observational Learning of a Teaching Skill," Journal of Educational Psychology, 1971, 62, pp. 219-228.
was a concrete representation of the teaching skill to be learned and that it provided "a behavioral representation for the learner that he could not generate for himself if given the written-modeling treatment."20 The field independent subjects appeared to make use of a mediator not readily used by field dependent subjects in order to learn as easily from written or video-modeling procedures. They appeared able to analyze the written material and create in their mind a representation of the skill to be learned.

In summary, then, field dependent subjects appear to be more attuned to their social surroundings and learn social content better than field independent subjects especially in incidental learning paradigms. Further, extrinsic, social reinforcement appears to have greater effect on the learning of field dependent persons. Lastly, field dependent subjects have more difficulty learning unstructured materials probably due to their lack of the use of mediators in learning such material.

Field independent subjects, on the other hand, seem to be less affected by extrinsic, social reinforcement but more affected by intrinsic or abstract reinforcers. They tend to be more task oriented than people oriented. Lastly, they learn unstructured materials better than field dependent subjects. They appear to use mediators such as structuring and analysis as an aid to learning even when these mediators are not present in the material itself.

20 Ibid. p. 226.
Educational Vocational Choice

The research on educational-vocational choice and field dependence-independence is a logical extension of the research on learning behavior. If persons with a defined cognitive style learn better under different conditions, with different content or using different strategies, then it seems to follow that they are more likely to favor some vocations or educational programs over others. Again, Witkin in his review of the literature on this general area concludes that:

No surprisingly, a consistent finding of most of these studies is that more field-independent students favor domains in which analytical skills are called for whereas more field-dependent students avoid such domains. Examples are the sciences (physical and biological), mathematics, engineering, technical and mechanical abilities, etc.

Equally clear is the strong preference of more field-dependent students for domains that feature interpersonal relations and in which day-to-day work requires involvement with people. Examples are social sciences, rehabilitation counseling, elementary school teaching, "persuasive" activities (that is, those requiring dealing and meeting with people and promoting projects or things to sell), the humanities, office managing, and selling real estate.

For the purposes of this investigation, it is important to explore some of the studies that led Witkin to these conclusions.

Vocational interests and field dependence-independence.

Using a sample of 140 male university freshmen and sophomores,

Pierson$^{22}$ explored the relationship between field dependence-independence and vocational interests as measured by the Strong Vocational Interest Blank (SVIB). Pierson found that field independence was significantly related to physical science and technical interests positively but negatively to sales and verbal-linguistic interests. The conclusion Pierson drew from that study was that "In sum, field independence dispositions tended to be associated with interests in 'impersonal' types of occupations, with field dependence more interpersonal concerns."$^{23}$

Arbuthnot and Gruenfeld$^{24}$ also explored the relationship of educational-vocational interests and field dependence-independence. In their study, they used a sample consisting of 55 male freshmen engineering students. The investigators hypothesized that increasing field independence would be associated with increasing interest in analytical, abstract areas such as physics and decreasing interest in the less abstract, analytical areas such as humanities. The interest scale used was from the Opinion, Attitude and Interest Survey (QAIS).


$^{23}$ Ibid. p. 876.

Both the Rod and Frame Test (RFT) and the Group Embedded Figures Test (GEFT) were used to measure field dependence-independence. They found that there was a significant relationship between field dependence-field independence and measured interests in the predicted direction. They also found that the RFT results were predictive but that the GEFT results were not.

Within a larger study, Scheibner also looked at the relationship between cognitive style and measured vocational interests. Her sample group consisted of 193 university students enrolled at Temple University's Ambler Campus. The instruments used were the Occupational Interest Inventory-Higher Education and the Thurstone Embedded Figures Test (TEFT). Scheibner found that field independent males scored significantly higher on math, analytical and research interests and scientific interest scales. Field dependent males scored significantly higher on welfare interests. For female subjects field independence was positively associated with the literary verbal score. Field dependent females did not score significantly higher on any key. Scheibner also investigated two other issues. She found that the measured vocational interests of field independent subjects was more in agreement with vocational goals than was the case for field dependent subjects. Further, field independent men had significantly higher achievement in college than field dependent men. For women there was no significant differences.

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However, in another study of the relationship of vocational interests and field dependence-independence, Osipow\(^26\) found that there was no significant relationship between field dependence-independence and scores on the Vocational Preference Inventory (V.P.I.) among college students enrolled in selected curricula.

Zytowski, Mills and Poepe\(^27\), using the individual form of the Embedded Figures Test (EFT) and the Sophistication of Body Concept Test, also failed to find the expected relationship between selected scales of the SVIB and EFT scores. They did find that the results of the Sophistication of Body Concept Test produced a relationship similar to that found by Osipow.

Some of the studies discussed above indicate that there is a significant relationship between measured vocational interests and the cognitive styles of field dependence-independence especially for male students. However, some studies found no such relationships. The results are mixed, but the weight of the available evidence suggests that measured vocational interests and field dependence-independence are related.

One problem that occurs in applying the findings is that all of the subjects in the studies are university students enrolled in


eastern universities. Because this group is a select and relatively homogeneous sample of higher education, the results from these studies cannot be readily extended to other areas or types of colleges. This problem could be especially true in considering the implications of this research for community college students. Further, with the expansion of higher education to include post secondary educational programs of less than the baccalaureate level, the question naturally arises as to the applicability of these findings to students enrolled in these programs. Also, when the ages of the subjects are given, it is apparent that they are mostly within the more traditional college going age group (17-22).

All of these studies relate to measured vocational interests. While they are useful for the type of student studied, interests or preferences are not the same as the actual choice behavior made by students of each cognitive style. These latter behavioral choices are examples of "harder" decisions than are inventoried interests.

Educational choice and field dependence-independence.

Osipow\(^{28}\) in the study cited earlier also examined the relationship between educational program choice and field dependence-independence. Within his female sample, nursing students were moderately field dependent, home economics students were somewhat field dependent, home economics students were somewhat field dependent,

dental hygienists were field independent and special education students were field dependent. Male students enrolled in pharmacy and fisheries technology were somewhat field independent. Undecided female students were the most field dependent group in his study.

DeRussey and Futch\textsuperscript{29} chose a random sample of 16 men and 16 women enrolled in selected undergraduate programs. One group of eight men and eight women was drawn from the areas of math, chemistry and physics. The other group consisted of eight men and eight women drawn from the liberal arts. They found that the male science-math group was the most field independent group, and the female liberal arts group was the most field dependent group. The female science-math and the male liberal arts group were nearly equal in regard to field-independence. They concluded that sex and curriculum functioned additively in predicting field independence or field dependence for a given program. However, they did not report the amount that each factor contributed to that prediction.

In a variation on the educational program choice theme, Barrett and Thornton\textsuperscript{30} studied 50 male engineers and technicians and 11 male college students (none of whom were engineering or physical science majors). They compared these two groups with Witkin's standardization

\textsuperscript{29}Edith A. DeRussey and Emily Futch, "Field Dependence-Independence as Related to College Curricula," Perceptual and Motor Skills, 1971, 33, pp. 1235-1237.

group on the Rod and Frame Test (RFT). The male college students did not differ from Witkin's standardization group, but the engineers and technicians group was significantly more field independent than either the college male group or Witkin's norm group. The investigators in attempting to explain the differences found stated:

It is possible that termination of education as a primary activity and the accepting of the responsibilities of adulthood may be an environmental factor which favorably affects the ability to handle successfully independence and the novel problem solving found in such a role. Such a change may, in fact, affect perception. It should be noted that Witkin's adult male sample was composed entirely of college students. The aforementioned factors which are concomitant with this period of life may yield responses that are not at all typical of adults in general. Even to say that college males may have assimilated the major properties of "adulthood" and can therefore be classed as "adult males" may not be justified.  

This latter discussion of the differences found raises a serious question of the applicability of the results of most of the studies in this area for adults older than the typical college age who have assumed the major roles of adulthood. However, the study by Barrett and Thornton did find a significant association between field independence and engineering.

In a different type of study, Clar 32 analyzed certain aspects of the vocational choice behavior of 29 male college students who voluntarily sought vocational counseling at a college counseling center.

31 Ibid. p. 792.

In a complex design involving the EFT, Sophistication of Body Concept Test, SVIB, OAIS, the Edwards Personal Preference Schedule (EPPS) and counselor ratings, Clar found that the more field dependent clients had comparatively more diffused vocational interests and were more vocationally undecided at the termination of counseling than were the more field independent clients. This study also found that the more field independent clients expressed more realistic initial vocational choices, made statements implying more self-reliance in presenting problems and had scientific occupational interests.

Chung\textsuperscript{33} studied the relationship between academic choice behavior and cognitive style. His sample included 141 students enrolled at the Nashville University Center who were either juniors, seniors or first year graduate students. The Group Embedded Figures Test (GEFT) was used to determine field dependence-independence. He found that there was a significant association between this cognitive style and the academic area chosen by the students. Chung concluded that:

Cognitive style measures appear to provide an effective way of predicting appropriate college academic areas, if included among the predictor variables and used in conjunction with other\textsuperscript{34} variables such as intellectual ability and vocational interests.


\textsuperscript{34} Ibid. p. 56
Critique of studies on educational-vocational choice.

All of the studies cited indicated a significant relationship between the academic choice behavior and the field dependence-independence of the subjects. It would seem that a strong case can be made for the application of these findings. However, some problems exist in extending these findings. First, all of the groups studied are university groups. Therefore, extending the results to community college students or any other dissimilar group without further study is not wise. Further, the variety of curricula involved is not comprehensive enough to take into account programs of post-secondary education which were not included in the studies cited. This, again, would be particularly true for students enrolled in curricula which are less than baccalaureate length. The one and two year occupational programs which exist in community colleges have not been examined to determine if similar results would be obtained.

A second problem relates to the method of classifying students as field dependent-independent. In many cases, Schiebner and Chung for example, a given portion of the extreme scoring subjects within the sample group are called field dependent or independent. In the Schiebner study the highest and lowest 25% are used. Chung used those that differed by \( \pm .20 \) standard deviation from the group mean. This procedure if applied to a sample of uniformly low scoring or high scoring subjects could produce misleading results.

Third, the age of the students involved in the studies relating to vocational interests and academic choice is in a relatively narrow
range. Few subjects in any of the studies reached beyond the more
typical college age (17-22). In only the Barrett and Thornton study
were a significant number of post college age adults included. That
study considered only engineers and technicians. It would appear that
few, if any, of these subjects were engaged in any formal college
study at the time. However, since this type of data was not reported
in the literature it cannot be said with certainty that they were not
so enrolled. Barrett and Thornton raise the question of the relation­
ship between assuming adult roles in society and scores on a test of
perception to determine field dependence-independence. Since the
community colleges are enrolling large and increasing number of
older adult students who have assumed "adult" roles, this question
is very important in applying the concept of field dependence-independ­
ence to these students. Further, intervening experiences could over­
come the influence of cognitive style on vocational choice behavior
for older students. Also, much of the literature on adult education
claims that adult students enrolled in colleges or other types of
formal schools are more "independent" than younger students. While
the reference is not directly to cognitive style, the question raised
by Barrett and Thornton is made more relevant by the prevailing attitude
among adult educators.

Field dependence-independence, age and sex.

Several studies have explored the relationship of field dependence­
independence with either age or sex. Some of these studies have found
that there is a difference in cognitive style among males and females.
Other studies have found that age and field dependence-independence are related. However, not every study which considered either of these two issues have discovered such associations. The following studies serve to illustrate the findings in these two areas.

Sex.

In the manual for the Embedded Figures Tests it is stated that:

Consistent sex differences have repeatedly been found in the field-dependence dimension. Boys and men tend to be more field independent than girls and women. Small but consistent sex differences have been observed in the EFT, and in other tests of field dependence, both in the United States and a number of Western European countries (e.g., Andrieux, 1955; Bennett, 1956; Franks, 1956; Wit, 1955), and in Hong Kong (Goodnow, unpublished study), Japan (Kato, 1965), Israel (Rothman, unpublished study), Sierra Leone, Africa (Dawson, 1967a, 1967b) and Nigeria (O Konyi, 1969) as well. The weight of the present evidence indicates that sex differences may not be present before the age of eight or in geriatric groups.

For college students, DeRussey and Futch in the study reported earlier found that sex and curriculum functioned additively in relation to this cognitive style. The amount that sex contributed to that association was not reported. However, Ruble and Nakamura in studying 2nd and 3rd grade children observed no sex difference between field dependent and independent subjects.


Schwartz and Karp\textsuperscript{38} looked for an association between sex and field dependence-independence within a larger study. They studied three groups of subjects: (1) 17-19 year olds, (2) 30-39 year olds, and (3) 58-80 year olds. In analyzing the data for the three groups, the investigators found that men in the 17-19 and 30-39 year old groups were significantly more field independent than were women in those same groups. Within the geriatric group (58-80 years old) no significant difference between males and females was found.

Messick and Demarin\textsuperscript{39} studied 50 subjects with an average age of 21.7 years. The group was made up of 40 male and 10 female subjects. They found no significant difference between the male and female subjects on field dependence-independence. They reasoned, however, that the small number of females in the sample group could have accounted for their finding of non-significance.

While the weight of the evidence may suggest basic sex differences on this dimension of cognitive style, there are studies in which no significant difference by sex was found. This investigator must agree with Schiebner who feels that some failure to find much differences "raises questions as to . . . the extent and genuineness of basic sex differences.


differences in perceptual style."\textsuperscript{40} For this reason, this investigation has explored the relationship between sex and cognitive style.

Age and field dependence-independence.

Schwartz and Karp\textsuperscript{41} explored the relationship of age and cognitive style in a cross sectional study. The hypothesized that field dependence increases throughout adulthood into old age. They based this hypothesis on the following line of reasoning:

Cross-sectional and longitudinal studies of children and young adults suggest that individuals proceed longitudinally from more field-dependent perception and less developed levels of differentiation toward greater field independence and differentiation with age. This trend seems clear up to the late teens. For the 17-24 year period, results are somewhat ambiguous. While a longitudinal group continued to increase in field-independence, cross-sectional groups did not, suggesting a possible reversal of the earlier age trend. Such results have stimulated the present study which was designed to provide initial information on differentiation in old age.\textsuperscript{42}

The study design contained three groups: (1) 17, (2) 30-39, and (3) 58-80. The 17 year old group was made up of 23 male and 23 female native born, middle class, college bound high school students. The 30-39 year old group consisted of 20 male and 20 female subjects. It included high school graduates, subjects with some college training, subjects with some college training,


\textsuperscript{42}Ibid. p. 496.
a variety of occupations and was middle class. The 58-80 year old group consisted of 17 male and 17 female subjects who were primarily foreign born, collecting social security, educated in europe and rarely exceeded grammar school level. The investigators found that there was a significant difference between the groups for both men and women in field dependence. The older the group the more field dependent the performance. Karp in an earlier study had discovered that for a geriatric group (age 60-90) there was a similar pattern. He found, in general, the older the subjects the more field dependent they were.

In the manual for the Embedded Figures Test, the authors state:

At some point beyond 24 years of age the process of increasing field dependence begins; the limited evidence now available from cross-sectional studies suggests that this point may be somewhere in the late 30's, after which the rate of change toward greater field dependence accelerates.

Admittedly, the evidence is limited. Few studies appear to address this phenomenon.

Summary

This chapter has reported studies on the cognitive style dimension of field dependence-independence illustrative of those related to


learning, educational-vocational choice, sex and age. In general, previous research on learning indicates that field dependent subjects are better at attending to the social surroundings whereas field independent subjects are more task oriented. Field independent subjects are motivated more highly by intrinsic motivation while field dependent subjects learn better under conditions of extrinsic motivation. Finally, field independent subjects use mediators such as structuring and analysis more than do field-dependent subjects when these mediators are not present in the material to be learned.

In relation to educational-vocational choice, field independent subjects have interests and choose educational-vocational programs related to the more analytical domains. Field-dependent subjects' interests and program choices favor the more "people-oriented" domains. Further, undecided students are more likely to be field-dependent than field-independent.

The research indicates a small but persistent difference between males and females. Males tend to be more field independent than are females.

In regard to age, the limited research available indicates that for adults, field dependence increases with age particularly beginning with the late thirties.

Chapter three describes the procedures, instruments and statistics used in this study.
CHAPTER III

PROCEDURES

Population and sample.

The population for this study was comprised of students 22 years of age and older enrolled in classes which began at 5:00 p.m. or later at Moraine Valley Community College. The classes were related to eight program areas which included five occupational and three college transfer program categories. The following list shows the program area and the specific curricula included in each area:

<table>
<thead>
<tr>
<th>Program Area</th>
<th>Curricula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Business Management (2 year occupational program)</td>
<td>Business Mid-Management</td>
</tr>
<tr>
<td></td>
<td>Marketing Mid-Management</td>
</tr>
<tr>
<td>2. Business-Technical (1 &amp; 2 year occupational programs)</td>
<td>Accounting &amp; Computing</td>
</tr>
<tr>
<td></td>
<td>Data Processing</td>
</tr>
<tr>
<td>4. Public Service - Education &amp; Social Science Related (1 &amp; 2 year occupational programs)</td>
<td>Child Care, Exceptional Education, Human Services, Teacher Aide</td>
</tr>
<tr>
<td>5. Public Service-Public Safety Related (2 year occupational programs)</td>
<td>Police Science, Fire Science</td>
</tr>
<tr>
<td>6. Science (1st 2 years of 4 year program)</td>
<td>Majors in biology, chemistry, physics, mathematics, engineering, pharmacy, pre-medicine, nursing and related fields.</td>
</tr>
<tr>
<td>7. Liberal Arts (1st 2 years of 4 year program)</td>
<td>Majors in social sciences, humanities, speech, elementary education, pre-law, pre-social work and related fields</td>
</tr>
</tbody>
</table>
8. Business (1st 2 years of 4 year program) Majors in accounting, management, personnel, finance and other related fields.

Using the official evening class schedule, all the classes related to each area were compiled in lists and numbered sequentially. Using a calculator which generated random numbers, a random sample of classes was chosen from each area. The number chosen from each area was selected to meet the following criteria: (1) the resulting number of usable subjects should be large enough to meet the frequency requirements of the various chi-squares to be used, (2) the number of sections within each program area, when chosen randomly, would obtain a fair cross-section of students within each area and (3) the number of sections chosen would produce similar numbers of subjects among the various programs. It was decided that three classes would be picked for each of the five occupational program areas and two for each of the three transfer program areas. Finally, one additional class in each program category was drawn at the same time as the initial selection. These additional classes were to be tested in case the number of usable subjects appeared to be insufficient to meet the demands of the chi-square used. With the chi-square statistic used in this study such a procedure is permissible. The possibility existed that both age and sex could have been associated with cognitive style. This would have necessitated splitting the data in various ways and computing the chi-square statistic for each. Because of the scarcity of useable female subjects discovered during the data collection phase in most program categories, the investigator decided to use the additional
classes. The following table shows the number of classes in the population and the number selected and used in the data collection phase.

**TABLE I**

**CLASSES IN EACH PROGRAM AREA**

<table>
<thead>
<tr>
<th>Area</th>
<th>Total No. of Courses</th>
<th>No. of Courses in Sample</th>
<th>No. of Subjects by Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Business-Management (2 year occupational program)</td>
<td>15</td>
<td>4</td>
<td>32 11</td>
</tr>
<tr>
<td>2. Business-Technical (1 &amp; 2 year occupational programs)</td>
<td>22</td>
<td>4</td>
<td>23 16</td>
</tr>
<tr>
<td>3. Mechanical &amp; Engineering Technologies (1 &amp; 2 year occupational programs)</td>
<td>13</td>
<td>4</td>
<td>34 0</td>
</tr>
<tr>
<td>4. Public Service-Education &amp; Social Science Related (1 &amp; 2 year occupational programs)</td>
<td>10</td>
<td>4</td>
<td>6 33</td>
</tr>
<tr>
<td>5. Public Service-Safety Related (1 &amp; 2 year occupational programs)</td>
<td>20</td>
<td>4</td>
<td>47 4</td>
</tr>
<tr>
<td>6. Business (1st 2 years of 4 year program)</td>
<td>16</td>
<td>3</td>
<td>23 12</td>
</tr>
<tr>
<td>7. Liberal Arts (1st 2 years of 4 year program)</td>
<td>41</td>
<td>3</td>
<td>13 14</td>
</tr>
<tr>
<td>8. Science (1st 2 years of 4 year program)</td>
<td>3</td>
<td>3</td>
<td>18 12</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>150</strong></td>
<td><strong>29</strong></td>
<td><strong>196 102</strong></td>
</tr>
</tbody>
</table>

Note: There were 12 unusable subjects not included in this table.
In classifying classes by program area a problem of overlap occurred. The classes necessary for Business-Transfer program are also necessary for either the Business-Technical or Business-Management programs. However, this same overlap did not occur between the Business-Technical and Business-Management programs. To solve this problem, the investigator first classified the courses into the Business-Technical and Business-Management categories and a sample was drawn from each. Then a composite list was made of those classes on each of the first two lists which were necessary for the Business-Transfer program and which were not chosen in the first drawing. Since the subjects were classified by the program indicated on the Personal Data Blank rather than on the basis of the course in which it was administered, this overlap would not effect either their placement or the results of the study.

The selection of courses and sections produced the following list:

<table>
<thead>
<tr>
<th>Program Area</th>
<th>Business-Technical related</th>
<th>Business-Management related</th>
<th>Industrial Technology - Mechanical and Engineering related</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Business 142 - Introduction to Accounting</td>
<td>Business 130 - Principles of Marketing</td>
<td>Electrical Engineering Technology 106 - Electronic Devices and Circuits</td>
</tr>
<tr>
<td></td>
<td>Data Processing 101 - Introduction to Data Processing</td>
<td>Business 236 - Real Estate Fundamentals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*Data Processing 102 - Introduction to R.P.G.</td>
<td>*Business 136 - Business Law</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Power Machines Technology 105 - Power Transmission Basics
*Drafting 115 - Assembly Drawing, Machine Design and Specifications

Public Service-Safety related
Police Science 105 - Criminology
Fire Science 101 - Principles of Fire Science and Equipment
Fire Science 106 - Fire Suppression Apparatus
*Police Science 102 - Principles of Security and Loss Prevention

Public Service-Education and Social Service related
Human Services 101 - Introduction to Social Work
Exceptional Education 105 - Principles of Behavior Management
Teacher Assistance 102 - Supervisory Methods
*Human Services 102 - Public and Private Welfare Agencies

Business-Transfer
Business 142 - Introduction to Accounting
Business 136 - Business Law
*Business 143 - Accounting Principles

Liberal Arts-Transfer
Literature 222 - English Literature II
Sociology 104 - Introduction to Anthropology
*Psychology 101 - Introduction to Psychology

Science-Transfer
Math 150 - Analytic Geometry and Calculus I
Physics 151 - Electricity, Magnetism and Light
*Biology 111 - General Biology I

*Sections drawn to be tested if usable N for each curriculum appeared to be low.

Two additional sections were picked randomly from the entire list as pilot groups: Psychology 201-Human Relations, and Police Science 203-Police Administration.

It must be kept in mind that the students were actually classified into program areas on the basis of the specific program in which they reported they were enrolled on the Personal Data Blank. The courses and sections selected in the random sample was simply a device for getting a random sample of students enrolled in each program area.
They served no other purpose. They were chosen randomly to protect against any bias that might be introduced if they were chosen in any other manner. This procedure achieved as random a sample of students enrolled in each program as is possible on such a large scale in the real educational process.

In all, fifteen individual curricula were represented within the eight program categories. The undecided group was drawn from the entire set of sample classes. This classification was simply made up of those students enrolled in the sampled classes who reported that they had not decided on a specific program. In all, 298 students completed the Personal Data Blank and the GEFT in 26 different course sections. The testing took place over a four week period starting three weeks before and one week after the mid-semester break. The pilot groups were tested one week prior to the testing of the groups picked for this study.

**Instrumentation**

**Personal Data Blank.**

The Personal Data Blank was used as a data gathering instrument. It asked for name, date of birth, date of administration, sex, present occupation, status of program choice at the time of administration, satisfaction with program choice and most/least preferred guidance strategy (available at MVCC) if the subject was undecided in regard to program choice (See Appendix A, Page ). Thus, it was a self-reporting instrument. It was felt that this would be the most accurate and current
method of obtaining information about curricula relative to each subject. Because of the ease of movement between curricula in a community college, official records are frequently out of date for individual students. Therefore, a current self-report would be more accurate than official records which are updated only on a sporadic basis. Further, this was the only practical way that a large number of students could be asked about preferred guidance strategies or program choice satisfaction. It was assumed that the subjects would answer the questions carefully and honestly.

The Group Embedded Figures Test.

The Group Embedded Figures Test (GEFT) grew out of the work by Witkin and his colleagues in the area of cognitive style and personality assessment. The original studies used the Rod and Frame Test (RFT), the Portable Rod and Frame Test (PRFT) and the Body Adjustment Test (BAT) all of which are described in Chapter I. The theory behind these tests rested on the idea of differentiation of an object from its field or, stated differently, its independence from its field. This led the researchers to the notion that a paper and pencil test which relied on this theory would produce the same results. As a result the Embedded Figures Test (EFT) was devised. This test asked the subject to identify a simple geometric figure within a larger, more complex figure. The EFT was individually administered with the examiner recording the number of seconds it took the subjects to find the "embedded" figure. It was found that there was a high consistency in the subjects' mode of performance on all three tests (RFT, BAT, EFT).
Reflecting in each case the strong influence of the immediately surrounding field upon the way in which one of its parts is perceived, the person who takes very long to discover the simple figure in the complex EFT design is also likely to tilt the rod far toward the tilted frame and his own body far toward the tilted room."

The EFT, while determined to have a relatively high reliability and validity, is an individually administered test. To enable such wide scale testing, Witkin and his colleagues developed a group form of this same test. The group form of the test (GEFT) was used in measuring field dependence-independence in this study. This test is modeled after the individually administered EFT. The GEFT contains three sections. The first section is used primarily for practice and contains seven simple problems. There are nine complex figures in both the second and third sections; there are eighteen complex figures in total. Just as in the EFT, the subject is asked to identify a simple figure contained within the complex one. Once found, the subject traces the simple figure exactly as it appears on the back cover of the test booklet. The time allowed for each of the last two sections is five minutes. The score is the number of simple figures identified within the complex figures on parts two and three of the test. The score range is 0 to 18.

The estimate of reliability of the GEFT was obtained by determining the correlation between the parallel forms (section two and three) with identical time limits. The Spearman-Brown prophecy

formula was used and produced a reliability estimate of .82 for both males and females. This finding compares favorably with the reliability estimates obtained for the EFT upon which the GEFT was based. The Spearman-Brown method produced reliability estimates of .82 to .85 for male college students and .79 for female college students for the earlier EFT.²

A great array of studies have been done demonstrating the construct validity of the EFT. These are reported in the manual for the Embedded Figures Test. The validity of the GEFT has been assessed by using results of the EFT, the portable version of the Rod and Frame Test (PRFT) and the degree of body articulation test as criterion measures. The following table gives the results obtained.

| TABLE II |
| VALIDITY COEFFICIENTS³ |

<table>
<thead>
<tr>
<th>Population</th>
<th>Criterion Variables</th>
<th>r with GEFT Score*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male undergraduates</td>
<td>Individual EFT, solution time</td>
<td>-.82</td>
</tr>
<tr>
<td>Female undergraduates</td>
<td>Individual EFT, solution time</td>
<td>-.63</td>
</tr>
<tr>
<td>Male undergraduates</td>
<td>PRFT, error</td>
<td>-.39</td>
</tr>
<tr>
<td>Female undergraduates</td>
<td>PRFT, error</td>
<td>-.34</td>
</tr>
<tr>
<td>Male undergraduates</td>
<td>ABC, degree of body articulation</td>
<td>.71</td>
</tr>
<tr>
<td>Female undergraduates</td>
<td>ABC, degree of body articulation</td>
<td>.55</td>
</tr>
</tbody>
</table>

²Ibid. p. 28.
³Ibid. p. 29.
The manual concludes that the

Combined evidence suggests that the GEFT may prove to be a useful substitute for the EFT when individual testing is impractical. It must still be considered a research instrument, however, until more extensive direct and construct validation data are collected from a wide variety of groups.

Because of the small but consistent differences between males and females found, this investigator chose to use the 1st and 4th quartiles for each group reported in the Manual for the Embedded Figures Test. The score ranges for these quartiles contain a small adjustment by sex. The range of scores for males is: 1st quartile = 0-9, 4th quartile = 16-18. For females the range is: 1st quartile = 0-8, 4th quartile = 15-18. On the basis of previous research, this investigator believed that this adjustment would tend to make the groups similar enough so that differences by sex would not be significant.

Pilot study.

This investigator administered the Personal Data Blank and the GEFT to two classes selected randomly as a pilot study. The purpose of the pilot study was to field test the Personal Data Blank and to gain experience in administering the GEFT. After each administration of the data blank in the pilot study, the subjects were asked to comment on whether the items were understandable and the directions clear. It was discovered that the items were understandable but that the directions on the branching items were not clear. As a remedy for this situation, the experimenter gave additional directions as the Personal Data Blank

4Ibid. p. 29.
was being completed during the data gathering phase of this study. In addition, each Personal Data Blank was quickly reviewed during the GEFT administration and subjects who did not follow the directions were asked to make any necessary corrections. As a result, all the Personal Data Blanks were usable.

No problems were experienced during the field test for the GEFT. However, in scoring the test this investigator noted the ease with which scoring mistakes could be made. To protect against this possibility, each test was scored twice. This was done once briefly after administration and again at least a day later. At the conclusion of the testing, those subjects that came with ±1 of being categorized as field dependent or field independent had their test booklets reviewed again by the investigator. On this final check no mistakes in scoring were found.

Thus, the pilot study provided useful information to this investigator.

Data Analysis Procedures

Once the data was collected, it was analyzed by using various forms of the chi-square statistic. The chi-square statistic was chosen because the data to be analyzed is in the form of frequencies within various classifications. Further, the investigator was interested in determining whether there was a significant association between the various classifications used. The chi-square statistic is an appropriate measure in determining association between variables.
The chi-square test is a nonparametric statistical test. As such, it "is a test whose model does not specify conditions about the parameters of the population from which the sample was drawn." The assumptions that are made when the chi-square test is used are:

1. Events categorized are randomly sampled.
2. Categories are mutually exclusive (not overlapping).
3. Outcomes are independent of one another.
4. \( O = E \), or the sum of observed frequencies must equal the sum of the expected frequencies.

The conditions imposed by these assumptions were all met in this study. In addition, there are requirements for the expected frequencies found in each cell of the chi-square. These will be taken up as each type of chi-square is considered because they differ with each type.

The first hypothesis is: No association will be found for the characteristics of field dependence-independence as measured by the Group Embedded Figures Test in relation to sex and age in this population. This hypothesis was tested by using a three way chi-square. There were three independent variables with two levels of each one. Field dependence and field independence was one variable. Sex was the second variable. For the third variable, age, subjects were classified into two categories: those below the median age for the sample group and those above the median age. The expected frequencies (fes) must be


five or more for this test. This requirement was easily met. The results of this first test indicated an association between field dependence-independence and age. Therefore, the relationship between age and the variables being examined in the following hypotheses was examined along with the other variables for each hypotheses. This necessitated the use of three-way chi-squares wherever possible.

The second hypothesis is: No association for the characteristics of field dependence-independence as measured by the Group Embedded Figures Test and curricular preference will be found in the population being studied. This hypothesis was tested by using a three-way chi-square. There were three independent variables. The cognitive style variable had two levels: field dependence and field independence. The second variable, curricular preferences, had seven levels. The third variable was age. There is some disagreement over the required size of the expected frequencies in tables that are greater than 2 x 2. Edwards reports that a minimum expected frequency of one is sufficient if df = 5 or more. Linton, Gallo, and Logan indicate that the minimum must be two in each cell. The data easily exceeded these requirements. However, the three-way chi-square format using the original


plan with eight program categories resulted in one of the thirty-two cells having zero observed frequencies. It is widely accepted that if this happens then either more subjects must be obtained or adjacent categories may be combined. An investigator may only combine adjacent categories if a rationale can be made for such a procedure. This investigator determined that the two public service program categories could properly be combined. First, they were both public service occupational program categories. One included public service-education and social service related programs. The other contained public service-safety related programs. Second, both categories loaded heavily on the cognitive style dimension of field dependence. Thus, the data was not obscured by collapsing these two categories into one. It was also determined by the investigator that the option of additional testing was neither essential or practical. It was not essential because of the reasons already cited. It was not practical because the condition occurred for the three-way cell of under median age, field independent, public service-education social science related which loaded very heavily on field dependence over median age. The probability of finding one or more subjects to fit this cell was very low in the light of the observed frequencies obtained in field dependent and over the median age category. This resulted in having only 2 x 7 chi-squares in the age by program and cognitive style by program parts of the three-way procedure rather than the 2 x 8 chi-squares originally planned.

Results obtained by using the chi-square were significant, therefore, additional analyses were performed to determine what was
contributing to the findings. In this way, a more exact interpretation could be made of the data. The first procedure in this analyses was to discover if there was an association between age or cognitive style and the two major curricular categories in a community college: Transfer and occupational. For each test, 2 x 2 chi-squares were used and the strength of the resulting association, if significant, was determined by using Yules Q. Next, Ryan's procedure was used to make pairwise comparisons in the two 2 x 7 tables. Specifically, it examined pairs of the variables and determined those which differed significantly from each other. This procedure allowed the investigator to pinpoint those factors contributing most to the significant results obtained using the chi-square procedure.

The third hypothesis was tested by using a three-way chi-square. The three-way chi-square was made necessary because of the finding of significance in testing the first hypothesis. There were three independent variables with two levels of each. The third hypothesis is: No association for the characteristics of field dependence-independence as measured by the Group Embedded Figures Test will be found in relation to decided or undecided subjects in reference to curricular preferences in the population being studied. Because this was a 2x2x2 chi-square, the expected frequencies (fes) needed to be five or more to use this test. The sample size was ample for this test.

The fourth hypothesis was tested by using a two-way chi-square. There were two levels for one independent variable and three levels of the others. Only subjects making a curricular choice were included in
this test. The fourth hypothesis is: No association for the characteristics of field dependence-independence and satisfaction/dissatisfaction with curricular choice will be found in the population being studied. The expected frequencies for this chi-square test must be two or more. This requirement was met. A three-way chi-square procedure would have been a more appropriate method since this investigator found significance in the first three-way procedure. However, in using chi-squares no cell can have zero observed frequencies. One cell in the three-way had zero observed frequencies. This cell contained students who were over the median age, field independent and not satisfied with their curricular choice. While additional testing is an acceptable method when employing the chi-square statistic, it would not have been practical in this case. The testing of 298 subjects yielded not one who fit the category. In addition it yielded only seven who said they were dissatisfied with their curricular choice. The probability that testing one or two more sections would produce the needed results was very slim. It would be more likely that another hundred or more subjects could have been tested before the required conditions would have been met. This investigator felt that it would be wiser to accept the limitation imposed rather than to attempt to test another ten or more sections with its attendant disruption of the educational process.

The fifth hypothesis is: No association for the characteristics of field dependence-independence and the most/least preferred guidance strategies will be found among undecided students in the population being studied. This fifth hypothesis was tested using four 2 x 3 chi-squares.
Each undecided subject was asked to indicate his most and least preferred guidance strategy from a list of six choices. These choices were grouped into three categories: (1) individual consultation, (2) self-help and (3) group activities. Each category contained two items from the list of six. Age and cognitive style were examined in association with the most preferred guidance strategies and the least preferred guidance strategies. A three-way chi-square was not usable because the limited number of undecided subjects did not allow sufficient numbers in each of the three-way cells. Additional testing was not a viable option for the same reasons cited in the discussion of the procedures used in testing the fourth hypothesis. Since the relationship of each two variables could be examined, this was probably not an important limitation on the findings.

Summary

The sample used in this study was drawn from students 22 years of age and older in randomly drawn classes related to eight specific program categories at Moraine Valley Community College. These classes were drawn only from those classes which met at 5:00 p.m. or later. Data was collected by administering a Personal Data Blank and the Group Embedded Figures Test. A pilot study was conducted by the investigator to validate the Personal Data Blank and to obtain experience in the administration and scoring of the Group Embedded Figures Test.

The data was analyzed by using various forms of the chi-square statistic for each hypothesis. If significance was found, additional
procedures were used to determine either the strength of the association or the variables which were contributing most to the association. These additional procedures were used to enable the investigator to more adequately interpret the findings.

Chapter IV presents the analysis of the data obtained through the use of the procedures outlined in Chapter III.
CHAPTER IV

ANALYSIS OF DATA

Introduction

The population for this study includes only Moraine Valley Community College students age 22 years and older who were enrolled in classes in eight curricular areas which began at 5:00 p.m. or later. The sample group consisted of subjects enrolled in 26 randomly selected courses. Each subject completed a Personal Data Blank and the group form of the Embedded Figures Test (GEFT). On the basis of the procedures outlined in Chapter III several hypotheses were tested. Each null hypothesis was rejected only if the resulting statistic had a probability equal to or less than the .05 level; otherwise, the hypothesis was accepted. Further, where the tests for an hypothesis reached this level of significance, additional procedures were used to determine what was contributing to that significance. This chapter contains a description of the sample group and the results of the statistical analyses used in this study.

The Sample Group

The total number of subjects in the sample group was 310. This sample group included those subjects who were 22 years of age and older, enrolled in 26 randomly selected classes within eight curricular areas.
which met at 5:00 p.m. or later at Moraine Valley Community College. The Group Embedded Figures Test and a Personal Data Blank was completed by each subject. Of this number, there were 12 subjects whose test results and Personal Data Blanks were not usable. Among the 12 unusable subjects were six who were not enrolled in curricula included in this study. This left a sample group of 298. On the basis of the definitions used in this study for field dependence and field independence, 200 of the 298 were classifiable in one or another of those two categories. The remainder were unclassifiable and were omitted from the study. This study was only concerned with those subjects who could be classified as either field-dependent or field-independent.

Score ranges used in this study correspond to the 1st and 4th quartiles for the college norm groups reported in the manual.¹ Male subjects were classifiable if their GEFT scores were 0-9 or 16-18, and female subjects were classifiable if their scores were 0-8 or 15-18. Subjects who scored in the lower range were classified as field-dependent and those who scored in the upper range were classified as field-independent. Table 3 illustrates the proportion of subjects who were classifiable for each program area. Overall, 67% of the subjects were classified as either field-dependent or field-independent and 33% were unclassifiable. Nearly all program areas show a similar proportion of classifiable and unclassifiable subjects. The highest proportion of

classifiable subjects occurs in the public service-safety program area (82%). The next highest proportion (78%) occurs in the business-management category. If the norm group reported in the manual for the Embedded Figures Test was equivalent to the sample group used in this study, only half of the subjects would have been classifiable. This difference in the proportions of classifiable subjects appears to be substantial.

TABLE 3
CLASSIFIABLE AND UNCLASSIFIABLE SUBJECTS BY PROGRAM AREA

<table>
<thead>
<tr>
<th>Program Area</th>
<th>Classifiable N</th>
<th>Classifiable %</th>
<th>Unclassifiable N</th>
<th>Unclassifiable %</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business-Mangement</td>
<td>21 (60%)</td>
<td>14 (40%)</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business-Technical</td>
<td>21 (65%)</td>
<td>11 (35%)</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical &amp; Engineering Technology</td>
<td>16 (62%)</td>
<td>10 (38%)</td>
<td>26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Service-Education and Social Science</td>
<td>18 (62%)</td>
<td>11 (38%)</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Service-Safety</td>
<td>27 (82%)</td>
<td>6 (18%)</td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science-Transfer</td>
<td>18 (78%)</td>
<td>5 (22%)</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liberal Arts-Transfer</td>
<td>14 (70%)</td>
<td>6 (30%)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business-Transfer</td>
<td>25 (68%)</td>
<td>12 (32%)</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undecided</td>
<td>40 (64%)</td>
<td>23 (36%)</td>
<td>63</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>200 (67%)</strong></td>
<td><strong>98 (33%)</strong></td>
<td><strong>298</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4 contains the age distribution of the subjects included in this study. Overall, males made up nearly two-thirds (65%) of the
sample group and females more than one-third (35%). The median age for the group was 29.4 years of age. This represents the exact age above which 50% of the subjects fall. These data were not grouped when the median age was determined but were grouped only for ease of display in Table 4.

### TABLE 4

**AGE DISTRIBUTION BY SEX**

<table>
<thead>
<tr>
<th>Years of Age</th>
<th>Males N %</th>
<th>Females N %</th>
<th>Total N %</th>
</tr>
</thead>
<tbody>
<tr>
<td>52-54</td>
<td>0 (0%)</td>
<td>2 (100%)</td>
<td>2 (100%)</td>
</tr>
<tr>
<td>49-51</td>
<td>1 (50%)</td>
<td>1 (50%)</td>
<td>2</td>
</tr>
<tr>
<td>46-48</td>
<td>1 (14%)</td>
<td>6 (86%)</td>
<td>7</td>
</tr>
<tr>
<td>43-45</td>
<td>6 (46%)</td>
<td>7 (54%)</td>
<td>13</td>
</tr>
<tr>
<td>40-42</td>
<td>10 (59%)</td>
<td>7 (41%)</td>
<td>17</td>
</tr>
<tr>
<td>37-39</td>
<td>11 (69%)</td>
<td>5 (31%)</td>
<td>16</td>
</tr>
<tr>
<td>34-36</td>
<td>10 (77%)</td>
<td>3 (23%)</td>
<td>13</td>
</tr>
<tr>
<td>31-33</td>
<td>14 (74%)</td>
<td>5 (26%)</td>
<td>19</td>
</tr>
<tr>
<td>28-30</td>
<td>30 (79%)</td>
<td>8 (21%)</td>
<td>38</td>
</tr>
<tr>
<td>25-27</td>
<td>23 (72%)</td>
<td>9 (28%)</td>
<td>32</td>
</tr>
<tr>
<td>22-24</td>
<td>24 (58%)</td>
<td>17 (42%)</td>
<td>41</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>130 (65%)</strong></td>
<td><strong>70 (35%)</strong></td>
<td><strong>200 (100%)</strong></td>
</tr>
</tbody>
</table>

**Tests of Hypotheses**

In this investigation five null hypotheses were examined. An appropriate chi-square test of association was used to test each null
The null hypothesis was only rejected if the resulting statistic was equal to less than the .05 level. If the observation could produce cell frequencies discrepant enough so that they could be due to chance no more than five percent of the time, then the null hypothesis was rejected and the alternate hypothesis was accepted. If an association was found that met this $\alpha$ level, then additional statistical tests were used to determine where the differences occurred. This allowed for more specific analysis and interpretation. The remainder of this chapter reports the results.

**Age, sex and cognitive style.**

The first null hypothesis was that no association would be found for the characteristics of field dependence-independence as measured by the GEFT in relation to sex and age in this population. To test this null hypothesis a three-way chi-square was used. There were three independent variables with two levels for each variable. The first variable was sex. The second was age, and subjects were classified as being either above or below the median age for the group (Mdn = 29.4 years of age). The cognitive style of field dependence-independence was the third variable, and subjects were classified as either field dependent or field independent. The three-way chi-square procedure contains two steps. First, a $2 \times 2$ chi-square was computed for all possible two variable combinations. There were three possible $2 \times 2$ combinations of the independent variables: (1) age and sex, (2) age and cognitive style and (3) sex and cognitive style. The formula used
for the two-way chi-square was:
\[
X^2 = \frac{N(bc - ad)^2}{(a+b)(c+d)(a+c)(b+d)}
\]

According to Linton and Gallo,\(^2\) no correction for continuity is used in computing the two-way chi-square when it is part of a three-way chi-square. A total three-way chi-square statistic, \(X^2_{\text{total}}\), is computed.
\[
X^2_{\text{total}} = \sum_{ABC=1}^{abc} \frac{(fo-fe)^2}{fe}
\]

Finally, each two-way chi-square is subtracted from \(X^2_{\text{total}}\). This results in \(X^2_{\text{AXBxC}}\) which is the three-way statistic which describes the interaction of the three variables not accounted for by the three 2 x 2 statistics. The formula for this statistic is:
\[
X^2_{\text{AXBxC}} = X^2_{\text{total}} - X^2_{\text{AXB}} - X^2_{\text{AXC}} - X^2_{\text{BxC}}
\]

Table 5 illustrates the sex of the 200 MVCC evening students who were 22 years of age or older. Age was divided into two categories: above median age and below median age (mdn = 29.4 years). For the data in Table 5, \(X^2 = .08\) with 1 degree of freedom. If these observations were drawn randomly from a population in which there was no association between sex and age levels, cell frequencies as discrepant as these would occur more often than five percent of the time by chance. Therefore, the null hypothesis that there would be no association between age and sex has not been rejected. There is no association between age level and sex for this population.

\(^2\)Linton and Gallo, The Practical Statistician, p. 84.
TABLE 5

AGE AND SEX

AGE:

<table>
<thead>
<tr>
<th>SEX:</th>
<th>under median</th>
<th>over median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>66</td>
<td>64</td>
</tr>
<tr>
<td>Female</td>
<td>34</td>
<td>36</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 0.08 \quad df = 1 \]

The cognitive style of the 200 subjects by age is displayed in Table 6. For the data in Table 6, \( \chi^2 = 6.40 \) with 1 degree of freedom. For \( \alpha = 0.05 \), \( \chi^2 = 3.84 \) with 1 degree of freedom. If these observations were drawn randomly from a population in which there was no association between cognitive style and age level, cell frequencies as discrepant as these would occur less than five percent of the time by chance. Therefore, the null hypothesis that there would be no association between age and cognitive style for this population is rejected. There is an association between age level and cognitive style. Subjects above the median age are significantly more field dependent than are subjects below the median age.

Since a significant association was found between age and cognitive style, further analysis of that association was needed. Yule’s \( Q^3 \) was used to test the degree of correlation between age level and

cognitive style. Yules Q has four important statistical properties:
(1) it has only two working parts BxC and AxD, (2) Q is equal to zero when x and y are independent, (3) it has an upper limit of +1.00, and (4) it is insensitive to multiplication or division of row and column frequencies by a positive constant. The formula for Yules Q is:

\[ Q_{xy} = \frac{(BxC) - (AxD)}{(BxC) + (AxD)} \]

The convention for describing Q values indicates that a \( Q_{xy} = -.37 \) is a moderate negative association between age and field dependence-independence. This means that as age level increases field independence decreases.

**TABLE 6**

**AGE AND COGNITIVE STYLE**

<table>
<thead>
<tr>
<th>COGNITIVE STYLE:</th>
<th>under median</th>
<th>over median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Independence</td>
<td>43</td>
<td>26</td>
</tr>
<tr>
<td>Field Dependence</td>
<td>57</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

\[ \chi^2 = 6.395 \quad df = 1 \]

significant at <.05 level

\[ Q_{xy} = .37 \]

The cognitive style of the members of the sample group by sex is shown in Table 7. For the data in Table 7, \( \chi^2 = 3.68 \) with 1 degree of freedom. For \( \alpha = .05 \), \( \chi^2 = 3.84 \) with 1 degree of freedom. Therefore, the null hypothesis that there is no association between sex and field dependence-independence as measured by the GEFT for this population was
not rejected. There is no association between sex and field dependence-independence for this population.

**TABLE 7**

**SEX AND COGNITIVE STYLE**

<table>
<thead>
<tr>
<th>STYLE:</th>
<th>Male</th>
<th>Female</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Independence</td>
<td>51</td>
<td>18</td>
<td>69</td>
</tr>
<tr>
<td>Field Dependence</td>
<td>79</td>
<td>52</td>
<td>131</td>
</tr>
</tbody>
</table>

The overall, three variable combination table is displayed in Table 8. There are eight combinations of the three independent variables. A $\chi^2_{total}$ was computed. For the data in Table 8, $\chi^2_{total} = 10.98$. The 2x2 chi-square value for each of the three combinations of two variables was subtracted from 10.98. This resulted in $\chi^2_{AxBxC} = 0.83$ with 1 degree of freedom. For $\alpha = .05$, a $\chi^2$ value of at least 3.84 is necessary. Since $\chi^2_{AxBxC} = .83$ is less than 3.84 there is not a significant association among age, sex and cognitive style.

For the first null hypothesis: no association will be found for the characteristics of field dependence-independence as measured by the GEFT in relation to sex and age for this population, the following can be concluded as a result of using a three-way chi-square statistic:

The only two characteristics that are associated with one another are age and field dependence-independence. Subjects above
the median age are significantly more field dependent than are subjects below the median age (mdn = 29.4 years). However, sex tells you nothing about either the age or cognitive style of a subject. Moreover, the presence of a third characteristic does not affect the degree of association between the other two. For example, the association between age and cognitive style is unaffected by whether the subject is male or female.

TABLE 8
THREE VARIABLE COMBINATION TABLE:
AGE, SEX AND COGNITIVE STYLE

<table>
<thead>
<tr>
<th>Description</th>
<th>Observed Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>under median age, male, field independent</td>
<td>30</td>
</tr>
<tr>
<td>under median age, male, field dependent</td>
<td>36</td>
</tr>
<tr>
<td>under median age, female, field independent</td>
<td>13</td>
</tr>
<tr>
<td>under median age, female, field dependent</td>
<td>21</td>
</tr>
<tr>
<td>over median age, male, field independent</td>
<td>21</td>
</tr>
<tr>
<td>over median age, male, field dependent</td>
<td>43</td>
</tr>
<tr>
<td>over median age, female, field independent</td>
<td>5</td>
</tr>
<tr>
<td>over median age, female, field dependent</td>
<td>31</td>
</tr>
</tbody>
</table>

TOTAL 200

\[
\chi^2_{\text{total}} = 10.98
\]

\[
\chi^2_{AxBxC} = 0.83
\]
Age, curriculum and cognitive style.

The second null hypothesis is: No association for the characteristics of field dependence-independence as measured by the GEFT and curricular preference will be found in the population being studied. Because age and cognitive style were found to be related in testing the first hypothesis, age must be added as a third variable in testing this hypothesis. This addition of a third variable makes it necessary to use a three-way chi-square procedure. For the purpose of testing this hypothesis, only subjects (N=160) indicating a curricular preference are included. Subjects (N=40) who indicated that they were undecided as to curricular preference are not included in the data analysis.

The specific three-way procedure used in testing this hypothesis is a 2x2xa design. There are two independent variables with two levels of each one: cognitive style and age. The third variable began with eight levels: the eight program areas. However, when the 32 cells of the three-way combination table were examined, it was discovered that one cell (over median age, field independent, public service-education and social science related) contained zero observed frequencies. A chi-square procedure may not be performed if zero observed frequencies occur in any cell. The usual procedure to remedy this problem is to combine adjacent classifications if it is reasonable to do so.\textsuperscript{4} Since the zero frequency occurred in the public service-education and social science

related classification, the adjacent public service-safety related program classification was examined. Both classifications involved public service programs and both loaded heavily on field dependence. Therefore, this investigator collapsed these two adjacent public service classifications into one. This resulted in a reduction of classifications for the program area from eight to seven. The results of the three-way statistical test of this null hypothesis follows.

Table 9 displays the age classification of the 160 subjects who have made a program decision by field dependence-independence. For the data in Table 6, $\chi^2 = 7.66$ with 1 degree of freedom. This $\chi^2$ value exceeds the .01 level. The .01 level is $\chi^2 = 6.64$ with 1 degree of freedom. Therefore, the null hypothesis that there will be no association between age and field dependence-independence for program decided subjects within this population is rejected. There is an association between age and field dependence-independence for this population. Subjects over the median age (mdn = 29.4 years) are significantly more field dependent than are subjects below the median age. Also, since the chi-square statistic was significant an additional analysis was made using Yules Q. For this data in Table 9, $Q_{xy} = -.44$. According to the conventions for Yules Q, a moderate negative correlation exists. This indicates that when age increases (exceeds median), the number of field independent subjects decreases.
TABLE 9

AGE AND COGNITIVE STYLE FOR
SUBJECTS INDICATING A CURRICULAR PREFERENCE

AGE:

<table>
<thead>
<tr>
<th>STYLE:</th>
<th>under median</th>
<th>over median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Independence</td>
<td>36</td>
<td>20</td>
</tr>
<tr>
<td>Field Dependence</td>
<td>43</td>
<td>61</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 7.66 \quad df = 1 \]

significant at < .01 level

\[ \phi_{xy} = -.44 \]

The next step in this three-way procedure determines the degree of association between age and curricular preference. Age has two levels and curricular preference has seven classifications. The formula for this procedure is:

\[ \chi^2 = \sum \frac{(fo-fe)^2}{fe} \]

\[ a = \text{the number of levels of independent variable A,} \]
\[ b = \text{the number of levels of independent variable B,} \]
\[ AB = \text{the total number of cells} \]
\[ fo = \text{the observed frequency for each of the } ab \text{ cells, and} \]
\[ fe = \text{the expected frequency for each of the } ab \text{ cells} \]

Table 10 displays the data for the 160 subjects according to program and age level. For the data in Table 10, \( \chi^2 = 14.46 \) with 6 degrees of freedom. For \( \alpha = .05 \), \( \chi^2 = 12.59 \) with 6 degrees of freedom. If these observations were drawn randomly from a population in which there

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>under median</td>
<td>8</td>
<td>13</td>
<td>7</td>
<td>14</td>
<td>16</td>
<td>10</td>
<td>11</td>
<td>79</td>
</tr>
<tr>
<td>over median</td>
<td>13</td>
<td>8</td>
<td>9</td>
<td>31</td>
<td>9</td>
<td>4</td>
<td>7</td>
<td>81</td>
</tr>
<tr>
<td>TOTAL</td>
<td>21</td>
<td>21</td>
<td>16</td>
<td>45</td>
<td>25</td>
<td>14</td>
<td>18</td>
<td>160</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 14.46 \quad df = 6 \]

significant at < .05 level
was no association between age level and program choice, cell frequencies as discrepant as these would occur less frequently than five percent of the time by chance. Therefore, the null hypothesis that there is no association between age level and program choice has been rejected. There is an association for these two variables for this population. However, to determine if a more specific interpretation of this association can be made, Ryan's Procedure⁶ was used. This procedure allows for all pairwise comparisons between proportions within a 2×a table by adjusting the significance levels for specific comparisons to keep the experiment wide error rate constant. It is used only when the chi-square statistic indicates an association between two independent variables. Use of Ryan's Procedure requires that one of the independent variables must have two levels and the other more than two levels. To make the pairwise comparisons, the classification levels must be arranged in order so that the most disparate classes are at each end of the ordered classes. For example, the data in Table 11 is arranged according to the proportion of each classification made up by subjects under the median age. The liberal arts transfer classification has the greatest proportion of subjects under the median age, and the public service classification has the smallest proportion of subjects under the median age. Starting with the most extreme pairs, liberal arts-transfer and public service, 2×2 χ² whose value is determined by α, a and d, where α is the level for the experiment as a whole, a is the number of levels

⁶Ibid, p. 301-305.
TABLE 11

COMPARISON TABLE USING RYAN'S PROCEDURE FOR
AGE AND CURRICULAR PREFERENCE

<table>
<thead>
<tr>
<th>Classification</th>
<th>Liberal Arts Transfer</th>
<th>Business Transfer</th>
<th>Business Technical Transfer</th>
<th>Science Transfer</th>
<th>Mechanical and Engineering Tech. Transfer</th>
<th>Business Management</th>
<th>Public Service</th>
<th>d</th>
<th>d-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberal Arts-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.34</td>
<td>2.52</td>
<td>5.64</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.12</td>
<td>5.82</td>
<td>6</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Business-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.42</td>
<td>5</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical &amp;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eng. Tech.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
of the dimension with more than two levels, and \( a \) is the number of ordered levels spanned by the specific comparison. The use of Ryan's Procedure, see Table 11 for summary, revealed that the subjects in any program classification did not differ significantly from the subjects in any other program classification on the basis of age level. Therefore, no further interpretation on the basis of Ryan's Procedure can be made for the association found by using chi-square.

In addition to examining specific comparisons between each pair of program classifications, it is also important to look at the community college's two major program classifications as well. Community colleges classify their degrees and certificate programs as either occupational or transfer programs. In this study, the occupational program category consists of the Business-Management, Business-Technical, Mechanical and Engineering Technology, and Public Service categories. The specific programs contained in these classifications are designed to lead to employment. The transfer classification consists of Business-Transfer, Liberal Arts-Transfer, and Science-Transfer. These programs lead to additional education in a four year college or university. These are important program classifications to community college educators. Therefore, this investigator examined the association between the occupational-transfer curricular and age classification.

Table 12 displays the 160 subjects who have selected a program by occupational-transfer category and age classification. For the data in Table 12, \( \chi^2 = 7.61 \) with 1 degree of freedom. Therefore, the null hypothesis that there is no association between age classification and
major program classification (occupational and transfer) must be rejected. There is an association between age classification and major program classification. Occupational students tend to be older than transfer students. The Q value of .46 reflects a moderate positive correlation between age classification and major program classification (occupational and transfer). This indicates that when age increases (exceeds median) the proportion of subjects in the occupational category increases.

**TABLE 12**

AGE AND CURRICULAR PREFERENCE

<table>
<thead>
<tr>
<th>AGE:</th>
<th>Occupational</th>
<th>Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under median</td>
<td>42</td>
<td>37</td>
</tr>
<tr>
<td>Over median</td>
<td>61</td>
<td>20</td>
</tr>
</tbody>
</table>

χ² = 7.61 df = 1 significant at < .01 level
Qₓᵧ = .46

The third two-way combination of this three-way procedure examines the association between cognitive style and curricular preference. The cognitive style variable has two levels and the curricular preference variable has seven levels. Table 13 displays the 160 subjects by cognitive style and program choice. For the data in Table 13, χ² = 24.24 with 6 degrees of freedom. If these observations were drawn randomly
### TABLE 13
COGNITIVE STYLE AND CURRICULAR PREFERENCE

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Independent</td>
<td>3</td>
<td>11</td>
<td>7</td>
<td>6</td>
<td>11</td>
<td>7</td>
<td>11</td>
<td>56</td>
</tr>
<tr>
<td>Field Dependent</td>
<td>18</td>
<td>10</td>
<td>.9</td>
<td>39</td>
<td>14</td>
<td>7</td>
<td>7</td>
<td>104</td>
</tr>
<tr>
<td>TOTAL</td>
<td>21</td>
<td>21</td>
<td>16</td>
<td>45</td>
<td>25</td>
<td>14</td>
<td>18</td>
<td>160</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 24.24 \quad \text{df} = 6 \]

significant at < .001 level
from a population in which there was no association between field
dependence-independence and program choice, cell frequencies as dis-
crepant as these would occur less often than one time in a thousand by
chance. Therefore, the null hypothesis that there is no association
between field dependence-independence and program choice has been re-
jected. There is an association between these characteristics.

Ryan's Procedure was then employed to allow more specific inter-
pretation of the association found between field dependence-independence
and curricular preference. Table 14 displays the results found. The
computations revealed that the public service subjects differed signifi-
cantly from both the science-transfer and the business-technical subjects.
Public service students are more field dependent while science-transfer
and business-technical students are more field independent. These three
program areas have contributed the most to the overall finding of sig-
nificance in the association between cognitive style and program choice.

An additional analysis was performed to examine the association
between cognitive style and major program classification (occupational
and transfer). Table 15 shows the distribution of the 160 subjects
according to major program classification and cognitive style. For the
data in Table 15, \( \chi^2 = 8.76 \) with 1 degree of freedom. For the .01 level,
\( \chi^2 = 6.64 \) with 1 degree of freedom. The \( \chi^2 \) value not only exceeds the
necessary level for this investigation (\( \alpha = .05 \)) but it exceeds the
value at the .01 level as well. If these observations were drawn
randomly from a population in which there was no association between
field dependence-independence and major program category, cell frequencies
### TABLE 14

Comparison Table Using Ryan's Procedure for Cognitive Style and Curricula Preference

<table>
<thead>
<tr>
<th>Classification</th>
<th>Liberal Arts Transfer</th>
<th>Business Transfer</th>
<th>Business Technical Transfer</th>
<th>Science Transfer</th>
<th>Mechanical and Engineering Tech.</th>
<th>Business Management</th>
<th>Public Service</th>
<th>d</th>
<th>d-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberal Arts-Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.31</td>
<td>12.57*</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Business-Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.25</td>
<td>9.47*</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Business-Technical Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.42</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Science Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical &amp; Eng. Tech.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Business-Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Public Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*significant difference between proportions*
CoNViTIVf Style & Curr'ICur Al Preference

Curricula:

COGNITI\V STYLE: | Occupational | Transfer |
---|---|---|
Field Independence | 27 | 29 |
Field Dependence | 76 | 28 |
103 | 57 | 160 |

\[ \chi^2 = 8.76 \quad df = 1 \]

significant at < .01 level

Q_{xy} = -.49

as discrepant as these would occur less than one percent of the time by chance. Therefore, the null hypothesis that there is no association between field dependence-independence and major program category has been rejected. There is an association between these two independent variables. Occupational students are significantly more field dependent than are transfer students. The Q value of Q_{xy} = -.49 indicates that this correlation is a moderate negative correlation.

The final procedure in the testing of the second null hypothesis is the three way combination procedure. Table 16 displays the subjects according to the 21 possible combinations of the three variable: age, program and cognitive style. For the data in Table 16, \[ \chi^2_{AxBxC} = 1.15 \]

with 6 degrees of freedom. For \( \alpha = .05 \), \[ \chi^2 = 12.59 \]

with 6 degrees of freedom. If these observations were drawn randomly from a population in which there was no association between age level, field dependence-
TABLE 16

THREE VARIABLE COMBINATION TABLE: AGE COGNITIVE STYLE AND EDUCATIONAL-VOCATIONAL PROGRAM

<table>
<thead>
<tr>
<th>Description</th>
<th>Observed Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>under median, field independent, Business-Management</td>
<td>2</td>
</tr>
<tr>
<td>under median, field independent, Business-Technical</td>
<td>7</td>
</tr>
<tr>
<td>under median, field independent, Mechanical &amp; Engr. Tech.</td>
<td>4</td>
</tr>
<tr>
<td>under median, field independent, Public Service</td>
<td>2</td>
</tr>
<tr>
<td>under median, field independent, Business-Transfer</td>
<td>8</td>
</tr>
<tr>
<td>under median, field independent, Liberal Arts-Transfer</td>
<td>5</td>
</tr>
<tr>
<td>under median, field independent, Science-Transfer</td>
<td>8</td>
</tr>
<tr>
<td>under median, field dependent, Business-Management</td>
<td>6</td>
</tr>
<tr>
<td>under median, field dependent, Business-Technical</td>
<td>6</td>
</tr>
<tr>
<td>under median, field dependent, Mechanical &amp; Engr. Tech.</td>
<td>3</td>
</tr>
<tr>
<td>under median, field dependent, Public Service</td>
<td>12</td>
</tr>
<tr>
<td>under median, field dependent, Business-Transfer</td>
<td>8</td>
</tr>
<tr>
<td>under median, field dependent, Liberal Arts-Transfer</td>
<td>5</td>
</tr>
<tr>
<td>under median, field dependent, Science-Transfer</td>
<td>3</td>
</tr>
<tr>
<td>over median, field independent, Business-Management</td>
<td>1</td>
</tr>
<tr>
<td>over median, field independent, Business-Technical</td>
<td>4</td>
</tr>
<tr>
<td>over median, field independent, Mechanical &amp; Engr. Tech.</td>
<td>3</td>
</tr>
<tr>
<td>over median, field independent, Public Service</td>
<td>4</td>
</tr>
<tr>
<td>over median, field independent, Business-Transfer</td>
<td>3</td>
</tr>
<tr>
<td>over median, field independent, Liberal Arts-Transfer</td>
<td>2</td>
</tr>
<tr>
<td>over median, field independent, Science-Transfer</td>
<td>3</td>
</tr>
<tr>
<td>over median, field dependent, Business-Management</td>
<td>12</td>
</tr>
<tr>
<td>over median, field dependent, Business-Technical</td>
<td>4</td>
</tr>
<tr>
<td>over median, field dependent, Mechanical &amp; Engr. Tech.</td>
<td>6</td>
</tr>
<tr>
<td>over median, field dependent, Public Service</td>
<td>27</td>
</tr>
<tr>
<td>over median, field dependent, Business-Transfer</td>
<td>6</td>
</tr>
<tr>
<td>over median, field dependent, Liberal Arts-Transfer</td>
<td>2</td>
</tr>
<tr>
<td>over median, field dependent, Science Transfer</td>
<td>4</td>
</tr>
</tbody>
</table>

TOTAL 160

\[ \chi^2_{\text{total}} = 47.52 \]

\[ \chi^2_{\text{AxBxC}} = 1.15 \]
independence and program choice, cell frequencies as discrepant as these would occur more often than five percent of the time by chance. Therefore, the null hypothesis was not rejected.

In testing the second null hypothesis a three-way chi-square was used. The three independent variables were age level, field dependence-independence and program choice. The following is a summary of what was discovered in testing the null hypothesis:

The two variables of age and cognitive style were associated for this group. This was true for age and program choice and for cognitive style and program choice. In making more specific analyses of these findings, it was discovered that occupational and transfer classifications were associated with both age and cognitive style. Subjects over the median age tended to select occupational programs and were more frequently field dependent than subjects under the median age. For cognitive style and program choice, public service programs subjects were significantly more field dependent than either science-transfer or business technical subjects. These latter two groups were significantly more field independent. Finally, the presence of a third characteristic does not affect the degree of association between the other two. For example, the association between field dependence-independence and program choice is unaffected by age level.

Undecided students.

The third null hypothesis stated that no association for the characteristics of field dependence-independence as measured by the
GEFT will be found in relation to decided or undecided subjects in regard to the program preference in the population being studied. Again, due to the findings in the data analysis for the first hypothesis, age was also studied in relation to cognitive style and decided/undecided subjects. Each of the three independent variables has two levels. A three-way chi-square, 2x2x2 design, was used for this analysis.

The data for the 200 subjects according to age level and decided or undecided status in regard to program choice is shown in Table 17.

**TABLE 17**

**AGE AND DECISION STATUS**

<table>
<thead>
<tr>
<th>AGE:</th>
<th>Decided</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under median age</td>
<td>79</td>
<td>21</td>
</tr>
<tr>
<td>Over median age</td>
<td>81</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>160</td>
<td>40</td>
</tr>
</tbody>
</table>

\[
\chi^2 = .13 \quad \text{df} = 1
\]

For the data in Table 17, \( \chi^2 = .13 \) with 1 degree of freedom. For \( \alpha = .05 \), \( \chi^2 = 3.84 \) with 1 degree of freedom. If these observations were randomly drawn from a population in which there was no association between age level and program decision status, cell frequencies as discrepant as these would occur more than five percent of the time by chance. Therefore, the null hypothesis that there was no association between age level and program decision status has not been rejected.
Table 18 displays the data for the 200 subjects by field dependence-independence and program decision status. For the data in Table 18, $\chi^2 = 3.84$ with 1 degree of freedom. If these observations were drawn randomly from a population in which there was no association between decision status and cognitive style, cell frequencies as discrepant as these would occur more often than five percent of the time by chance. Therefore, the null hypothesis that there is no association between field dependence-independence and program decision status has not been rejected.

**TABLE 18**

**COGNITIVE STYLE AND DECISION STATUS**

<table>
<thead>
<tr>
<th>STYLE:</th>
<th>Decided</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Independence</td>
<td>56</td>
<td>13</td>
</tr>
<tr>
<td>Field Dependence</td>
<td>104</td>
<td>27</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>160</strong></td>
<td><strong>40</strong></td>
</tr>
</tbody>
</table>

$\chi^2 = .08 \quad df = 1$

The contingency table which displays the data for all 200 subjects according to age level and field dependence-independence is Table 19. For the data in Table 19, $\chi^2 = 6.40$ with 1 degree of freedom. For $\alpha = .05$, $\chi^2 = 3.84$ with 1 degree of freedom. If these observations were drawn randomly from a population in which there was no association between field dependence-independence and age level, cell frequencies
as discrepant as these would occur less than five percent of the time by chance. Therefore, the null hypothesis that there would be no association between field dependence-independence and age has been rejected. There is an association between age and field dependence-independence. The $Q$ value of $-0.37$ indicates that there is a moderate negative correlation between style type and age level. Subjects over the median age (mdn = 29.4 years) are significantly more field dependent than are subjects below the median age.

**TABLE 19**

**COGNITIVE STYLE AND AGE FOR ALL SUBJECTS**

**AGE:**

<table>
<thead>
<tr>
<th>STYLE:</th>
<th>under median</th>
<th>over median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td>43</td>
<td>26</td>
</tr>
<tr>
<td>Independence</td>
<td></td>
<td>69</td>
</tr>
<tr>
<td>Field</td>
<td>57</td>
<td>74</td>
</tr>
<tr>
<td>Dependence</td>
<td></td>
<td>131</td>
</tr>
</tbody>
</table>

$100$  $100$  $200$

$\chi^2 = 6.40$  $df = 1$

significant at $< .05$ level

$Q_{xy} = -.37$

Table 20 displays the data for the 200 subjects according to the 8 possible combinations of the three independent variables: age level, cognitive style and program decision status. For the data in Table 20, $\chi^2_{ABC} = 1.33$, with 1 degree of freedom. For $\alpha = .05$, $\chi^2 = 3.84$ with 1 degree of freedom. If these observations were drawn randomly from a
population in which there was no association among age level, field
dependence-independence and program decision status, cell frequencies
as discrepant as these would occur more than five percent of the time
by chance. Therefore, the null hypothesis that there would be no assoc­
iation among age level, field dependence-independence and program
decision status has not been rejected.

TABLE 20
THREE VARIABLE COMBINATION TABLE: AGE,
COGNITIVE STYLE AND DECISION STATUS

<table>
<thead>
<tr>
<th>Description</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>under median age, field independent, decided</td>
<td>36</td>
</tr>
<tr>
<td>under median age, field independent, undecided</td>
<td>7</td>
</tr>
<tr>
<td>under median age, field dependent, decided</td>
<td>43</td>
</tr>
<tr>
<td>under median age, field dependent, undecided</td>
<td>14</td>
</tr>
<tr>
<td>over median age, field independent, decided</td>
<td>20</td>
</tr>
<tr>
<td>over median age, field dependent, undecided</td>
<td>61</td>
</tr>
<tr>
<td>over median age, field dependent, decided</td>
<td>13</td>
</tr>
</tbody>
</table>

TOTAL 200

\[ \chi^2_{\text{total}} = 7.93 \]
\[ \chi^2_{\text{AxBxC}} = 1.33 \]

In testing the third hypothesis a three-way chi-square was used.
The following is a summary of what was discovered in testing the null
hypothesis.
There is no association between the cognitive style and the program decision status of MVCC evening students 22 years of age and older. Nor is there an association between age level and program decision status. The only two variables that are associated are age level and field dependence-independence. Subjects above the median age are significantly more field dependent than subjects below the median age. However, program decision status tells nothing about age or cognitive style. Moreover, the presence of a third characteristic does not affect the degree of association between the other two. For example, the association between age and cognitive style is unaffected by whether or not the subject is decided in regard to educational-vocational program.

Field dependence-Independence and Curricular Choice Satisfaction.

The fourth null hypothesis stated that no association for the characteristics of field dependence-independence and satisfaction-dissatisfaction with curricular choice will be found in the population being studied. Data to test this null hypothesis was collected through the Personal Data Blank. Subjects indicated their satisfaction with the program choice they had made. An analysis of these responses indicated that 81% of the 160 program decided subjects were satisfied, 15% were not sure how satisfied they were and four percent were dissatisfied. The preponderance of the respondents being satisfied with their choices made it impossible to perform a three-way procedure examining the inter-relationship of age, degree of satisfaction and cognitive
style. Therefore, the following procedure was used. First, the rela-
tionship of the degree of satisfaction and age level was examined in a
2x2 chi-square design. Then, the relationship between field dependence-
independence and degree of satisfaction was studied by a separate 2x3
chi-square design. Since the association between age level and field
dependence-independence has already been examined for this same group
of 160 subjects earlier in this chapter, the table is not shown here.
See pages 84 and 85 for a discussion of those results.

The distribution of the 160 subjects by degree of satisfaction
and age level is shown in Table 21.

<table>
<thead>
<tr>
<th>AGE:</th>
<th>Satisfied</th>
<th>Not Sure</th>
<th>Dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under median</td>
<td>60</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>Over median</td>
<td>69</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 3.41 \quad df = 2 \]

For the data in Table 21, \( \chi^2 = 3.41 \) with 2 degrees of freedom. If
these observations were drawn randomly from a population in which there
was no association between age level and degree of satisfaction, cell
frequencies as discrepant as these would occur more often than five
percent of the time by chance.
Therefore, the null hypothesis that there was no association between field dependence-independence and degree of satisfaction has not been rejected. There is no association between these two characteristics for this population.

Table 22 displays the data for the 160 subjects by cognitive style and degree of satisfaction with their program choice.

TABLE 22
COGNITIVE STYLE AND CHOICE SATISFACTION FOR DECIDED STUDENTS

<table>
<thead>
<tr>
<th>COGNITIVE STYLE</th>
<th>Satisfied</th>
<th>Not Sure</th>
<th>Dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Independence</td>
<td>48</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Field Dependence</td>
<td>81</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>129</td>
<td>24</td>
<td>7</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 1.96, \quad df = 2 \]

For the data in Table 22, \( \chi^2 = 1.96 \) with two degrees of freedom. For \( \alpha = .05, \chi^2 = 5.99 \) with two degrees of freedom. If these observations were drawn randomly from a population in which there was no association between cognitive style and degree of satisfaction, cell frequencies as discrepant as these would occur more frequently than five percent of the time by chance. Therefore, the fourth null hypothesis that there would be no association between field dependence-independence and degree of satisfaction has not been rejected. There is no association.
between these two characteristics for this population.

Field Dependence-Independence and Guidance Strategies.

The fifth null hypothesis stated: no association for the characteristics of field dependence-independence and most/least preferred guidance strategy will be found among undecided students in the population being studied. As with the tests for the previous hypotheses, age must be examined along with the independent variables stated in this hypothesis. The comparatively small number of subjects who indicated that they were undecided in relation to educational-vocational program choice made the use of a three-way chi-square unsuitable for these analyses. Therefore, two-way chi-squares were used to determine the association between cognitive style, age and most/least preferred guidance strategies. This resulted in four 2x3 chi-square tests of significance.

There were six different guidance strategies from which each subject who was undecided in regard to educational-vocational choice selected a most and least preferred strategy. These six were collapsed into three classifications: individual consultation by either a professional counselor or peer advisor, self-help through the use of programmed guides or vocational information sources, and group activities led by a professional counselor or peer advisor.

For the 40 undecided subjects, the data with regard to age level and most preferred guidance strategy is displayed in Table 23. For the data in Table 23, \( \chi^2 = .98 \) with 2 degrees of freedom. For \( \alpha = .05 \), \( \chi^2 = 5.99 \) with 2 degrees of freedom. If these observations were drawn
randomly from a population in which there was no association between age level and most preferred guidance strategy, cell frequencies as discrepant as these would occur more frequently than five percent of the time by chance. Therefore, the null hypothesis that there would be no association between age level and most preferred guidance strategy has not been rejected. There is no association between age level and most preferred guidance strategy for population.

**TABLE 23**

**AGE AND MOST PREFERRED GUIDANCE STRATEGIES FOR UNDECIDED STUDENTS**

<table>
<thead>
<tr>
<th>AGE:</th>
<th>Individual Consultation</th>
<th>Self-Help</th>
<th>Group Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>under median age</td>
<td>12</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>over median age</td>
<td>10</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ \chi^2 = .98 \quad df = 2 \]

Table 24 contains the data for the 40 undecided subjects displayed by cognitive style and most preferred guidance strategy. For the data in Table 24, \( \chi^2 = 4.61 \) with 2 degrees of freedom. For \( \alpha = .05 \), \( \chi^2 = 5.99 \) with 2 degrees of freedom. If these observations were drawn randomly from a population in which there was no association between field dependence-independence and most preferred guidance strategy has not been rejected. Therefore, the null hypothesis that there would be no
association between cognitive style and most preferred guidance strategy has not been rejected. There is no association between these two independent variables for this population.

TABLE 24

COGNITIVE STYLE AND MOST PREFERRED GUIDANCE STRATEGIES FOR UNDECIDED STUDENTS

<table>
<thead>
<tr>
<th>STYLE:</th>
<th>Individual Consultation</th>
<th>Self-Help</th>
<th>Group Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Independence</td>
<td>5</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Field Dependence</td>
<td>17</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

\begin{align*}
\chi^2 &= 4.61 \\
df &= 2
\end{align*}

For the 40 undecided subjects, Table 25 displays the data by age level and least preferred guidance strategy. For the data in Table 25, \( \chi^2 = .35 \) with 2 degrees of freedom. For \( \alpha = .05 \), \( \chi^2 = .35 \) with 2 degrees of freedom. For \( \alpha = .05 \), \( \chi^2 = 5.99 \) with 2 degrees of freedom. If these observations were drawn randomly from a population in which there was no association between age level and least preferred guidance strategies, cell frequencies as discrepant as these would occur more frequently than five percent of the time by chance. Therefore, the null hypothesis that there would be no association between age level and least preferred guidance strategy has not been rejected. There is no association between these two independent variables for this population.
### TABLE 25

**AGE AND LEAST PREFERRED GUIDANCE STRATEGIES FOR UNDECIDED STUDENTS**

<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>Individual Consultation</th>
<th>Self-Help</th>
<th>Group Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE: under median age</td>
<td>5</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>AGE: over median age</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11</strong></td>
<td><strong>14</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

\[ \chi^2 = 0.35 \quad df = 2 \]

Table 26 displays the data for the 40 undecided subjects by cognitive style and least preferred guidance strategy. For the data in Table 26, \( \chi^2 = 1.63 \) with 2 degrees of freedom. For \( \alpha = 0.05 \), \( \chi^2 = 5.99 \) with 2 degrees of freedom. If these observations were drawn randomly from a population in which there was no association between field dependence-independence and least preferred guidance strategy, cell frequencies as discrepant as these would occur more frequently than five percent of the time by chance. Therefore, the null hypothesis that there would be no association between field dependence and least preferred guidance strategies has not been rejected. There is no association between these two independent variables for this population.

In order to test the fifth hypothesis, four chi-square tests of association were used. They examined both cognitive style and age in relation to the most and least preferred guidance strategies. On the basis of these \( \chi^2 \) tests of association for the fifth null hypothesis,
TABLE 26
COGNITIVE STYLE AND LEAST PREFERRED GUIDANCE STRATEGIES FOR UNDECIDED STUDENTS

<table>
<thead>
<tr>
<th>COGNITIVE STYLE:</th>
<th>Consulation</th>
<th>Self-Help</th>
<th>Group Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Independence</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Field Dependence</td>
<td>6</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 1.63 \quad df = 2 \]

the following has been found:

First, the fifth null hypothesis that there would be no association between field dependence-independence as measured by the GEFT and the most/least preferred guidance strategy has not been rejected. No association was found between these characteristics. In addition, the association between age level and most/least preferred guidance strategy was also examined due to findings in testing the first hypothesis that age and field dependence-independence were associated. No association was found between these characteristics.

**Summary**

The five hypotheses in this study were tested by using various forms of the chi-square procedure. When significance was found, the data was further analyzed, to determine what the strength of the association was and what classificatory variables contributed most to the findings.
The principle findings of the study indicated that age and curricular choice were significantly associated with field dependence-independence. In addition, age and curricular choice were also associated at a significant level. Decision status, choice satisfaction and most or least preferred guidance strategies were found to be not associated with either field dependence-independence or age.

Chapter five will explore the implications of these findings. Also, recommendations will be made based upon the analysis of the data presented in Chapter four.
The main purpose of this study was to explore the association of field dependence-independence and the program or curricular choice of older adult evening students enrolled at Moraine Valley Community College. It was felt that this study would help demonstrate whether or not this cognitive style dimension had any value for this type of college student. No other study was found which included either this population or these specific programs.

To answer this main purpose, the five objectives were developed to determine whether there was an association between (1) age, sex and cognitive style, (2) cognitive style and program choice, (3) decision status and cognitive style, (4) choice satisfaction and cognitive style and (5) most/least preferred guidance strategy and cognitive style.

**Study Methodology**

Specifically, the population for this study consisted of students 22 years of age or older who were enrolled in selected classes which began at 5:00 p.m. or later at Moraine Valley Community College. The classes used in this study related to seven program areas representing the two major curricular divisions of the community college: occupational and transfer programs. There were four program areas included from the 1 and 2 year occupational program category: (1) business-
management, (2) business-technical, (3) mechanical and engineering technology, and (4) public service. There were three program areas from the transfer category: (1) liberal arts, (2) business, and (3) science.

The sample group consisted of 298 subjects who were enrolled in 26 classes randomly selected from the lists of classes for the seven curricular areas. Each subject completed a personal data blank and the group form of the Embedded Figures Test (GEFT). Of the 298, 200 were classificable as field dependent or field independent. The data for these 200 subjects were used in completing this study.

The hypotheses of this study were based upon the earlier research for other populations. They were stated as null hypotheses.

1. No association will be found for the characteristics of field dependence-independence as measured by the Group Embedded Figures Test in relation to sex and age in this population.

2. No association for the characteristics of field dependence-independence as measured by the Group Embedded Figures Test and curricular preference will be found in the population being studied.

3. No association for the characteristics of field dependence-independence as measured by the Group Embedded Figures Test will be found in relation to decided or undecided subjects in regard to curricular preference in the population being studied.
4. No association for the characteristics of field dependence-independence and satisfaction-dissatisfaction with curricular choice will be found in the population being studied.

5. No association for the characteristics of field dependence-independence and most/least preferred guidance strategy will be found among undecided students in the population being studied.

To test these hypotheses, various chi-square tests of association were used. They included both two-way and three-way tests. Where a significant association was found, additional statistical measures were used to further explore that association. For a 2 x 2 chi-square, Yules Q was used to determine the strength of the association. For a 2 x a chi-square, Ryan's Procedure was used to identify the classificatory variables which were contributing most to the association found.

**Study Results**

The preceding was a summary of the purpose and procedures used in conducting this study. The following is a summary of the results of the study.

**Cognitive style, sex and age.**

In testing the first hypothesis it was found that of the three independent variables (cognitive style, sex and age), only age and cognitive style were associated. Subjects over the median age (29.4 years) were significantly more field dependent than subjects below the
median age. The variables of sex and cognitive style were not associated at the five percent level of probability; however, the $\chi^2$ statistic was less than the ten percent level of probability. Thus, even with the small adjustment in the score ranges for both the field dependent and field independent categories on the basis of sex, the relationship of the two variables approached significance. Female subjects were more field dependent, though not significantly so, than were male subjects. Finally, the presence of a third characteristic had no effect on the relationship of the other two. For example, the presence of sex had no effect on the association between age and cognitive style.

**Cognitive style, age and program choice.**

The tests of significance for the second hypothesis revealed that both age and cognitive style were associated with program choice. Also, age and cognitive style were associated for subjects who had made a program choice.

Age and program choice were associated at less than the five percent level of probability. This latter association was significant at less than the one percent level of probability. The $\varphi$ value of .46 indicates that this was a moderate positive correlation. In comparing the seven individual program areas, it was found that no two program areas differed significantly from each other in regard to the age of the subjects.

Cognitive style and program choice were associated at less than .001 level of probability. Subjects enrolled in occupational programs
were significantly more field dependent than were subjects enrolled in transfer programs. This association was significant at less than the one percent level of probability. The $\phi$ value was -0.49 which indicated a moderate negative correlation. However, this value was only 0.01 from being a substantial negative correlation according to the conventions for Yules $Q$. In examining the individual programs, it was found that the public service subjects differed significantly from science-transfer and business-technical subjects. Public service subjects tended to be field dependent while science-transfer and business-technical subjects tended to be more field independent.

As a result of the three-way analysis, it was also determined that the presence of a third characteristic does not affect the degree of association between the other two. The presence of age did not affect the degree of association between cognitive style and curricular preference.

**Cognitive style, age and decision status.**

The third hypothesis was tested by using the three-way procedure. The results of the various tests of significance indicated that neither age nor cognitive style were associated with a subject's decision status. Undecided subjects (undecided in regard to curricular preference) did not differ significantly from decided subjects in either age level or field dependence-independence. In testing the first hypothesis, it was already learned that age and cognitive style were associated at less than the five percent level of probability.
Cognitive style, age and choice satisfaction.

In examining the fourth hypothesis, it was discovered that only 19% of the 160 subjects who had made a curricular choice expressed any degree of dissatisfaction with that choice while satisfied subjects accounted for 81% of the group. The tests of significance revealed that there was not an association between either age level or cognitive style and choice satisfaction. Because of the very small proportion of subjects who were either dissatisfied (4%) or were not sure how satisfied they were (15%), a three-way chi-square could not be used to analyze the data.

Cognitive style, age and most/least preferred guidance strategies.

In order to test the fifth hypothesis four two-way chi-square tests of significance were used. Age level and cognitive style were examined in relationship to both the most preferred and least preferred guidance strategies. Neither cognitive style nor age were associated with the most or least preferred guidance strategies. However, a probability level of less than .10 was found for the association between cognitive style and the most preferred guidance strategies. Field independent subjects tended to prefer self-help strategies more than field dependent subjects. Field dependent subjects tended to prefer individual consultations and group activities more than field independent subjects.
Conclusions

The findings related to age tend to corroborate the results of a study by Schwartz and Karp. They also found that as age increases so does field dependence. Witkin, et al, state that there is some evidence that the process of so called de-differentiation (increasing field dependence) begins in the late thirties. This study raises the possibility that this process may begin slightly earlier than the late thirties for older adult (22 years of age and older) community college students enrolled in evening classes. In any case, the finding of an association between age and cognitive style caused this investigator to consider age as an additional variable throughout the remainder of this study.

In previous studies summarized in the manual for the embedded figures test, it has been found that there is a small but consistent difference between males and females on the basis of cognitive style. Female subjects have tended to be more field dependent. This study would tend to confirm these previous findings. If the adjustment in score ranges had not been made, the chi-square value would have been significant at the five percent level of probability. Therefore, the adjustment that was made appears to be logical in obtaining equivalent ranges for males and females.

1 Schwartz and Karp, "Field Dependence in a Geriatric Population."


3 Ibid.
The findings related to cognitive style and program choice represent some new findings. This study determined that there was an association between program choice and field dependence-independence for a population not previously studied: older adult, evening students enrolled in a community college. Further, students from this population enrolled in occupational programs were determined to be more field dependent than were transfer students. Previous studies by Osipow, DeRussey and Futch, Chung, and others found that field independent students chose more scientific or analytic fields while field dependent subjects chose less scientific, more people oriented fields. This study also found similar results for a population heretofore neglected. Public service programs which represent more people oriented fields were chosen by a significantly greater proportion of field dependent subjects and science-transfer and business-technical which represent more analytical fields were chosen by field independent subjects. However, the mechanical and engineering classification contained more field dependent subjects than field independent ones. While the difference between this and other programs was not significant, it is a somewhat surprising finding in the light of previous studies.


Barrett and Thornton\textsuperscript{7} found that engineers and technicians were field independent. The present study would indicate that it cannot be assumed that previous findings are applicable to this older adult group of students without further investigation.

In studies by Osipow\textsuperscript{8} and Clar,\textsuperscript{9} different results were obtained in relation to cognitive style and decision status than were obtained in this study. Osipow found that undecided females tended to be field dependent, and Clar found that field dependent subjects were more vocationally undecided after counseling than were field independent ones. This difference between the present study and those previously reported is important. Since the subjects in this study are older than subjects in either the Osipow or Clar study, they would have had more intervening life experiences. These life experiences, including employment, could have the effect of mitigating against the effect of field dependence in program choice for older adult students.

Once again, age could have interfered with the effects of cognitive style and choice satisfaction. Clar\textsuperscript{10} had found that field independent subjects expressed more realistic initial vocational choices.


\textsuperscript{8}Ibid.

\textsuperscript{9}Clar, "The Relationship of Psychological Differentiation to Client Behavior in Vocational Choice Counseling," \textit{Dissertation Abstracts International}, 32, p. 1837B.

\textsuperscript{10}Ibid.
than did field dependent ones. This finding formed the basis for the hypothesis that field dependent subjects would be more dissatisfied with their program choice than field independent subjects. However, the expected result was not found in this study. Life experiences could have the effect of helping students of any cognitive style be more realistic in their choice of educational programs. This finding underscores the need to test previous findings for other populations on older adult evening students. Assumptions made as a result of these previous findings in regard to decision status would have been false for this population.

Crutchfield,11 Messick and Demarin,12 Fitzgibbons et al,13 and Ruble and Nakamura14 established that field dependent subjects were more attentive to the social surroundings. Thus, it was felt by this investigator that field dependent subjects who were undecided as to program choice would prefer the more social guidance strategies: individual consultation and group activities. Also, the Ruble and Nakamura study and studies on reinforcement such as that conducted

11 Ibid.
by Ferrell\textsuperscript{15} indicated that field-independent subjects were more task oriented than field-dependent subjects. Therefore, it was also hypothesized that field independent subjects would be more attuned to self-help guidance strategies.

Using a chi-square statistic, the null hypothesis that there would be no association between cognitive style and most preferred guidance strategies was not rejected at the experiment wide $\alpha$ level of five percent. However, the consequences of making an error by rejecting an hypothesis at a higher level are small. The probability that the association found was due to chance was less than 1 in 10, or less than the ten percent level of probability. For purposes of planning guidance activities and suggesting them to students according to cognitive style findings, this level appears more than adequate to this investigator.

Field dependent subjects selected the more social strategies as expected. Sixty-three percent selected individual consultation strategies. Among field independent subjects, the most frequently preferred strategies were self-help strategies with 46% choosing either to use a programmed guide to educational-vocational decision making or to use informational materials by themselves. Though not significant at the five percent level, the findings were in the predicted direction and appear to be useful.

\textsuperscript{15}Ferrell, "The Differential Performance of Lower Class, Pre-School, Negro Children, Dissertation Abstracts International, 32, pp. 3024B-3029B.
No association was found for cognitive style and the least preferred guidance strategies. Age was not associated with either most or least preferred guidance strategies. Developing guidance strategies based upon age level appears to be not as wise as developing them according to cognitive style differences.

**Implications**

The finding that there was an association between cognitive style and program choice for community college students over 22 years of age enrolled in evening classes is an important one. It has implications for both teaching and guidance. Because of the importance of such a finding, several recommendations can be made relative to it.

First, teachers and counselors at Moraine Valley Community College should be made aware of the findings of this, and other, studies concerning cognitive style and its educational correlates. This would alert them to the possibilities and problems associated with cognitive style. Selecting teaching strategies and the diagnosing of learning difficulties are both affected by cognitive style research. The staff should also become familiar with their own cognitive style, and the possible problems it may have for students. However, before any major programs are initiated beyond awareness and simple applications, more research needs to be conducted. Because it explores a population heretofore neglected, this study needs to be corroborated by similar studies. Further, the success and persistence of these students needs to be examined in relation to field dependence-independence. These
studies could supply the necessary evidence upon which some major pro-
gramming could be built. Illustrative of this major programming could
be efforts to develop alternative learning materials and procedures for
students enrolled in any given program or efforts to develop teaching
modules designed to teach learning strategies to students whose styles
do not naturally possess those strategies. Perhaps further research
could identify areas where such effort would be of most value.

Second, since cognitive style appears to affect educational-
vocational choice, counselors need to take more notice of the cognitive
styles of students. It should be noted that the results of this study
and others like it should not be used to justify the use of cognitive
style as a screening device in program admission. Field dependent
persons might perform well in analytical fields and field-independent
persons in people oriented fields with the development of appropriate
skills. While it would be inappropriate to "screen out" students from
curricula more hospitable to one style or another who do not possess
that style, it would be appropriate to discuss a client's style with
its attendant advantages and disadvantages. The information about
cognitive style should also help provide some insight into possible
student problems that a counselor might be asked to help a student
resolve. Difficulty with courses in a particular program could be due
to a mis-match of the students cognitive style and the nature of the
skills expected in the course. Or a student-teacher cognitive style
mis-match would also be possible. Special informational programs
about cognitive style need to be presented to community college
counselors to acquaint them with this concept and its associated findings.

Since cognitive style was not associated with the decision status or program choice satisfaction of subjects in this study, field dependence-independence does not appear to be useful in determining those who may need educational-vocational guidance. Thus, field dependence-independence cannot be used to identify those students within this age group who may be most in need of educational-vocational guidance. Because this finding is at odds with previous findings in this area, another look at this phenomenon is important. A study should be conducted to determine if this finding can be corroborated for this population. It should also explore the effect of life experience on educational-vocational choice. A wider scale of choice satisfaction should also be used to further explore the relationship of this factor in relation to field dependence-independence.

However, this present study does appear to indicate that the guidance staff could plan alternate guidance strategies for persons who are field dependent or independent. Self-help strategies appear to be preferred by more field independent subjects, and individual consultation is preferred by field dependent subjects. Since field dependent subjects predominate in the population under study here, more individual counseling time should be made available for evening students in this and similar colleges. Here, again, more research is needed. Most persons in the group studied have had little or no exposure to group strategies except as they are reported in the media.
A study comparing the most preferred strategies should be conducted on a sample group of older adult community college students who have experienced self-help, individual and group strategies. In addition, counselors need to know which are the most effective strategies with persons of varying cognitive styles. These findings would be very helpful in matching student style with the best strategies for that style.

Finally, the results of this study can only be appropriately extended to community colleges and to a student sub population similar to the one used in this study. The results cannot be generalized to other types of community colleges and students. More studies need to be conducted at other types of colleges and with other sub populations before any results can be widely generalized.

Because of the diversity of both students and programs, community college educators are faced with a myriad of teaching and guidance problems. In addition, relatively new strategies are being employed to meet these problems in both the instructional and student personnel programs. Cognitive style research appears to be useful in understanding the success or failure of these new strategies. Research studies such as this one conducted for all the various sub populations within the community college student population can provide valuable information in the evaluation process. These findings could help minimize the failures and increase the successes of these new programs for the benefit of the students and the communities they serve.
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**PERSONAL DATA BLANK**

1. Name___________________________________________ 2. Date________________

3. Date of Birth___________________________________________ 4. Sex________________

5. Present Occupation___________________________________________

6. Have you definitely decided on a program or major at this time?
   Yes____ No____

7. IF YOU HAVE DECIDED on a program or major check it on the following list (CHECK ONLY ONE).

<table>
<thead>
<tr>
<th>1 or 2 Year Occupational Programs</th>
<th>2 Year Transfer Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting &amp; Computing</td>
<td>Accounting (4 yr. degree)</td>
</tr>
<tr>
<td>Business Mid-Management</td>
<td>Art, Music</td>
</tr>
<tr>
<td>Child Care</td>
<td>Biology, Chemistry</td>
</tr>
<tr>
<td>Data Processing</td>
<td>Business Management (4 yr. degree)</td>
</tr>
<tr>
<td>Drafting and Machine Design</td>
<td>Elementary Education</td>
</tr>
<tr>
<td>Electronics</td>
<td>Finance (4 year degree)</td>
</tr>
<tr>
<td>Exceptional Education</td>
<td>Mathematics, Physics</td>
</tr>
<tr>
<td>Fire Science</td>
<td>Personnel Management</td>
</tr>
<tr>
<td>Human Services</td>
<td>Philosophy, History</td>
</tr>
<tr>
<td>Marketing Mid-Management</td>
<td>Political Science,</td>
</tr>
<tr>
<td>Police Science</td>
<td>Economics</td>
</tr>
<tr>
<td>Power Machines Technology</td>
<td>Pre-Engineering</td>
</tr>
<tr>
<td>Teacher Aide</td>
<td>Pre Law</td>
</tr>
<tr>
<td>Other___________________________</td>
<td>Pre Medicine</td>
</tr>
<tr>
<td></td>
<td>Pre Nursing (4 yr. degree)</td>
</tr>
<tr>
<td></td>
<td>Pre Pharmacy</td>
</tr>
<tr>
<td></td>
<td>Pre Social Work</td>
</tr>
<tr>
<td></td>
<td>Sociology or Psychology</td>
</tr>
<tr>
<td></td>
<td>Speech, Drama, Literature</td>
</tr>
<tr>
<td>Other___________________________</td>
<td>Other___________________</td>
</tr>
</tbody>
</table>

8. IF YOU HAVE DECIDED on a program or major field of study, how satisfied are you with your choice of program or major field at this time. Please check the appropriate phrase:

   ____I am satisfied
   ____I am not sure how satisfied I am
   ____I am dissatisfied
IF YOU HAVE NOT DEFINITELY DECIDED on a program or major field answer question 9.

9. A number of counseling and guidance services are offered to help students choose a program or major. Please indicate which one of the following you would most prefer by placing a check (✓) in the space provided. Indicate the one you least prefer by placing an 0 in the space provided:

Most Preferred = ✓  Least Preferred = 0
(check only one choice) (place an 0 by only one choice)

___ Individual sessions with a professional counselor to explore possible program choices.

___ Individual sessions with a well-informed adult student like myself (not a professional counselor) to obtain information about programs or majors.

___ Read or look at information about programs and majors by myself in the information center.

___ Use a printed step-by-step guide to help me make a choice of programs or major on my own.

___ Meet with a small group of students to explore possible choices led by a professional counselor.

___ Meet with a small group of students to hear and discuss information about programs or majors led by a well-informed adult student like myself (not a professional counselor).
The dissertation submitted by Richard D. DeCosmo has been read and approved by the following Committee:

Dr. John A. Wellington, Chairman
Professor, Guidance and Counseling, Loyola

Dr. Mary Kathryne Baratta
Research Associate, Moraine Valley Community College

Dr. John P. Eddy
Professor, Guidance and Counseling, Loyola

Dr. Manuel S. Silverman
Associate Professor, Guidance and Counseling, Loyola

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Education.

Date: January 5, 1977

Director's Signature