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Cognitive Styles and Measured Occupational Preferences of College Freshmen and Sophomores

Leonard M. Fisher
Andrews University

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Andrews University
School of Education

COGNITIVE STYLES AND MEASURED OCCUPATIONAL
PREFERENCES OF COLLEGE FRESHMEN
AND SOPHOMORES

A Dissertation
Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

by

Leonard M. Fisher
May 1984
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PREFERENCES OF COLLEGE FRESHMEN
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ABSTRACT

COGNITIVE STYLES AND MEASURED OCCUPATIONAL PREFERENCES OF COLLEGE FRESHMEN AND SOPHOMORES

by

Leonard M. Fisher

Chairman: Robert A. Williams, Ph.D.
ABSTRACT OF GRADUATE STUDENT RESEARCH
Dissertation

Andrews University
School of Education

Title: COGNITIVE STYLES AND MEASURED OCCUPATIONAL PREFERENCES OF COLLEGE FRESHMEN AND SOPHOMORES

Name of researcher: Leonard M. Fisher

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Problem
This research study tested the hypothesis that significant statistical relationships obtain for junior college and college freshmen and sophomore students, between the cognitive style measures field independence/dependence, "preference for structure," Harvey's Cognitive Style Factors--and occupational factors measure by the UNIACT Interest Inventory.

Method
Four paper and pencil tests measuring three cognitive styles were administered to 213 Michiana area junior college and college freshmen and sophomores. The Group Embedded Figures Test was used
to measure field independence/dependence while the two major measures of "preference for structure" cognitive styles were the VRTTAB average, and the FRTTAB average scores of the Verbal Reasoning Test and the Figure Recognition Test. Harvey's Cognitive Style Factors were measured by means of the Personal Opinion Scale. Occupational preferences were measured by the UNIACT Interest Inventory. Sixty specific research hypotheses and eight of the nine linear hypotheses were tested by zero-order correlation and stepwise-regression analysis, respectively. The ninth general linear hypothesis was tested by means of canonical-correlation analysis.

Findings

Results of the study indicated that field independence was statistically significantly related to two of the eight interest patterns, those of Science and Technical interest. A statistically significant correlation between field-independence and Creative Arts interest appeared consistent with the type of items measured on the UNIACT Interest Inventory. "Preference for structure" was found to be only minimally related to UNIACT Interests. Harvey's Cognitive Factors yielded by far the most statistically significant relationships both considered separately as well as collectively considered in relation to each of the interest scales. Canonical-correlation analysis indicated the significant correlation between variables in the first set, Need to Help People, Need for Structure-Order, and field independence and the variables in the second set of interests in Social Service, Business Detail, Science, and Things.
Conclusions

Although these research findings appear somewhat limited in scope they nevertheless seem to provide sufficient evidence to establish a significant relationship between the selective cognitive-style measures used in this study and general occupational preferences as measured by the UNIACT Interest Inventory. Even though some of the relationships suggested by the research literature (e.g., Field Dependence associated with Social Service, "preference for structure" associated with Science and Business Detail interests) were not obtained, the overall study appeared supportive of the literature and yielded a number of interesting and meaningful relationships on cognitive style preference variables and offered support for the further study of these two important classes of variables.
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CHAPTER I

INTRODUCTION

Statement of the Problem

Research through the years has suggested that interest type represented an outgrowth of personality development. Darley (1938, 1941) saw occupational selections as functions of ability and/or aptitude as well as personality type. He concluded that "occupational interest types grew out of the development of the individual's personality." Bordin (1943) further elaborated interest type in terms of the individual's identification of self-concept. Bordin asserted that in answering an interest inventory an individual expresses his acceptance or rejection of a particular view or concept of himself in terms of his own occupational stereotype. Super (1953) conceived interests as a product of the interaction between inherited aptitudes and endocrine factors on the one hand, and opportunity and social evaluation on the other. In investigating the relationships between motives and vocational interests, Crites (1963) postulated that interests were reflections of more general motives. Although his empirical study demonstrated significant relationships between certain motives and vocational interests, the study generally failed to indicate how various significant motives are translated into vocational interests. Other investigators, for example, Sarbin and
Berdie (1940); Tyler (1945); Ginzburg (1951); Roe (1956); Dunnette et al. (1958); Walsh (1959); Stewart (1959); and somewhat more recently Scott and Day (1972); and Johnson; Nelson; Flammer (1975), have investigated the relationships of personality structure, needs, motives, defenses, and other factors believed relevant to occupational interests and choices. However, mixed findings and only relatively modest relationships have generally emerged, suggesting a continuing need to understand the specific manner in which selected personality orientations, perceptual styles, needs and dispositions might become associated with occupational preferences. As a result of this lack of understanding, an approach which utilized constructs that might shed light on the translation process referred to above would seem to be a fruitful approach for research.

Cognitive theories using hypothetical constructs such as cognitive styles, perceptual styles, and personality constructs have greatly increased the understanding of how the individual perceives, organizes, processes, transforms, and adapts the world of experience consistent with his personality style (Tyler, 1954; Kelley, 1955; Gardner 1959; Witkin, Lewis, Hertzman, Machover, Meissner, and Wapner, 1954, 1972; Klein, 1960; Allport, 1961; Harvey et al., 1961; Bieri, 1971; and Messick, 1976. Inasmuch as occupational preferences represent an individual's attraction to groups of occupations and occupational activities, a study of these variables from a cognitive viewpoint also appears worthwhile. It would appear to the author, because of his familiarity with occupational preferences and interest and familiarity with research literature on cognitive styles, that
it is reasonable to expect some kind of relationship between the
two—that cognitive styles shape one's experiences and perspectives
in a way that leads to the specification of occupational prefer­
ences. With this notion in mind the author reviewed the literature
and was able to give more specificity to his hunch of the relation­ship
between cognitive styles and occupational preferences. The
following is a brief review of selected major studies which lends
some credence to the relationship. A more thorough review of the
direct and supporting literature will be presented in chapter II.

Borow (1964) suggested the use of expressive and stylistic
traits to study vocational interest and choice. In the same series
of papers, Tyler (1964) presented an approach for studying vocational
interests and occupational selection with respect to cognitive struc­
tures and activities. A number of studies have been made in an
attempt to relate cognitive styles to occupational preferences.
Pierson (1965) investigated the relationship of two major cognitive
styles of field-independence/field-dependence, preference for struc­
ture, and selected demographic variables with subject's scores on
the Strong Vocational Interest Blank and found few statistically
significant relationships.

Chung (1966) explored the relationships between four cogni­
tive styles (field dependence-independence, leveling-sharpening,
constricted-flexible control, and equivalence range) and both aca­
demic fields in college and Kuder Preference Record categories. To
his sample of 141 college students taken from eight academic areas,
Chung applied multiple-discriminant analysis in order to determine
the relationship between the previously mentioned variables and cognitive style. His study found a significant relationship between cognitive style and academic areas but not between cognitive style and vocational interest groups.

Osipow (1969) investigated five female and two male groups of college-level students; measured the relationship of four selected cognitive styles to student scores on Holland's Vocational Preference Inventory; and concluded that his results appeared to lend some substance to the general hypothesis that VPI personality traits are related to cognitive functioning. He further postulated that educational groups preparing for different vocations exhibit distinctive cognitive styles.

Zytowski and Mills (1969) investigated the relationship of psychological differentiation and scores on the Strong Vocational Interest Blank and found that neither error nor time scores of the Embedded Figures Test were systematically related to the Strong Vocational Interest Blank. However, an additional measure of differentiation entitled the Sophistication of Body Concepts, measured by variation of the Draw-A-Person Test, exhibited significant correlations with some of the engineering and business scales as hypothesized, but the hypothesis for the social services scales was clearly not supported.

Scheibner (1969) investigated the "possible relationships between field-independent and field-dependent perceptual styles and measured interest and attitude patterns. A secondary consideration was the relationship of these perceptual styles to academic
achievement" (p. 127). Regarding field-independent and field-dependent perceptual styles and measured interest, Scheibner concluded that (1) from the male data, there was some evidence that measured interest and perceptual styles were related in males; (2) from the female data, there was insufficient documentations to show a relationship between measured interest and perceptual style in females; and (3) in field-independent men, there is evidence of greater agreement of measured vocational interest and stated vocational goals than in field-dependent men which was not true for women.

Baker (1970) investigated the relationships of creativity to several selected personality variables. Baker tested three main and two secondary hypotheses. The three main hypotheses were:

1. Graduate students judged to be highly creative will be more open-minded than graduate students judged to be noncreative.
2. Graduate students judged to be highly creative will operate from a more internal locus of evaluation than graduate students judged to be noncreative.
3. Graduate students judged to be highly creative will be less field dependent than graduate students judged to be noncreative. (Baker, 1970, p. 41)

The two secondary hypotheses were:

4. Students who are judged to be highly creative will not have higher grade point average than students judged to be noncreative.
5. Students who are judged to be highly creative will prefer complexity, as measured by the Revised Art Scale, more frequently than will students who are judged to be noncreative. (Ibid.)

She found that none of the three major hypotheses and only the minor hypothesis which anticipated no difference in grade point averages between students judged to be low and those judged to be
high in creativity were confirmed. Additionally, analyses of how the selected personality variables interacted in specific schools were performed. Results of these analyses indicated that subjects who were judged as highly creative in engineering were found to be less field dependent than those who were judged to be low in creativity. A trend in the same direction for students in business administration was also found. Students who were judged to be highly creative in engineering and sociology were found to have higher grade point averages than those who were judged to be low in creativity. A trend in the same direction was found for students in business administration.

Quinlan and Blatt (1972) investigated field articulation and performance under stress in surgical and psychiatric nursing student nurses and found that psychiatric student nurses who were given the highest effectiveness ratings by their supervisors were relatively field-dependent, whereas the most highly rated surgical student nurses tended to be field-independent.

In studies of the relation between cognitive style and academic achievement in specialized areas, field-independent students have been found to do significantly better in the sciences and engineering than more field-dependent students (Dubois & Cohen, 1970; Rosett, Robbins, & Watson, 1968).

MacKinnon (1962) investigated the relationship between cognitive style and achievement in practicing architects. The study found practicing architects chosen as outstandingly creative by their peer group to be markedly field-independent. Holtman et al.
(1971) and Peterson and Sweitzer (1973) also found architecture to be one of the fields favored by field-independent students in the academic setting.

Studies of subjects already engaged in occupations (e.g., Barret & Thornton, 1967) have shown that engineers are likely to be very field independent.

Watson (1978) in a study utilizing Harvey's Conceptual Systems Test, the Role Survey, and the Self-Esteem Questionnaire found that nursing students are more abstract than practicing nurses; more nursing students than practicing nurses or other students have a need for structure and order, and nursing students have a higher overall expanded role orientation than practicing nurses.

Goodenough et al. (1979) in two longitudinal studies investigated cognitive style in the development of medical careers. The first study investigated field dependent-independent students who chose a premedical major at college entrance, and who apply and are successful in gaining admission at medical school. The authors concluded that these cognitive styles played a discernible role in determining who eventually enters medical school. In the second study of medical students, the authors found that field dependent-field independent students subsequently tend to choose different medical specialties.

A careful consideration of all of these studies suggests that there is potential for relating such behavioral concepts concerning cognitive style to Holland's personality types. To
this end, this study investigates relationships between selected
cognitive styles and occupational preferences as a contribution
toward clarifying this area.

**Purpose of the Study**

The purpose of this study was to search for empirical sup­
port for the contention that there is a significant relationship
between the several cognitive styles and occupational preferences
of college freshmen and sophomore students. The three cognitive
styles selected for this study were Field-Independence/Field-
Dependence, Preference for Structure, and Harvey's Six Cognitive
Factors. The occupational preferences were measured by the UNIACT
Interest Inventory. Occupational preferences as well as the Data/
Ideas, Things/Persons interests were measured by the UNIACT Interest
Inventory. The three cognitive styles selected for this study as
well as the UNIACT Interest Inventory are described below.

**Field-Independence: Intrinsic-Extrinsic Orientation**

From the cognitive viewpoint, Witkin's et al. (1962, 1972)
field-dependence/field-independence construct-dimension reflects
an external-internal orientation. Basically the field-independent
person is likely to rely primarily on internal references in process­
ing information and controlling his behavior, whereas the field-
dependent person is more likely to rely primarily on external
reference in process information and controlling his behavior. As
a result of the internal reference available for restructuring the
psychological field, field-independent people are much more likely to use a restructuring approach and are much more successful in solving a variety of perceptual and problem-solving tasks (Goodenough, 1976). Additionally, in defining their attitudes field-dependent people are more likely to make use of external social frames of reference and to engage in behaviors likely to make those reference available to them when needed. Thus field-dependent individuals have been characterized as having a social orientation. Field-independent people, in contrast, are likely to have a non-social orientation. Such differences have been identified in a variety of specific kinds of social behavior. For example, field-dependent people are relatively attentive to social cues provided by others whereas field-independent people prefer more solitary impersonal situations. Also field-dependent people prefer interpersonal situations in which they are involved with others and as a consequence show greater skills in getting along with others, while field-independent people are more concerned with ideas and abstract principles.

Of special interest to vocational psychologists is the observation that field-dependent individuals choose popular occupations requiring considerable involvement with other people, and further that field-dependent subjects are low in achievement orientation. On the other hand, the field-independent individual appears cold and distant to others, and tends to be individualistic, while the field-dependent individual makes a favorable first impression, is gregarious, affectionate, considerate, and tactful (Witkin
et al., 1962). The field dependent/field independent cognitive style was measured by the Group Embedded Figures Test (Witkin et al., 1971).

**Preference for Structure**

Frenkel-Brunswik (1940) first reported intolerance of ambiguity to be an emotional perceptual variable which was related to difficulty in managing ambiguities and inconsistencies. Pemberton (1952), investigating closure factors relating to temperament, administered a battery of twenty-five cognitive tests to 154 men and women, mostly graduate students. Eight factors were extracted from the intercorrelations among the twenty-five tests. Pemberton found:

People with high scores on tasks involving flexibility of closure regard themselves as socially retiring, independent of the good opinions of others, analytical, and interested in theoretical and scientific problems; and they express a dislike of rigid systematization and routine.

A markedly different self-evaluation is given by the group making high scores on the speed of closure tests. This group shows positive association with sociability, self-confidence, quick reactivity, and artistic interests. They express a dislike for logical and theoretical problems. Furthermore they describe themselves as systematic, neat, and precise, in contrast to all the other high groups. This was found meaningful in the light of Frenkel-Brunswik's discussion of intolerance of ambiguity. (pp. 173-174)

Guilford's (1959) factor analytic research basically supported this conception, delineating one factor containing two components: (1) "black-white thinking" and (2) "need for definiteness." Intolerance of ambiguity is a cognitive and perceptual attitude which has been given a central place in discussions of cognition (Krech et al., 1962) and has been found to be significantly related to occupations.
(Budner, 1962). As such it appears to be a mode which might be associated with or control relative interests in occupations characterized by clear-cut versus unstructured, vague job requirements.

In the series of studies investigating intolerance of ambiguity in medical education, Budner (1962) studied medical students comprising the five major medical specialties and general practice and found that the mean rankings of specialty fields in terms of the degree of structure characterizing them tended to fall into three clusters—psychiatry as the least structured; internal medicine, general practice, and pediatrics in the middle; and surgery and obstetric-gynecology as the most structured.

In the second study, Budner asked medical-school students to list their residency plans. The approximately 75 percent who chose major specialties, gave usable responses, and had plans, were divided into three groups: (1) those planning to enter psychiatry, (2) those planning to enter general medicine, pediatrics, and general practice, and (3) those planning to enter surgery or obstetrics-gynecology. Budner found those tolerant of ambiguity tended to choose relatively unstructured fields while for those intolerant of ambiguity, the reverse was true.

In a third study, students who preferred to practice in one of the five major specialties were asked to indicate the specialty in which they would most and least prefer to work. Using these two questions to construct an index of preference for unstructured specialties, Budner found the correlation coefficients between the index and ambiguity scores were statistically signifi-
cant in the first year medical students and insignificant in the second and third year.

In a fourth study, data were analyzed involving medical students' evaluations of their preferred field of specialty practice. Two major groups were set up. Those who evaluated their chosen fields as structured scored as significantly more tolerant of ambiguity than those who perceived their fields as unstructured.

In the fifth study, a scale of intolerance of ambiguity in medical situations measuring to a large extent acceptance of the psychiatric ethos was correlated with the general ambiguity scale in the six medical-school samples. The results strongly suggested that acceptance of the ethos was negatively associated with ambiguity intolerance.

Although not statistically significant, Budner found that student nurses preferring to work on medical and psychiatric wards tended to score more ambiguity tolerance than those preferring to work on the other wards; and that those with a psychoanalytic orientation tended to score more ambiguity tolerance than those with a somatic orientation.

However, Pierson (1965) in his investigation of cognitive styles and measured vocational interests of college men found preference for structure measures to be only minimally related to SVIB interest patterns.

**Harvey's Six Cognitive Factors**

Harvey (Harvey, Hunt & Schroeder, 1962; Harvey & Schroeder, 1963), focusing on the Concrete-Abstractness dimension of cognitive
functioning, has postulated that persons can be placed on a concrete-abstract dimension according to their cognitive functioning. He further postulates that from the interaction between conceptual content and structure, four systems of cognitive structure may be theoretically deduced. His System I cognitive functioning person has the most concrete mode relating to and constructing the world. 

System I individuals are characterized as being high in superstition, having high religiosity, being high in absoluteness, closeness of belief, and of having high evaluativeness, and high dependence on representatives of institutional authority. They also are closely identified with social roles and status positions.

System II cognitive-style individuals more than any other of Harvey's self systems are guided by more rejection of social prescriptions and avoidance of dependency on government and other representation of institutional authority.

System III individuals are described as less oriented toward institutional power and authority than are System I individuals, with their attitudes of deference and acquiescence; or than System II individuals, with their orientation on independence and negative rebellion. System III individuals are postulated to be concerned with establishing friendships, and intergroup consensus, in order to avert feelings of helplessness and social isolation that would result from being forced out on their own.

System IV is the most abstract of Harvey's four systems. System IV individuals are seen as highly task oriented, in.ormation
seeking, engaging in exploratory behavior, and being characterized by risk taking and independence.

Harvey related all four systems of cognitive style to six cognitive factors which he identifies as Divine Fate Control (DFC), Need for Structure-Order (NSO), Need to Help People (NHP), Need for People (NFP), Interpersonal Aggression (IA), and General Pessimism (GP). The relation of these cognitive factors with the eight scales on the UNIACT Interest Inventory were explored in this study.

The UNIACT Interest Inventory

The UNIACT Interest Inventory (1977) developed by the American College Testing Service was used to measure the occupational preferences (Holland's Types) of the selected students.

The corollary purposes of the study are to aid in identifying any significant relationship which may be found in carrying out the main purpose of the study. Specifically the corollary purposes of the study were:

1. To describe the cognitive styles held by the selected students.

2. To describe the occupational preferences of the selected students.

3. To assess the specific relationships between the selected cognitive styles and the eight subscales of the UNIACT Interest Inventory.

4. To determine the relative weight of the various cognitive style dimensions distinguishing the selected students according to the eight subscales of the UNIACT Interest Inventory.
Significance of the Study

Osipow (1969) has indicated that cognitive styles are a set of behavioral concepts which offer potential for relating Holland's personality types to larger behavioral issues. Because Holland's conception is molar, it is limited as an explanatory system despite its potential usefulness as a predictive model. However, there is evidence to support the idea that occupational preferences and selection at least partially reflect an individual's attempt to find an occupational environment perceived to be congruent with personal style. Thus, personality types (Holland, 1968) are found to be significantly related to basic human behavioral cognitive styles and their importance to occupational behavior may result.

Assumptions

This study was based on the following assumptions:

1. All students have individually predominant cognitive styles and occupational preferences.

2. The several measures of cognitive style actually and accurately measure the predominant cognitive styles of the students.

3. Because of the varied background in education, upbringing, ability, and other factors, cognitive styles and occupational preferences will differ from student to student.

4. The UNIACT Interest Inventory adequately measures the interest and Holland-type "personal orientation" of students.
Definition of Terms

For the purposes of this study, the following definitions of terms were adopted:

1. **Cognitive Styles.** Cognitive styles are defined as habitual ways or modes of dealing with information about oneself and one's environment which are to a large degree independent of the information being handled (Warr, 1970, p. 11).

2. **Occupational Environment.** Occupational environment refers to that set of physical settings posing special problems and stress. According to Holland (1973) there are six types of environments, each corresponding to and dominated by a given type of personality. This study uses Holland's definition and the term personality type is synonymous with the occupational environment it dominates. Because different types have different interests, competencies, and dispositions, they tend to surround themselves with special people and materials and seek out problems that are congruent with their interests, competencies, and outlook on the world.

3. **Occupational Preference.** Occupational preference designates those measured interests as manifested on the UNIACT Interest Inventory.

4. **Preference for Structure.** Preference for structure as used in this study is defined as the motor-style response associated with need for definitiveness. As such this mode of response would theoretically be associated with or controlling of relative interests and occupations characterized by clear-cut versus unstructured, vague job requirements. For the purpose of this study the degree of
preference for structure is defined as measured by the two basic scores identified by Pierson (1965), namely, mean number of tabs lifted per item in the Figure Recognition Test, and mean number of tabs lifted per item on the Verbal Reasoning Test.

5. Divine Fate Control. Divine Fate Control (DFC) is the conviction that a divine being has, and ought to have, control of the person's life.

6. Need for Structure-Order. Need for structure-order (NSO) is the desire for the various aspects and situations of a person's life to be highly organized and arranged.

7. Need to Help People. Need to help people (NHP) is the feeling of satisfaction derived from and the importance attached to doing things for others.

8. Need for People. Need for people (NFP) is the feeling that contact with people is very important and constitutes a primary source of one's own satisfaction.

9. Interpersonal Aggression. Interpersonal Aggression (IA) is the feeling that a person will, or is likely to, express hostility toward others when they do something the person does not like.

10. General Pessimism. General pessimism is the feeling of general distrust of people, especially those in power, such as politicians.

Statement of Hypotheses

The purpose of this study was to investigate the proposition that occupational preferences of junior college and college freshmen
and sophomore students are a related variation in certain cognitive styles. To clarify the central problem, sixty specific research hypotheses and nine general research hypotheses were tested from the data in the study.

**Specific Hypotheses**

This study related field independence, the degree of preference for structure, and Harvey's Six Cognitive Factors to the several UNIAC T Interest scales. The specific research hypotheses tested by this study in order to explore the general hypotheses stated below are here stated in null form. The significance of their respective relationships are evaluated by noting their product-moment correlation coefficients in a zero-order correlation table. There are forty-four null hypotheses to be tested. Hypotheses one through eight list relationships between (1) field independence and (2) preference for structure and each of the eight UNIAC T Interest scales. In each case, the hypothesis is identified as "a", "b", and "c", where "a" relates field independence to the interest scale; "b" relates the figure recognition that measure of preference for structure to the interest scale; and "c" relates the verbal reasoning test measure of preference for structure to the respective interest scale. Hypotheses nine through forty-four relate Harvey's Six Cognitive Factors to the several interest scales respectively. The sixty specific research hypotheses are as follows:

**Hypothesis 1a.** There is a significant relationship between field independence and interest in Science as measured by the UNIAC T scale.
Hypothesis 1b. There is a significant relationship between FkTTAB measured "preference for structure" and interest in Science as measured by the UNIACT scale.

Hypothesis 1c. There is a significant relationship between VRTTAB measured "preference for structure" and interest in Science as measured by the UNIACT scale.

Hypothesis 2a. There is a significant relationship between field independence and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 2b. There is a significant relationship between FRTTAB measured "preference for structure" and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 2c. There is a significant relationship between VRTTAB measured "preference for structure" and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 3a. There is a significant relationship between field independence and interest in Social Service as measured by the UNIACT scale.

Hypothesis 3b. There is a significant relationship between FRTTAB measured "preference for structure" and interest in Social Service as measured by the UNIACT scale.

Hypothesis 3c. There is a significant relationship between VRTTAB measured "preference for structure" and interest in Social Service as measured by the UNIACT scale.

Hypothesis 4a. There is a significant relationship between field independence and interest in Business Contact as measured by the UNIACT scale.
Hypothesis 4b. There is a significant relationship between FRRTAB measured "preference for structure" and interest in Business Contact as measured by the UNIACT scale.

Hypothesis 4c. There is a significant relationship between VRRTAB measured "preference for structure" and interest in Business Contact as measured by the UNIACT scale.

Hypothesis 5a. There is a significant relationship between field independence and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 5b. There is a significant relationship between FRRTAB measured "preference for structure" and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 5c. There is a significant relationship between VRRTAB measured "preference for structure" and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 6a. There is a significant relationship between field independence and interest in Technical as measured by the UNIACT scale.

Hypothesis 6b. There is a significant relationship between FRRTAB measured "preference for structure" and interest in Technical as measured by the UNIACT scale.

Hypothesis 6c. There is a significant relationship between VRRTAB measured "preference for structure" and interest in Technical as measured by the UNIACT scale.

Hypothesis 7a. There is a significant relationship between field independence and interest in Data/Ideas as measured by the UNIACT scale.
Hypothesis 7b. There is a significant relationship between FRTTAB measured "preference for structure" and interest in Data/Ideas as measured by the UNIACT scale.

Hypothesis 7c. There is a significant relationship between VRTTAB measured "preference for structure" and interest in Data/Ideas as measured by the UNIACT scale.

Hypothesis 8a. There is a significant relationship between field independence and interest in Things/People as measured by the UNIACT scale.

Hypothesis 8b. There is a significant relationship between FRTTAB measured "preference for structure" and interest in Things/People as measured by the UNIACT scale.

Hypothesis 8c. There is a significant relationship between VRTTAB measured "preference for structure" and interest in Things/People as measured by the UNIACT scale.

Hypothesis 9. There is a significant relationship between Harvey's Divine Fate Control and interest in Science as measured by the UNIACT scale.

Hypothesis 10. There is a significant relationship between Harvey's Divine Fate Control and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 11. There is a significant relationship between Harvey's Divine Fate Control and interest in Social Service as measured by the UNIACT scale.

Hypothesis 12. There is a significant relationship between Harvey's Divine Fate Control and interest in Business Contact as measured by the UNIACT scale.
Hypothesis 13. There is a significant relationship between Harvey's Divine Fate Control and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 14. There is a significant relationship between Harvey's Divine Fate Control and interest in Technical as measured by the UNIACT scale.

Hypothesis 15. There is a significant relationship between Harvey's Need for Structure-Order and interest in Science as measured by the UNIACT scale.

Hypothesis 16. There is a significant relationship between Harvey's Need for Structure-Order and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 17. There is a significant relationship between Harvey's Need for Structure-Order and interest in Social Service as measured by the UNIACT scale.

Hypothesis 18. There is a significant relationship between Harvey's Need for Structure-Order and interest in Business Contact as measured by the UNIACT scale.

Hypothesis 19. There is a significant relationship between Harvey's Need for Structure-Order and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 20. There is a significant relationship between Harvey's Need for Structure-Order and interest in Technical as measured by the UNIACT scale.

Hypothesis 21. There is a significant relationship between Harvey's Need to Help People and interest in Science as measured by the UNIACT scale.
Hypothesis 22. There is a significant relationship between Harvey's Need to Help People and interest in Creative Arts as measured by the UNIACCT scale.

Hypothesis 23. There is a significant relationship between Harvey's Need to Help People and interest in Social Service as measured by the UNIACCT scale.

Hypothesis 24. There is a significant relationship between Harvey's Need to Help People and interest in Business Contact as measured by the UNIACCT scale.

Hypothesis 25. There is a significant relationship between Harvey's Need to Help People and interest in Business Detail as measured by the UNIACCT scale.

Hypothesis 26. There is a significant relationship between Harvey's Need to Help People and interest in Technical as measured by the UNIACCT scale.

Hypothesis 27. There is a significant relationship between Harvey's Need for People and interest in Science as measured by the UNIACCT scale.

Hypothesis 28. There is a significant relationship between Harvey's Need for People and interest in Creative Arts as measured by the UNIACCT scale.

Hypothesis 29. There is a significant relationship between Harvey's Need for People and interest in Social Service as measured by the UNIACCT scale.

Hypothesis 30. There is a significant relationship between Harvey's Need for People and interest in Business Contact as measured by the UNIACCT scale.
Hypothesis 31. There is a significant relationship between Harvey's Need for People and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 32. There is a significant relationship between Harvey's Need for People and interest in Technical as measured by the UNIACT scale.

Hypothesis 33. There is a significant relationship between Harvey's Interpersonal Aggression and interest in Science as measured by the UNIACT scale.

Hypothesis 34. There is a significant relationship between Harvey's Interpersonal Aggression and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 35. There is a significant relationship between Harvey's Interpersonal Aggression and interest in Social Service as measured by the UNIACT scale.

Hypothesis 36. There is a significant relationship between Harvey's Interpersonal Aggression and interest in Business Contact as measured by the UNIACT scale.

Hypothesis 37. There is a significant relationship between Harvey's Interpersonal Aggression and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 38. There is a significant relationship between Harvey's Interpersonal Aggression and interest in Technical as measured by the UNIACT scale.

Hypothesis 39. There is a significant relationship between Harvey's General Pessimism and interest in Science as measured by the UNIACT scale.
Hypothesis 40. There is a significant relationship between Harvey's General Pessimism and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 41. There is a significant relationship between Harvey's General Pessimism and interest in Social Service as measured by the UNIACT scale.

Hypothesis 42. There is a significant relationship between Harvey's General Pessimism and interest in Business Contact as measured by the UNIACT scale.

Hypothesis 43. There is a significant relationship between Harvey's General Pessimism and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 44. There is a significant relationship between Harvey's General Pessimism and interest in Technical as measured by the UNIACT scale.

General Hypotheses

Nine general hypotheses were tested from the data in the study. The nine general hypotheses which follow are in a generic sense inclusive of the sixty specific hypothesis because the zero-order relationship take things only one at a time and fail to look at the patterns of relationships. These additional hypotheses are offered as a more systematic and comprehensive test of the relationship of cognitive styles to occupational preferences. The nine general hypotheses are as follows:
1. There is a linear combination of the cognitive-style scores which yields a statistically significant correlation with the **Science** type on the UNIACT Interest Inventory.

2. There is a linear combination of the cognitive-style scores which yields a statistically significant correlation with the **Creative Arts** type on the UNIACT Interest Inventory.

3. There is a linear combination of the cognitive-style scores which yields a statistically significant correlation with the **Social Service** type on the UNIACT Interest Inventory.

4. There is a linear combination of the cognitive-style scores which yields a statistically significant correlation with the **Business Contact** type of the UNIACT Interest Inventory.

5. There is a linear combination of the cognitive-style scores which yields a statistically significant correlation with the **Business Detail** type on the UNIACT Interest Inventory.

6. There is a linear combination of the cognitive-style scores which yields a statistically significant correlation with the **Technical** type on the UNIACT Interest Inventory.

7. There is a linear combination of the cognitive-style scores which yields a statistically significant correlation with the **Data/Ideas Dimension** on the UNIACT Interest Inventory.

8. There is a linear combination of the cognitive-style scores which yields a statistically significant correlation with the **Things/People Dimension** of the UNIACT Interest Inventory.

9. There is a linear combination of cognitive-style scores and a linear combination of UNIACT Interest Inventory-type scores.
which yields a significant canonical correlation between the two sets.

Limitations of the Study

The population for this study was defined as the body of selected junior college and college freshmen and sophomore students available at the local Michiana Junior College and college campuses. Specifically, freshmen students were obtained from Bethel College; junior college students comprising both freshmen and sophomore students were obtained from Holy Cross Junior College, and freshmen and sophomore students were obtained from Indiana University, South Bend. The age range of the students was 17 to 25. It is necessary, therefore, to limit the conclusions of this study to that population as described above.

Organization of the Study

The study is organized as follows: Chapter I includes the statement of the problem, the purpose of the study, significance of the study, assumptions, definition of terms, statement of hypotheses, and limitations of the study. In chapter II, the literature is reviewed. Chapter III describes the research design; describes the population and instrumentation used for the study; states the null hypotheses and describes the methods of analysis. The data are presented and analyzed in chapter IV, and chapter V summarizes the study and presents findings and conclusions and suggestions for further research.
CHAPTER II

COGNITIVE STYLES AND MEASURED OCCUPATIONAL PREFERENCES: A REVIEW OF THE LITERATURE

Field Independent/Field Dependent

Chung (1966) investigated the nature and extent of relationships between measures of four different cognitive styles (i.e., field independence-field dependence, leveling-sharpening, constricted-flexible control, and equivalence range) in both academic areas in college and Kuder Preference Record Vocational Form C categories. Using a sample of 141 college students drawn from eight academic major areas, namely, Social Science, Natural Science, Humanities, Engineering, Elementary Teaching, Music, Social Studies, and Library Science, he applied a multiple discriminant analysis to determine the relationship between the eight major academic areas in the college investigated and nine Kuder Vocational Interest Categories. Chung found that there was a significant relationship between measures of cognitive style and academic major areas in college, but not between cognitive style and the nine vocational interest groups. Although the intercorrelations between scores on measures of cognitive style and vocational interest scores on the Kuder Preference Record in general were not high
enough to suggest any meaningful associations, some significant correlations between Embedded Figures Test (EFT) (field independence) and Mechanical ($r = .274$), Computational ($r = .220$), and Science ($r = .293$) were obtained. Additionally inverse relationships were found between field dependence and persuasive ($r = -.211$) and Social Service ($r = -.279$).

Barrett and Thorton (1967) investigated cognitive-style differences between engineers and college students. The authors stated their study was designed to determine whether engineers were more field independent than the normal population. Rod-and-frame test data were obtained from engineers and technicians and compared with those obtained in previous studies (Witkin et al., 1954). Two samples were tested: the first composed of engineers and technicians and a second of male college students which were selected because they nearly approached Witkin's so-called standardization population on three important variables, namely, age, occupational status, and educational level. Three hypotheses were generated. First, technical personnel would be more field independent in Witkin's standardization sample; second, college male students would not differ from Witkin's standardization sample; and third, technical personnel would be more field independent than the college students. Data from forty-six of fifty male engineers and technicians between the ages of thirty and forty-five drawn at random from a Midwest Aerospace company from another investigation were available for this study. Of these, twenty-five held a degree in engineering while the remainder had at least two years of college. All subjects were performing
engineering, technical, or technical administrative functions. Eleven males between the ages of seventeen and twenty-two were tested in the same manner as the engineers and technicians. All eleven students were non-degreed and none were majoring in engineering or the physical sciences. The cognitive style was measured with the Rod-and-frame test following the Witkin procedure. Comparison of mean error (degrees) for the technical personnel and the college males along with the Witkin data were made for the three series. The data analysis showed that the technical personnel were significantly less field dependent on either Witkin's standardization sample or the sample of the college males. The authors found no significant difference between the cognitive-style responses of Witkin's standardization sample and the male college students--suggesting that there were no important procedural differences between the measurements in the two studies. The authors stated that all three hypotheses were confirmed: engineers were found to be more field independent than Witkin's standardization sample; college students did not differ from Witkin's normative data; and engineers were more field independent.

Osipow (1969) refers to studies (Osipow & Ashby, 1967) which support the idea that occupational preferences and selection at least partially reflect an individual's attempt to find a work setting he perceives to be congruent with his personal style. Although these studies, the 1959-71 study review (Holland, 1973), as well as recent investigations (for example, Fabry, 1974; Wasserman, 1974; Morrison & Arnold, 1974; Holland & Gottfredson, 1975;
Fishburne & Walsh, 1976) support the validity of his general hypothesis, they do not clearly identify the forces involved in the particular development of individual personality types affecting career preference.

Osipow (1969) proposes the behavioral concepts concerning cognitive types as offering potential for relating Holland's personality types to larger behavioral issues and reviews the results of a number of investigations (Gardner, Holzman, Klein, Linton, & Spence, 1959; Kagan, Moss, & Segal, 1963; Kagan, Rosman, Day, Albert, & Phillips, 1964; Witkin, Dyk, Faterson, Goodenough, & Karp, 1962) which

... suggest that individuals are prone to organize their perceptual experiences along distinctive and significant lines and that these differences in perceptual organization have important behavioral consequences. (p. 535)

However, in his study involving 328 female students representing the fields of nursing, special education, home economics, dental hygiene, and undecided and 37 males in pharmacy and fishery technology, no differences were observed regarding cognitive-style variations and Vocational Preference Inventory high-point codes or ease of vocational selection.

This result is somewhat surprising when compared to the results found by Pierson (1965). Pierson investigated the field independence (intrinsic-extrinsic orientation) and preference for structure (flexibility-rigidity) cognitive styles of 140 University of Texas freshmen and sophomore males as these were related to measures (SVIB) of vocational interest patterns. The cognitive styles
were measured by group tests designed to measure the previously named cognitive styles. Field independence was measured by Hidden Figures III, a group form of the Embedded Figures Test. "Preference for structure" was measured by three group tests which tapped a common dimension of "request for information." These three tests were (1) the Verbal Reasoning Test (VRT), (2) the Figure Recognition (FRT) Tests (Messick & Hills, 1960), and (3) the Information Demand (ID) Test (Westcott, 1961). Strong's Vocational Interest Blank (form MM) was used to measure vocational interests. The independent-dependent score was computed on the basis of the number of correct Hidden Figures III Test answers. "Preference for structure" was measured by the average number of tabs lifted or clues requested on the FR, VR, and ID tests. The SVIB was scored not only for the individual occupational scales but also for five interest group patterns in which, for each group, a single index was yielded. To test the hypothesis, three correlational methods were employed; a principal axis factor analysis was used to clarify the "preference for structure" style, a zero-order product-moment correlational analysis for evaluating a specific hypothesis, and multiple-linear regression to investigate the relative contributions to interest prediction of each cognitive-style factor.

The results of the main correlational analysis provided some but limited support for the belief that cognitive styles may organize perception of, and preferential behavior relative to, occupational activities, if significant prediction of vocational
interest scores is taken as evidence of this. Significant relationships between field independence and four SVIB interest pattern indices constituted some substantiation of the general hypothesis. The specific hypothesis relating interest patterns to "preference for structure," however, received little statistical support in this study, although significant correlations occurred at better than a chance rate between this style and individual occupational scales. The field independence factor was the sole factor which contributed to the prediction of variance in the physical science group index. The findings from the multiple-regression analysis and the zero-order correlation analysis of the sales group paralleled each other where field independence was considered. In contrast, significant concomitance of sales interests with low preference for structure found by multiple linear regression analysis suggested that variance in sales interests might be partially ascribed to the structure preference variable.

Zytowski and Mills (1969) studied the relationship of psychological differentiation and Strong vocational interest measures. Psychological differentiation was measured by error and time scores on the Embedded Figure Test, and a variation of the Draw-A-Person Test entitled "Sophistication of Body Concepts." The authors noted that scores on the field dependence/independence measures appear to be positively related to the block design, picture arrangement, and object assembly subtests of the Wechsler Intelligence Scale for Children. High scores on the cognitive style and the intellectual measures appear to be related to the articulated or field indepen-
dence style, whereas the lower scores on both dimensions seem to be related to the overall global or field dependence style. Additionally, field dependence appears to be related to the lack of clear boundaries between one's body in the field, while awareness of one's body as having a definite and independent structure is regarded as being field independent.

The authors investigated three hypotheses in this study: (1) that there would be a significant negative relationship between scores on the Engineering and related Science Scales (group two) of the Strong Vocational Interest Blank and degree of differentiation; (2) that there would be a similar but opposite relationship between the Business Detail and Business Contact scales (group eight and nine) of the Strong Vocational Interest Blank and the same measures of differentiation; and (3) that there would be a significant positive relationship between the social service scale (group five) of the Strong Vocational Interest Blank and the measures of differentiation.

Subjects were sixty-two male volunteers from a class in Developmental Psychology at Iowa State University. The Embedded Figures Test Data and the Human Figures Drawing were obtained in individual test administration while the subjects were administered the Strong Vocational Interest Blank in a group session. Using a 1966 edition by TESTSCOR, the Strong Vocational Interest Blanks were scored for the regular occupational and non-occupational scales. Scoring on the Embedded Figures test was for total errors and for total completion times. The Human Figures Drawings were scored
independently by three authors for SBC with the mean correlation between raters being .76. Additionally, scores were available for all subjects on the verbal ability measures from the Minnesota Scholastic Aptitudes Test and from the English Expression Exam. Intercorrelations of all sixty-two subjects were computed between all variables of the Strong Vocational Interest Blank, the two verbal ability variables, and the three cognitive-style variables. Partial correlations were computed between the Cognitive Style scores and the Strong Vocational Interest Blank scores keeping constant the influence of both measures of verbal ability noting Corah's (1965) conclusion that differentiation may be an admixture with a component of intellectual ability.

Confirming earlier results by Elliott (1961), the authors found the two measures of differentiation, the EFT and the SBC were not significantly related to each other and suggested that the two instruments were not measuring a common dimension. Although the two scores derived from the EFT, number of errors and total time, were significantly related, they were not sufficiently related to use either singly. The authors noted that, despite Corah's (1965) reported relationship between measures of differentiation and intelligence, only trends in that direction appeared in the investigator's data. However, because of Corah's earlier work, a partialing out and subsequent analysis of the amounts of variance due to intelligence was made. The authors found that neither the Embedded Figure Test error nor time scores have any systematic relationship to scores on the Strong Vocational Interest Blank Scores and deter-
mined that the connection between psychological differentiation as measured by the error and time scores of the Embedded Figure Test and any occupational interest similarity on the Strong Vocational Interest Blank was totally random in their sample. However, results from the SBC rating of human figure drawings suggested that some tentative support may be assigned to the hypothesis. A significant correlation did appear among the Engineering related scales (mathematician). Five of the ten business-detail scales and one of the three business-contact scales correlated beyond the .05 level of confidence with the SBC. However, in group five, Social Service, the predicted relationship was not found.

Some unexpected correlations in the SBC data were observed. Three of the six scales in the technical occupations, specifically servicemen, farmer, and printer, correlated negatively with the sophistication of body concept. On the Group I, the veterinarian scale correlated significantly in adverse relationship to the sophistication of body concept. There was a strong positive correlation on two of the artistic expressive occupations, librarian and music teacher. Additionally, the psychiatrist scale correlated significantly in the positive direction with the sophistication of body concept measure. The authors speculate that it is possible that the forest/farm occupations relationship with lack of differentiation, that is, global style, is conceptually consistent with a lack of specialization in these occupations. Conversely, the authors speculate that the librarians' concern for detail may be the source of their concern for detail in the Human Figure Drawing,
which obtains for them a high differentiation score. The authors regard their speculations, however, as highly tentative due to the incomplete support for these assertions from other related scales from the Strong Vocational Interest Blank.

Zytowski and Mills (1969), in summarizing their study, indicate that while others have found many relationships between the level of psychological differentiation and other behavior variables, their study did not find that differentiation consistently penetrates the Strong Vocational Interest transformation of interest into occupational similarity scores. When verbal ability is held constant, only SBC demonstrates some of the hypothesized relationships, and additional relationships present themselves which are difficult to explain. The authors indicate that their study demonstrates several difficulties in dealing with Witkin et al. constructs—specifically, the apparent lack of relationship between the various measures of psychological differentiation. Attempting to discuss their results, the authors cite the lack of relationship between the two measures used and talk of types of differentiation, that measured by the EFT and that measured by the SBC. Because of the difficulty of instrumentation, the authors recommend two other measures of differentiation, the Rod-and-Frame Test (RFT) and the Tilting Chair Test (TRTC) which were not used. The authors felt that further study of cognitive style and occupational interest should include these measures.

Scheibner (1969) studied the "possible relationships between field independent and field dependent perceptual styles and measured interests and attitude patterns" with a secondary view of the rela-
tionship of academic achievement and these perceptual styles. The sample composed of 193 Temple University freshmen and sophomore basic-studies students was divided into four basic variable groups (field-independent males, field-dependent males, field-independent females, field-dependent females) according to their sex and their scores on the Thurstone Concealed Figures Test (perceptual-style criterion measure). The Occupational Interest Inventory was used to assess vocational interests, while the Runner Studies of Attitude Patterns--College Form was used to assess attitude patterns. Academic achievement was measured by the end-of-year grade point average and comparisons of verbal and math ability were obtained from College Entrance Examination Board scores. According to Scheibner, "The means and standard deviations for each variable group were computed for each of the aforementioned variables, and statistical comparisons were made through the use of t tests or chi squares." Relationships were only considered significant at or below the 5 percent level.

Scheibner concluded in her study that: (1) using the total number of males and females there was no demonstrated sex difference in perceptual style, (2) from the male data there was some evidence that measured interests and perceptual style were related in males, (3) from the female data there was insufficient documentation to show a relationship between measured interests and perceptual style in females, (4) in field-independent men there is evidence of greater agreement of measured vocational interests and stated vocational goals than in field-dependent men which was not true for
women, (5) there is some evidence of the relationship between perceptual style and attitude patterns in males, (6) there is insufficient evidence to show relationships between perceptual style and attitude patterns in females, (7) field-independent males have better mathematical aptitude (but not verbal) than field-dependent males, (8) field-independent females have better mathematical and verbal aptitude than field-dependent females, and (9) there is evidence of better academic achievement in field-independent than field-dependent males.

Baker (1970) used measures of three different cognitive styles (i.e., field-independence-dependence, open-closed-mindedness, internal versus external locus of evaluation) in an effort to explore the nature and extent of relationships between them and creativity. Using a sample of eighty-five graduate students drawn from five graduate school populations (business administration, education, technology, social work, and sociology), students were rated as highly creative or as being less or noncreative. Twenty-nine professors and instructors served as judges from the several graduate school areas. Students were administered a Dogmatism Scale, Form E, (Rokeach, 1960) which measured individual differences in the open or closed mindedness of the belief systems; the I-E Scale (Rotter, 1966) measuring external locus of evaluation; the Embedded Figures Test (short form) (Jackson, 1956) measuring the field-independence-dependence dimension; the Revised Arts Scale (Welsh, 1959) as well as the Creative Rating Form developed by the author to be used by the judges. Only students who had received at least two ratings
on creativity were considered as subjects. Three major and two minor hypotheses were investigated. The three major hypotheses were:

1. Graduate students judged to be highly creative will be more open-minded, than graduate students judged to be less creative.
2. Graduate students judged to be highly creative will operate from a more internal locus of evaluation than graduate students judged to be non creative.
3. Graduate students judged to be highly creative will be less field-dependent than graduate students judged to be non creative. (Baker, 1970, p. 41)

The two minor hypotheses were:

4. Students who are judged to be highly creative will not have a higher grade point average than students judged to be non creative.
5. Students who are judged to be highly creative will prefer complexity, as measured by the Revised Arts Scale, more frequently than will students who are judged to be non creative. (Ibid.)

These hypotheses were tested by computing Pearson product-moment correlations between all the experimental variables and judges ratings of creativity. None of the three major hypotheses and only the first of the two minor hypotheses was confirmed. Additional analyses involved the computing of separate Pearson product-moment correlations for all the variables within each school. These analyses revealed that students who were judged to be highly creative in engineering were less field-dependent than those who were judged to be low in creativity, and there was a trend in the same direction for business administration students. Students in engineering and sociology who were judged to be highly creative were found to have higher grade point averages than those who were judged to be low in creativity. A trend in the same
direction was noted for business administration students. When a two-way analysis of variance using arbitrarily determined cut-off point ratings as one factor and schools as another was done, business administration students were found to have a significantly more internal locus of evaluation than students in sociology whose external locus of evaluation was greater than the general mean. Grade point averages were found higher for students in education, sociology, and business administration when compared with those in social work and engineering. Preference for complexity as measured by the Revised Arts Scale was found to be greater in sociology students than those in social work and business administration. It was concluded that the findings of the study suggested that "judged creativity represents more of a social judgment than an objective evaluation of a unitary trans-situational personality trait of creativity."

DeRussy and Futch (1971) investigated field dependence-independence as related to college curricula. The subjects were eight male and eight female randomly selected undergraduate chemistry, physics, or mathematics majors and a similar group of randomly selected liberal arts majors. The dependent variable, field dependence, was measured by the seconds it took for each subject to correctly identify the simple form within the more complex figure of Form B of Witkin's Embedded-figures Test. The subject's score was the sum of the solution times, the number of seconds it took to identify all twelve items. Analysis of variance of embedded figures test scores as a function of sex and the college curricula
was performed. Significant differences between all pairs of means were found except between female science and male liberal arts majors. The male science group had two conditions favorable to field-independence (sex and curriculum) and achieved scores that were more field-independent than those of the female liberal arts group who had opposite characteristics. The female science and male liberal arts groups had just one condition favorable to field-independence and had scores in the mid-range of the field dependency-independency scores.

Quinlan and Blatt (1972) investigated the performance of twenty-six volunteer student nurses. Half of these volunteers were randomly assigned to a surgical nursing rotation—which is a highly structured nonpersonal task, and half were randomly assigned to psychiatric nursing—which is a loosely structured interpersonal task. The authors examined two criterion measures: (1) the instructor's grades, and (2) a four-item scale of reported anxiety and stress in the training situation. It was the expectation of the authors that field-independent students would experience less anxiety and perform better in surgical nursing, whereas moderately field-dependent students would experience less anxiety and perform better in psychiatric nursing. The students were tested in their second year of training, four to eight weeks after the start of the training sequence. The Block Design, Object Assembly, Digit Symbol, Digit Span, Information, and Similarities subtests of the WAIS were given along with the Rod-and-frame Test. This was followed by a self-report scale. Additionally an Otis I.Q. score was
obtained from a previous testing. Excluding the WAIS similarities which the surgical group scored significantly higher (p < .01) the two groups were not significantly higher on the cognitive and perceptual measures. The authors found that the surgical sequence subjects reported higher levels of anxiety (p < .01), but both experiences were described by instructors as the most stressful among the student nursing curriculum. The anxiety scale was positively correlated significantly with grades in psychiatry (p < .05) and in the opposite direction (but not significantly) with surgery grades. The difference between the correlations was significant (p < .05). The RFT error score had a positive correlation with reported anxiety in psychiatry (p < .05) and a negative correlation in surgery (p < .10), and the difference between these correlations was also significant (p < .01). Few significant correlations were found with grades and anxiety on the tests with the exception of the WAIS Information subtest which correlated negatively with grades and anxiety in the psychiatry group and in a positive direction in the surgery group. Both differences between correlations were significant (p < .01). The authors concluded that their results suggest that RFT and WAIS Information predict differential abilities to deal with stress in young women that is either task oriented or interpersonally oriented. They further concluded that field dependence may be related to capacity for empathy even though greater anxiety is experienced, in that the greater social sensitivity of the moderately global subjects facilitates functioning with severely disturbed patients. The findings with the Information subtest suggest that the orientation toward factual detail may be more facilitating in some contexts and nonfacilitating in others.
Peterson and Sweitzer (1973) investigated three hypotheses regarding architectural students, namely (1) whether architecture students were more field independent than other university students, (2) whether architecture students were less variable in field independence than other university students, and (3) whether the early years in architecture would be less field independent than the later years. All of these were male students at the University of Cincinnati. Twenty randomly selected volunteers from the University, not including students from the College of Design, Architecture, and Art, were the subjects for this study. The architecture students were randomly selected volunteers from the freshman, sophomore, and prejunior years in architecture and were divided into three groups of twenty each. Using a portable rod and frame apparatus, Rod-and-frame Tests were individually administered. The score for each subject was average degrees from the true vertical over eight trials with the RFT. The difference in field independence between university students and architecture students, the authors found, was that university students have a significantly higher mean than first-year architecture students \((p < .001)\). Similarly, the second-year architecture students had a significantly lower mean when compared with university student means \((p < .01)\). Third-year architecture students had a still significantly lower mean when compared with the university students' mean \((p < .001)\). The authors concluded that it was clear that architectural students are significantly more field independent than unselected university students. With regard to the second hypothesis concerning the homogeneity of
field independence among the sample, the test for homogeneity of variance yielded an $F$ of 4.42 when compared with university students and first-year architecture students ($p < .02$). Similarly, comparisons with second-year architecture students gave an $F$ of 5.77 ($p < .002$), and with third-year students an $F$ of 10.07 ($p < .002$). The authors concluded that architectural students were a particularly homogeneous population with respect to field independency. From an analysis of variance comparing RFT scores for the third-year architectural students, the authors concluded there is no reason to believe that there was a difference in field dependency between the years in architecture ($p < .001$). They stated that their last hypothesis concerning the difference between years in architecture was not supported and speculated that the range of the years sampled was not sufficiently great to produce a significant result.

Witkin et al. (1977) report numerous studies relating the field-independent/field-dependent cognitive styles and their educational implications to four major areas; namely, how students learn, how teachers teach, how teachers and students interact, and how students make their educational/vocational choices and perform in the areas of their choice. For purposes of this study, findings regarding field-independent/field-dependent and educational/vocational choices are used. The authors point out that almost all of the relationships that have been reported have been between field-independence cognitive styles and interest defined in vocational terms as measured by the Strong Vocational Interest Blank or similar
Instruments. The authors indicate that studies have found repeatedly that responses of the more field-independent people to standard interest inventories are.

... consistent with those of people in the mathematics and science domains--as, for example, mathematician, physicist, chemist, biologist, architect, engineer--and of such health professionals as physician, dentist, psychiatrist. In some studies field-independent persons have also shown interest in the teaching of mathematics-science, industrial-arts and vocational-agricultural subjects. These teaching areas, as well as the health-profession areas cited, all require analytical/structuring competence (for psychiatrists, perhaps more during their training than during their medical practice), and, although these areas may also involve interpersonal relations in varying degree, they tend to go with field independence. Field-independent persons also show interest in practical domains, such as production manager, carpenter, forest service, farmer, mechanic (for example, Gehlmann, 1951; Levy, 1969; Pierson, 1965), and they give clear evidence of theoretical interests (for example, Adcock and Webberley, 1971; Pemberton, 1952).

There is finally a result for which we did not have an advance hypothesis but which is worth noting because it has appeared in a number of studies: field independence is associated with artistic interest (for example, Clar, 1971; Crutchfield et al., 1958). (Witkin et al., 1977, pp. 40-41)

In contrast field-dependent persons express interest in interpersonal domains--particularly those that require social skills.

In summarizing the findings of the report of the studies on the field-independent person and educational/vocational interests Witkin et al. (1977) report:

One cluster of interests they frequently express falls in the welfare-helping-humanitarian domain, including social worker, minister, rehabilitation counselor, probation officer. Another is the teaching of social sciences, elementary-school teaching, and business administration. It is noteworthy that the teaching and health-profession areas we find here on the field-dependent side do not involve analytical.
competence, in contrast to their teaching and health-profession counterparts found on the field-independent side, although all these occupations involve interpersonal relations to some degree. Other vocational interests frequently expressed by field-dependent persons fall into the "persuasive-activities" domains (selling, advertising) and administrative activities which involve dealing with people (for example, personnel director, community recreation administrator, YMCA public administrator, city school superintendent, and chamber of commerce director). (p. 41)

In reporting studies of field-independence/field-dependence and educational/vocational choices Witkin et al. report that the studies consistently indicate that

In the academic setting, relatively field-independent college and graduate students are likely to choose for specialization such fields as, for example, the sciences, mathematics, art, experimental psychology, engineering, architecture. Relatively field-dependent students are likely to choose, for example, sociology, humanities, languages, social work, social services (religion), elementary school teaching, education, clinical psychology, writing, nursing. Complementing these findings, studies of persons already engaged in occupations have shown that engineers, architects, Air Force captains, mathematics-science teachers, and airplane pilots are likely to be very field independent (Barrett and Thornton, 1967; Crutchfield et al., 1958; Cullen, Harper, and Kidera, 1969; DiStefano, 1970; MacKinnon, 1962), whereas social-studies teachers (DiStefano, 1970), social workers (Braun, 1971) and writers (MacKinnon, 1962) tend to be field dependent. (p. 43)

Witkin et al conclude that with few exceptions the findings from the studies of cognitive field-independence/field-dependence cognitive style and interests indicate that relatively field-independent persons favor impersonal domains requiring competence in cognitive articulation whereas field-dependent persons favor interpersonal domains which do not call for that kind of cognitive competence.
Goodenough et al. (1979) investigated cognitive styles in the development of medical careers. Two longitudinal studies were made. The first involved a study of college undergraduates who early expressed an interest in medicine and the second a study of medical students. The data were collected in the first study as part of a larger study of academic evolution during the period from college admission through graduate/professional school enrollment. This study of 787 men and 761 women began in 1967 at a large city college. The students were given the Group Embedded Figures Test at that time to assess their standing on the field-dependence-independence dimension. There were asked at this time to indicate their present vocational major and plans. Additionally their SAT-M and SAT-V scores were obtained from their college records. The collection of academic records for these students from the college at which the study was done or the institution to which they had transferred was attempted during the subsequent years. Information as to whether these students had applied to graduate or professional schools was obtained from these records. Since there were sex differences in the extent of field dependence-independence, only data for the men were considered in the study.

One hundred forty-one of the 787 male freshmen declared themselves to be college entry premedical students, 518 declared other vocational plans, and 128 either were undecided or did not complete the vocational questionnaire. The medical-school-applicant group was comprised of 71 students who subsequently requested that their transcript copies be sent to medical schools. Of these 71
students 41 were accepted and enrolled in medical schools, 26 did not enroll, and the subsequent status of four could not be determined. The first analysis of the authors' data compared students who chose and/or were chosen to enter an educational program leading to a medical degree with students who did not at three points in their academic evolution: college entry, medical school applications, medical school entry.

An analysis of variance revealed no significant difference between students who were college-entry premedical students and those students who chose other academic fields. However, the results indicated that medical school enrollees and applicants were significantly more field independent than non-applicants and non-enrollees. Results of the analysis also indicated that some college majors chosen by students tended to be more field dependent than the premedical group, while some other majors were chosen by the students who tend to be more field independent than the premedical group at all points examined during the college years. However, what was most interesting about the data was that senior pre-meds were not much different than other freshmen. The authors concluded that greater field independence of the medical school applicant and enrollee groups reflected a tendency for relatively field dependent pre-meds to change their vocational goal by the time of college graduation and for relatively field-independent pre-meds to remain.

In discussing the SAT scores, the authors indicated that no significant differences were found between pre-meds and non-pre-meds, but both the SAT-V and SAT-M scores were significantly higher among
medical school applicants and enrollees when compared to the rest of the group. The GEFT scores were slightly but significantly related to the SAT-V and SAT-M, and the question of whether the higher GEFT scores among the medical school applicants and enrollees could be attributed to greater scholastic aptitude or to the use of aptitude test scores in the admissions process was investigated. In order to answer this question analysis of covariance was conducted adjusting the GEFT scores, for SAT-V and SAT-M. The difference in GEFT scores in favor of the applying and enrolling groups remained statistically significant (p < .01) and the authors concluded that students who applied to and enrolled in medical schools are relatively field-independent as compared with students in other fields, and the result was not due to aptitudes measured by the SAT.

The next data analysis by Goodenough et al. was to investigate the question as to whether students' cognitive style helps to predict if they will later apply to a medical school and whether they will subsequently be accepted and enrolled. Only those students who declared themselves to be pre-meds at college entry were involved in these comparisons. In order to answer this question 141 male premedical students at college entry were divided into two groups two ways: (1) those who subsequently applied (N = 47) and did not apply (N = 94) to medical school, and (2) those who subsequently did (N = 30) and did not (N = 108) enroll—excluding three students whose enrollment status was unknown. The authors using an analysis of variance found a significant difference (p < .01) in mean Embedded Figures Test scores between the pre-med
students at college entry who applied and those who did not apply. A significant difference (p < .01) was also found between the pre-med students who eventually enrolled in medical school and those who did not. These differences remained significant after covariance adjustments for the SAT-V and SAT-M. The authors concluded that the greater field independence of premedical students who continued their medical education compared to premedical students who did not indicates that these differences cannot be attributed to scholastic aptitudes as measured by the SAT. The final question dealt with by the authors was the relationships between GEFT scores and applicant selection by medical schools: that is, if a student applied, would his cognitive style help predict whether he would be accepted to enroll in medical school. The authors' concluded that the data suggested a negative answer; that is, the mean GEFT score for applicants who enrolled was not significantly different from the mean GEFT score for applicants who did not enroll. They further indicated that therefore it may be concluded that the scarcity of field-dependent medical students was primarily due to a shift in vocational goals while in their college years rather than to medical school selection.

The second longitudinal study by Goodenough et al. was concerned with the relationship between medical students' cognitive styles and subsequent choices of specialty. While this study was also longitudinal in nature, it covered the time period from the fourth year of medical school to the time of board specialty certification. The study was started in 1959-60 with the testing of 111
male students of a fourth-year large medical school class which was located near a liberal arts college from which the subjects of the first study were drawn. The Embedded Figures Test was individually administered to each of the students. Although similar to the GEFT, the subjects score on the EFT was the total time taken to locate the simple figure embedded in each of the twenty-four complex organized designs. Of the 111 students, 106 were later located in the American Medical Directory. Eighty-five were also located in the Directory of Medical Specialists having specialty board certification. Among these specialists, 14 were in psychiatry, 14 in surgery, 15 in internal medicine, 11 in radiology, and 31 in scattered other specialties. The authors stated that the objective of their data analyses was mainly to test the hypothesis that relatively field-dependent medical students would be more apt to specialize in psychiatry during their future professional careers, whereas relatively field-independent students would be more apt to become surgical specialists. A test of this hypothesis that psychiatrists would be more field dependent than surgeons was significant at less than the .05 level. The authors stated that the remaining groups with ten or more cases were also examined for exploratory purposes, even though the data on the other specialties which required more interpersonal relationships with patients such as psychiatry and internal medicine were located toward the field-dependent end of the score distribution, and the specialties which were more impersonal in nature such as surgery and radiology were located toward the field-independent end. However, perhaps
because of the relatively small sizes, overall the groups did not differ significantly. The authors conclude from the data obtained that among students who state themselves to be pre-meds at college entry those who are field independent stand a significantly better chance of becoming medical students than those who are relatively field dependent: that this outcome was a function of the kind of students who presented themselves as candidates for medical schools. The authors conclude that the data suggest that once in the medical profession specialty, choices may be related to field dependence-independence.

**Preference for Structure/Intolerance of Ambiguity**

Frenkel-Brunswik (1949) first reported intolerance of ambiguity to be an emotional perceptual variable which was related to difficulty in managing ambiguities and inconsistencies. Guilford's (1959) factor analytic research basically supported this conception, delineating one factor containing two components, (1) "black-white thinking" and (2) "need for definiteness." Intolerance of ambiguity is a cognitive and perceptual attitude which has been given a central place in discussions of cognition (Krech et al., 1962) and to be significantly related to various occupations (Segal, 1953; Budner, 1962).

Intolerance of ambiguity appears to be a mode which might be associated with or control relative interests in occupations characterized by clear-cut versus unstructured, vague job requirements. In the series of studies investigating intolerance of
ambiguity in medical education, Budner (1962) had medical students rank the five major medical specialties and general practice. He found that the mean rankings of specialty fields in terms of the degree of structure characterizing them tended to fall into three clusters: (1) psychiatry as the least structured; (2) internal medicine, general practice, and pediatrics in the middle; and (3) surgery and obstetric-gynecology as the most structured.

In the second study Budner asked medical school students to list their residency plans. The approximately 75 percent who chose major specialties, gave usable responses, and had plans were divided into three groups: (1) those planning to enter psychiatry, (2) those planning to enter medicine, pediatrics, and general practice, and (3) those planning to enter surgery or obstetrics-gynecology. Budner found that those tolerant of ambiguity tended to choose relatively unstructured fields while those intolerant of ambiguity tended to choose the reverse.

In a third study students who preferred to practice in one of the five major specialties were asked to indicate the specialty in which they would most and least prefer to work. Using these two questions to construct an index of preference for unstructured specialties, Budner found the correlation coefficients between the index and ambiguity scores were statistically significant in the first year and insignificant in the second and third years.

In a fourth study data were analyzed involving medical student's evaluations of their preferred field of specialty practice. Two major groups were set up--those who evaluated their chosen
fields as structured scored significantly more tolerant of ambiguity than those who perceived their fields as unstructured.

In the fifth study a scale of intolerance of ambiguity in medical situations measuring to a large extent acceptance of the psychiatric ethos was correlated with the general ambiguity scale in the six medical school samples. The results strongly suggested that acceptance of these ethos was negatively associated with ambiguity intolerance.

Although not statistically significant, Budner found that student nurses preferring to work on medical and psychiatric wards tended to score more ambiguity tolerance than those preferring to work on other wards; and that those with a psychoanalytic orientation tended to score more ambiguity tolerance than those with a somatic orientation.

For the purposes of this study, the basic scores for measuring the degree of preference for structure are the two measures of the number of mean tabs pulled on the Figure Recognition Test and the number of mean tabs pulled on the Verbal Reasoning Test. These are considered separately but are the two scores under Pierson's (1965, pp. 32-33) definition of preference for structure.

Budner (1962) dealt with the analysis of intolerance of ambiguity and defined this variable as "the tendency to perceive (i.e., interpret) ambiguous situations as a source of threat." He went on to define an ambiguous situation as "one which could not be adequately structured or categorized by the individual because of lack
of sufficient cues . . . in short, situations characterized by novelty, complexity, or insolubility." In summing up the concept, Budner believed that "intolerance of ambiguity may be conceived of as a content characteristic of the individual, as a tendency to evaluate particular phenomena in a particular way; rigidity, as a formal characteristic of the individual, as a tendency to manifest certain modes of response irrespective of the phenomena being dealt with. Data on which Budner's study was based were obtained from a total of seventeen samples:

1. Two introductory sociology classes (combined in the adult education division of a private university in New York City (N = 35).

2. An evening session class in graduate business administration at a university in New York City (N = 37).

3. Two elective classes in education (combined) at one of the municipal colleges in New York City (N = 45).

4. An introductory psychology class, all freshmen, at a college located in the suburbs of New York City (N = 50).

5. An evening session introductory psychology class in the same school (N = 57).

6. Two elective sociology classes (combined) at a private women's college in New York City (N = 41).

7. Two classes of engineering students (combined) in a required course in social studies at one of the municipal colleges in New York City (N = 58).

8. Two advanced classes in sociology (combined) at a private college in New York City (N = 33).

9. A group of first-year student nurses at a local hospital in New York City (N = 34).

10. Two classes in a special English course (combined) at one of the elite high schools in New York City (N = 62).

11. The first-year class at an eastern medical school (N = 79).
12. The second-year class at the same school (N = 75).
13. The third-year class at the same school (N = 75).
14. The first-year class at a midwestern medical school (N = 83).
15. The second-year class at the same school (N = 80).
16. The third-year class at the same school (N = 88).
17. Paid volunteers for a drug experiment, all graduate students in New York City (N = 15). (Budner, 1960, p. 31)

A sixteen-item scale designed to tap a particular mode of response to a specific type of ambiguous situation was the measure of tolerance-intolerance for ambiguity. Each individual scale item was designed to tap at least one of the postulated indicators of perceived threat—phenomenological submission, phenomenological denial, operative submission, and operative denial—and had to refer to at least one of three types of ambiguous situations—novelty, complexity, or insolubility. Individuals in the pre-test and in succeeding administrations of the scale were required to check off one of six response categories for each item varying from strongly agreeing (which was given the score of seven) to strong disagreement (which was given the score of one). In order to minimize the effects of acquiescent response the ambiguity scale was composed of an equal number of positively and negatively worded items.

Cronbach's alpha formula was used to compute reliabilities with the mean of the scale in these samples being approximately .49. The scores ranged from 25-79 and the maximum possible range was from 16 to 112. An experimental group composed of fifteen members was
given the ambiguity scale and then retested at two-week to two-month intervals with the test-retest correlation of .85. Budner, in discussing validity, stated that in general the measures intercorrelated at a level high enough to suggest tapping a common dimension, presumably ambiguity intolerance. Correlations were made between this scale and the Coulter Scale, the Walk Scale, and the Princeton Scale designed also to measure tolerance of ambiguity.

Short autobiographies were obtained from each member of sample 17, and four judges (a psychologist, a teacher, a graduate student, and a secretary) ranked each sample member in terms of tolerance-intolerance of ambiguity on the basis of these autobiographies. The only judge whose rankings did not intercorrelate satisfactorily with the other judges was the secretary.

The third piece of validity datum involved peer evaluation given to sample 10. These high-school students filled out a questionnaire which included five questions regarding tolerance of ambiguity. The correlations between the peer-rating index and the ambiguity scale was .34 (p < .01, two-tailed test). The author concluded that "the ambiguity scale is valid in the sense that it shows moderate correlations with other presumed measures of that dimension, and with judgments of autobiographical material and peer ratings in terms of tolerance-intolerance of ambiguity."

The last concern of this study was to determine particular areas in which intolerance of ambiguity might be a significant variable. The first was the general area of socially relevant beliefs and behavior and included conventionality, religious values,
and censorship. The second was the area of personality and personal value systems which included authoritarianism, attitude toward parents, and machiavellianism. The third was the role of intolerance of ambiguity in the specific area of medical education.

Individuals accept or reject existing norms or values in varying degrees. According to Budner, "since acceptance of such norms and values implicitly reduces the extent of perceived ambiguity with which the individual is confronted, individuals who are intolerant of ambiguity should tend to be more conventional than those who are tolerant of ambiguity." Since one possible indicator of this is the way an individual likes to describe himself, Budner investigated the relationship between conventionality and intolerance of ambiguity. Samples 5 and 10 were asked to fill out a self-rating scale which consisted of pairs of adjectives representing the polar ends of a particular dimension. The subjects were required to rate themselves regarding an estimate of their position on each dimension by using a 7-point scale. Budner found:

Intolerance of ambiguity correlated .32 with tendencies to describe oneself as conventional rather than unconventional, .25 with tendencies to do so as cautious rather than daring, .27 as ordinary rather than individualistic, and .11 with timid rather than bold. (p. 38)

Budner found these correlations to be significant at the .05 level, two-tailed test.

Budner also predicted that an individual could reduce the amount of ambiguity with which he had to contend by belief in divine power and that such beliefs would be positively associated with intolerance of ambiguity. To test this, samples 4, 5, and 6 were
given questionnaires which included several items on religious belief. These items were used to build a 6-item index of religious conviction. Respondents were asked to check one of six categories with stronger, moderately, or slight agreement, to strongly, moderately or slight disagreement with the worded item. Strong agreement on positively worded items was scored 7, moderate agreement 6, slight agreement 5, slight disagreement 3, moderate disagreement 2, and strong disagreement 1. Negative items were scored in the reverse direction. A majority of samples 4 and 5 scored 6 (maximum religiosity) on the index and a plurality of sample 6 did so. Budner found that individuals who scored 6 or more inclined to be tolerant of ambiguity than individuals who scored less than 6, thus supporting this hypothesis.

Budner also predicted that religious-serious attendance might also reflect the effect of conventionality and religious belief and therefore would show positive correlation with intolerance of ambiguity. Samples 4, 5, 6, 8, and 9 were used to test this hypothesis and were queried as to the frequency of religious-service attendance. Budner found the hypothesized association between religious attendance and ambiguity intolerance to be significant in groups 4 and 8. Budner also predicted that self-questioning about one's religious beliefs would show a possible relationship with intolerance of ambiguity. Samples 4, 5, and 6 were given the following statement: "I have often thought and wondered about the meaning of religion and God." Most answers agreed with this statement. Two categories--wonderers and non-wonderers--
were set up and the responses to the question were dichotomized at the median. Budner found that the wonderers scored more tolerant of ambiguity than non-wonderers within each level of religious belief.

Budner's final hypothesis dealt with the socially relevant attitudes outside the area of religion. That is, he predicted "that avoidance of exposure to conflicting value systems, as manifested in favorable attitudes toward censorship, would be positively associated with intolerance of ambiguity." Three of his groups of subjects were given a questionnaire with four items of measuring attitudes towards censorship. Item responses were dichotomized at the median, those below the median were scored zero's and those above were scored one, which yielded a 5-point index of favorable attitudes toward censorship. In general, Budner found support for the hypothesis that the intolerance of ambiguity is positively associated with favorable attitudes toward censorship, although he noted that the index items primarily dealt with attitudes toward censorship on questions of morality.

On the second part of his study, Personality and Personal Values, Budner predicted "on the basis of the theory of the authoritarian personality, that intolerance of ambiguity would be positively related to authoritarianism." Nine samples were given the ambiguity scale and the version of the "F" scale designed by Christie and his associates (1958). Nine correlations were all positive: six at a statistically significant level. In view of the association between intolerance of ambiguity and conventionality, Budner predicted a positive correlation between the ambiguity scale and the measure of the extent to which submission to and idealization of parents was deemed desirable. To research this hypothesis, sample 10 was given a
questionnaire which included the scale of expressed idealization of and submission to parents designed by Budner. He found that the correlation between the ambiguity scale and this instrument was .35, significant at less than the .01 level on a two-tailed test.

As an additional study Budner utilized an instrument designed to tap attitudes and personality traits which were congruent with the successful manipulation of interpersonal relationships. Because of the conflict between conventional morality and the tough-minded items which made up the scale, it appeared reasonable to expect a negative association between this scale and the ambiguity scales. Budner gave these scales to samples 4 through 13 and found that of the nine correlations seven were in the predicted direction, three at a statistically significant level, and the remaining showed complete independence.

In the last part of his study, Budner investigated the relationship of intolerance of ambiguity as a factor in medical education. Among the areas of investigation, one that appeared particularly relevant was specialty preference. Budner felt that "specialties in medicine differ markedly in the degree of structure characterizing them, and insofar as personality factors determine occupational choice, one would expect intolerance of ambiguity to be related to choice of fields of practice." Samples 14, 15, and 16 which were midwestern medical school students, ranked five major general specialties. In terms of degree of structure characterizing each field the mean ranking generally fell into three clusters: the least structured, psychiatry (mean rank 5.44); the most structured, gynecology (mean 2.10) and surgery (mean 2.24); and the middle cluster,
pediatrics (mean 3.48), internal medicine (mean 3.73), and general practice (mean 3.77). Samples 11, 12, 13 which were students at an eastern medical school were investigated as to their residency plans. Approximately one-fourth of the students gave responses that were not usable—possibly because they chose minor specialties or because they had as yet made no plans. The remainder of these samples was divided into three groups: those planning to go into (1) psychiatry, (2) medicine, pediatrics, or general practice, and (3) surgery or obstetrics-gynecology. The data presented gave the proportion of individuals below and above the median on the ambiguity scale in each of these three groups and indicated that those who were tolerant of ambiguity had a tendency to choose relatively unstructured fields, and those who were intolerant of ambiguity had a tendency to choose relatively structured fields. According to Budner, these findings were significant at the .07 level.

The second part of this study dealt with students at a mid-western medical school who were asked to list the specialty in which they most preferred to work and the specialty in which they least preferred to work. The answers to these two questions were used to make an Index of Preference for Unstructured Specialties. For example, a student who chose obstetrics-gynecology as his preferred specialty and psychiatry as his least preferred would be given a score of 2; conversely a student who chose psychiatry as his preferred field and obstetrics-gynecology as his least preferred specialty would be given a score of 10. In the first year the correlation coefficients between the index and ambiguity scale scores was -.43, -.15 for the
second year, and -.18 for the third year. Budner found the degree of association between the two measures meaningfully significant for the first year, insignificant for the second year, and at the .10 level for the third year.

Although statistically insignificant, Budner relates two relevant findings: (1) among sample 9 (student nurses) those with a preference for working on medical and psychiatric wards had a tendency to score more tolerant of ambiguity than those with a preference for working on other wards; and (2) among the small group of medical students those with an orientation toward psychoanalysis had a tendency to be more tolerant of ambiguity than those with a somatic orientation.

Recognizing that recent developments in the education of medical students have stressed the role of social and psychological factors, it was predicted that acceptance of such an approach to etiology and therapy would be inversely related to intolerance of ambiguity. To test this hypothesis, intolerance of ambiguity in a medical setting, which largely measures acceptance of the psychiatric ethos, was correlated with the general ambiguity scale in the six medical school samples. Budner found acceptance of this ethos to be negatively associated with intolerance of ambiguity.

Budner's final analysis concerned medical students' evaluation of their preferred specialty field. Given that perception is influenced by personality characteristics, Budner predicted that "medical students who are intolerant of ambiguity would tend to perceive their preferred fields of medical practice (whatever they might be) as more structured than would students who are tolerant of ambi-

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guity. (p < .46)" Each of three classes at a midwestern medical school were categorized according to the six evaluated fields they would most prefer to enter. Using the median rankings within each of the eighteen groups, students were divided into two clusters: (1) those who graded their chosen practice as relatively structured and (2) those who graded their chosen practice as relatively unstructured. Budner found that those who rated their chosen practice as structured scored significantly more tolerant of ambiguity than those who rated their chosen practice as unstructured (47.0 as opposed to 44.3, p < .02).

Messick and Hills (1960), in their study of the objective measurement of personality cautiousness and intolerance of ambiguity, gave the Figure Recognition Test and the Verbal Reasoning Test to 272 female high-school students from a large urban area who were following a college preparatory course. Five "pure factor" ability reference tests (Advanced Vocabulary, the Mathematical Aptitude Test, the Gestalt Completion Test, Thurstone's Reasoning Test, and the Concealed Figures Test) were additionally administered in order to partial out content-ability variance from the tab-lifting scores and to control the possibility of ability correlates of intolerance of ambiguity from the tab-lifting scores on the two experimental objective personality tests. Scores used for all five aptitude tests were the number correct. The computation of product-moment correlations among the seven tests included both content and tab-lifting scores for the two objective personality tests. For purposes of reliability, scoring was separate on the odd and even numbered items on the Verbal Reasoning and Figure Recognition Tests. On the Verbal
Reasoning Test the corrected split-half reliability of the average tabs-lifted score was .91. The reliability of the tabs scored of the Figure Reasoning Test—which had only half the number of items—was .64. Since there was a significant correlation between the tab-lifted score on the Verbal Test (.36) and the content score of this same test, the consideration arose as to how much influence the reliability of the tab score had on the consistent content variance. Computation was made of the residual tab score (the deviation around the regression of the original tab-lifting score on content ability), with the result that the reliability of the tab-lifting tendency dropped from .91 to .82 upon regressing out the verbal content score. Similarly after regressing out the content measure from the Figure Test, the reliability of the figure tab score dropped only from .64 to .63. According to Messick and Hills,

... since content and tab scores for each test were obtained from the same set of items, some experimental dependence may have affected the recomputation of the reliabilities. Hence, new reliabilities were estimated for residual scores in which Vocabulary was regressed out of the verbal tab measure and Gestalt Completion out of the figure tab measures. (p. 693)

Re-estimation of the reliabilities for these corrected verbal test and figure test tab scores was .90 and .48, respectively. According to the authors, these reliabilities of the tabs scored (various control measures being regressed out) appeared to signify that appreciably less than one-half of the reliable variance of the tab-lifting inclination was because of content ability.

Messicks and Hills tentatively concluded that

Since the two objective personality tests were rationally constructed as direct attempts to assess two aspects of
intolerance of ambiguity—the tendency toward early closure and the tendency to jump to generalizations—the findings of a significant correlation between the two measures contributes to the construct validity of the variable. (p. 695)

However, the authors emphasize that an intuitive analysis of the experimental test procedures additionally proposes considerable face validity for the concept of "cautiousness" or Murray's (1938) "deliberation-impulsion" dimension. At the response level, a similarity appears evident between the tendency to jump to an impulsive conclusion and toward reducing cognitive uncertainty to closure, but the authors caution that the underlying dynamics might differ significantly. Messick and Hills summarize their study by stating that two objective personality tests were developed for the following two phases of ambiguity: (1) tendency to quickly reach perceptual closure and (2)—on the basis of specific information—the tendency to jump to generalization. Each test used a tab format which allowed the subjects to either respond to an item immediately or to lift tabs for more information as he chose. The reliability on the Verbal Recognition Test was .91, while on the Figure Recognition Test with only half as many items was .64. With various ability-control measures regressed out, the corrected reliabilities signified that only a small portion of this reliable variance could be accounted for by content ability. Additionally, the two scores were correlated significantly (.34) and upon partialing out various control measures, the coefficients tended to slightly increase. According to the authors this significant correlation adds to the construct validity of intolerance of ambiguity, but it was also indicated that the
concept of "cautiousness" presented an alternative rationale for the test procedures and was consistent with the end results.

Wescott (1961) quantitatively investigated individual differences in their tendency to carry on intuitive thinking. From 1955 to 1961 the following six samples of college students were used for this study: 30 Oxford undergraduate and graduate students (1955); 33 Vassar college students (1959); 70 freshmen and 44 seniors from Vassar (1960); and 28 females and 38 males from Bard College (1961). A series of twenty problems each consisting of a number of pieces of relevant information (clues) was developed. Each clue could be obtained in a fixed sequence, and if all were exposed, they led to a decision on which a high amount of agreement could be secured. The two general types of problems were series and analogy. Clues in a series-type problem consisted of progressive consecutive steps of a verbal or numerical variety. Clues in an analogy problem were similarly presented and also were of verbal and numerical varieties. Paper seals held in place long tabs which covered each clue. The first tab could be lifted, breaking the seal, and revealing the first clue. To reveal the second clue the tab could be lifted even further and the second seal broken, and so on until the subject had reached a decision of the problem or all the seals were broken. Decisions were written on a separate answer sheet.

The subjects, tested in groups ranging in size from one to fifteen members, were given the tab-covered clues, an answer sheet, and printed instructions describing the procedure for exposing clues. They were encouraged several times to use as few clues as possible.
and to solve as many problems as possible. There was no time limit.

A raw item score (G) and a raw overall score for information demand (ΣG) was obtained by a count of the number of exposed clues. A simple count gave the total number of correctly solved problems (ΣR) by scoring as correct that conclusion which would be agreed upon if all clues were uncovered. In addition to the raw number of clues taken on each problem, and the total clues taken on individual problems, clues were given weight which was empirically determined from the group’s demand for clues on that problem. An efficiency score was also calculated by dividing the number of correctly solved problems by the sum of the weighted item clue scores.

Westcott indicated that the mean number of correctly solved problems by the various groups ranged from 13.1 to 16.0 with standard deviations ranging from 1.9 to 2.7. The mean number of clues used by the various groups ranged from 49.0 to 58.4.

In summarizing his study, Wescott makes the following points: (1) the tendency to demand little or much information is stable within any subject but varies among subjects; (2) the tendency to arrive at correct solutions regardless of information amount is reasonably stable within the subject but varies among subjects; (3) the overall efficiency of problem solving as measured by a ratio between correct solutions and information demand is stable within a subject but varies among subjects; (4) information demand, whether much or little, is unrelated to the tendency to
...to reach correct solutions; and (5) competence displayed by subjects in their solution to problems is positively related to problem-solving efficiency.

Pierson (1965) as part of his doctoral investigated intolerance of ambiguity as one aspect of preference for structure. Pierson, using the Figure Recognition Test and the Verbal Recognition Test developed by Messicks and Hill (1960), postulated that ambiguity intolerant subjects would tend to generalize quickly from specific clues, thus responding prematurely at the expense of accuracy. Mean number of tabs lifted per item was Pierson's basic score measuring the degree of preference for structure in both of these tests. In attempting to relate these cognitive-style factors with Strong vocational interest scores in a group of 140 University of Texas freshmen and sophomore males, Pierson found that, of the three "Preference for Structure Measures," only the Figure Recognition Test tab average was the one which approached showing the statistically significant relationship (-.160) between this style and the social-service collective-interest group. Pierson concluded that both Verbal Reasoning and Figure Recognition were consistently unrelated to vocational interest.

Hansen and Johansson (1974) investigated the relationship between dogmatism and Strong Vocational Interests. An empirical dogmatism scale was constructed from the Strong to differentiate high and low dogmatism criterion samples. The authors concluded that the SVIB dogmatism scale did identify dogmatic and non-dogmatic patterns of occupational interest. Dogmatic interests were found to
be related to conventional or realistic types of occupations, while fine arts occupations had non-dogmatic patterns of interest. Specifically the groups found to be highest in dogmatism were skilled trade occupations—such as farmer, carpenter, tool and die maker—and the military occupations—such as Army sergeant, Army general, and policemen—where regimentation and conformity to authority were necessary. Additionally high positive correlations also were found for the more realistic and conventional basic interest scales including military activities, technical supervision, and office practices. The highest positive correlation with the Holland-type scales was with the conventional scale. This type was characterized by Holland (1966) as rigid, dominant, stable, and conservative and preferring computation and structured occupations. On the other hand the SVIB-dogmatism scale had the highest negative correlations with the artistic basic interest scales of art, writing, and music in the Holland-type artistic scale which characterizes "artistic persons as asocial, sensitive, and introspective; having exceptional motor perceptual skills and preferring literary, dramatic, artistic, and musical areas of interest that are consistent with previous research on open-mindedness."

**Harvey's Six Cognitive Factors**

Watson (1978) compared University of Colorado School of Nursing undergraduate students with practicing nurses and university students at large to examine the level of concreteness-abstractness as measured by the CST, Role Survey, and Self-Esteem Questionnaire.
in the first phase of a longitudinal, nonexperimental, comparative-type study. Subjects of this study were Level-I, University of Colorado School of Nursing undergraduate students, a sample of practicing nurses, and approximately 100 liberal arts students.

In the Fall of 1975, Level-I nursing students were asked to take part on an informed consent basis. The practicing nurse subjects were registered nurses with differing educational background and experience who attended the various University Nurse Practitioner programs in the Spring of 1975. Data on the liberal arts students were gathered from three area colleges—a private college, a private university, and a community college. The data on the nursing students were collected at the end of their first class in a particular course at the beginning of their upper division nursing coursework. For the nurse practitioner, the measuring instruments were used as a part of the evaluation of the continuing education program. One of the three measuring instruments used was Harvey's Conceptual System Test, a forty-eight-item objective test designed as a measure of conceptual or belief systems. Individuals responding to this test can be classified in terms of System I, System II, System III, and System IV categories. The second test administered was the Role survey, a Likert-type scale developed to measure the degree of positive or negative orientation toward the currently existing expanded practitioner role. The third test given, the Self-Esteem Questionnaire, was a twenty-one item scale designed to measure self-esteem and self-other satisfaction.
Watson's results indicated that nursing students were found to be more abstract than practicing nurses; no difference was found on abstractness-concreteness between nursing and the other students. More nursing students than practicing nurses or other students were found to have a need for structure and order, and nursing students showed higher overall expanded-role orientation than practicing nurses.

Although not specifically described as "cognitive" factors, a number of studies relating personality trait or factors (similar to some of Harvey's factors) to vocational interests appeared to warrant reporting.

Dunnette et al. (1958) studied the "Relations among Scores on Edwards Personal Preference Schedule, California Psychological Inventory, and Strong Vocational Interest Blank for an Industrial Sample." The authors found that

... occupational interests directed toward sales, verbal, and personal contact activities show positive association with scales that might be expected to measure social orientation such as Exhibition and Dominance on the EPPS and Dominance Capacity for Status, Sociability and Social Presence on the CPI. On the other hand, scientific interests and skilled trades interests tend to be negatively correlated with the above personality measures and positively correlated with measures more nearly suggestive of individual effort and idea orientation such as Autonomy and Endurance on the EPPS and Psychological-Mindedness and Achievement-via-Independence on the CPI. (p. 179)

Klein (1962) in a study of SVIB scores of clinical psychologists, psychiatrists, and social workers found nine of the forty-five occupational scales significantly discriminated among three professions at the .05 level or higher. The author found:

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Social workers differed from the other two professions on four scales: physician, chemist, YMCA physical director, and YMCA secretary. Fewer psychiatrists than psychologists or social workers showed high interests in personnel management and as might be expected, psychologists differed from psychiatrists and social workers in that more of them scored high on the psychologist scale.

Compared with social workers, both psychologists and psychiatrists had higher interest in the biological science and physical science areas and more often rejected the business detail area. Social workers had higher social welfare interests than psychiatrists or psychologists. In the verbal-persuasive area, all three disciplines differed significantly from each other with social workers showing least rejection and psychiatrists most rejection of the area. (pp. 177-178)

Suziedelis and Steimel (1963) studied the relationship of need hierarchies to inventoried interests. These authors administered the Edwards Personal Preference Schedule and the Strong Vocational Interest Blank to 198 college freshmen and sophomore males. Students were assigned a rank for each of the fifteen needs and the need for which the subjects scored highest was ranked 1 with the rank of 15 for the need with the lowest T score. For each need a "high" and "low" group were then selected from the sample. The A and B+'s on each of seven major occupational categories on the Strong for both high and low group were counted. This procedure was repeated also for each of the fifteen needs on the EPPs versus each of the major occupational groups on the SVIB. The authors found most of the significant relationships obtained were in keeping with common assumptions. For example, individuals with endurance and achievement uppermost in their need hierarchy indicated a preference for the biological and physical sciences. The authors felt this to be meaningful insofar as success in these areas presupposes
strong motivation for achievement and capacity for sustained effort. The findings were likewise in agreement with such stereotype traits as dominance of a salesman, autonomy of an author-lawyer-journalist, and sense of affiliation of a social-service person. The authors felt their findings suggested possible direct application to the EPPs in vocational counseling and personnel selections.

Scott and Day (1972) investigated personality dimensions in vocational interest among graduate business students. Relationships between three broadly defined personality factors underlying the Adjective Check List Test and the basic interest scales for the Strong Vocational Interest Blank (SVIB) were investigated using a sample of 148 graduate business students. These three factors were described as similar to those obtained in other factor analytic studies of the ACL and were defined as general adjustment, self-assertiveness, and ego control. Particular interest for this study was that the authors described a high score on the second personality factor of self-assertiveness as characterized by

... a forceful, dominant, and self-assured individual who is energetic, competitive, and determined to do well. He appears to be assertive in all realms, including the social. In the social realm, his gratification stems more from the opportunity to assume dominant leadership roles than from affiliation for its own sake from the rewards which might be associated with assisting others with their personal problems. (p. 32)

The authors report that the MBA test sample in their study differed significantly from previous studies in that they were lower on the four scales of science, mechanical, nature, and agriculture and had significantly higher scores than reported by Gough and
Heilburn (1965) on the ACL scales of "Defensiveness, Achievement, Dominance, Endurance, Order, and Intraception, and significantly lower scores on Succorance and Abasement." The authors found scores on the self-assertiveness dimension to be significantly correlated with several of the basic interest scales (sales, merchandising, business management) anticipated from the work of Holland in his description of the "Enterprising" personality type as one who has skills for selling, dominating, leading, and concerned with power, status, and leadership.

The authors report a significant correlation between scores on self-assertiveness and the "managerial orientation" scale developed by Nash (1966). This scale taps the characteristic of an effective manager which Nash described as "prefers activities which involve independent and intensive thought, perhaps with some risk involved, (and) . . . enjoys activities which bring him into contact with others, especially if they afford him an opportunity to assume a leadership or dominant role" (p. 252).

The authors found the scores on Ego Control, the third personality dimension were

... associated positively with the Basic Interest Scales of Adventure, Social Science, Teaching, Art, and Writing, and negatively correlated with Office Practices and Mathematics. These results are consistent with the fact that the high Ego control person is one who abhors the routine and seeks to involve himself in self-expressive activities. He desires varied and complex and rather high-risk experiences, many of which are of his own making. Siess and Jackson (1967) identified a similar but bipolar factor, labeled Impulse Control versus Expression, which was positively associated with interests in creative writing and negatively associated with interests in accounting and office work. (p. 35)
Johnson et al. (1975) investigated multiple correlations between personality factors and SVIB Occupational Scales. The authors were interested in the extent to which personality factors in combination contributed to the relative magnitude of the SVIB occupational scores. Five personality factors derived from the California Psychological Inventory (adjustment, extroversion, independent thought, conventionality, and emotional sensitivity) were correlated with each of the occupational scales. Multiple correlations ranged from .24 to .64 for the 359 college males. Although Factors I and IV contributed relatively little to the multiple-regression equations, the authors found:

Eleven of the 48 correlations for Factor II (extroversion) were equal to or greater than .40. The high correlations were positive for social service occupations (YMCA Staff Member, Rehabilitation Counselor, School Superintendent, Public Administrator, Social Worker, and Personnel Director) and negative for technical and scientific occupations (Printer, Carpenter, Farmer, Dentist, and Engineer). None of the correlations for Factor III (independent thought) were as high as .40; however, 10 of the correlations were greater than or equal to .30. The positive correlations were highest for the Psychologist, Psychiatrist, Librarian, and Musician Performer scales while the negative correlations were highest for the Purchasing Agent, Banker, Office Worker, and Pharmacist scales. Two of the correlations for Factor V (emotional sensitivity) were equal to or greater than .40. Eleven additional scales had r's > .30. The highest positive correlations were with the Librarian, Music Teacher, Minister, and Lawyer scales. The highest negative correlations were with the Forest Service Man, Veterinarian, Army Officer, and Policeman scales. (p. 221)

The authors concluded that three factors (extroversion, emotional sensitivity, independent thought) appeared to be tapping the same personality characteristics identified by means of Holland's
Personality Theory. That is, the extroversion factor favored a social versus an investigative-realistic dimension; the emotional sensitivity factor appeared to be an artistic-social versus a realistic dimension, while the third factor, independent thought, could be described as an artistic-investigative versus conventional-enterprising dimension.

Holland's Personal Orientation

In 1959 Holland first advanced his theory of vocational choice. Over the years his theory has undergone considerable transformation partly because of the extensive research that has gone into it. However, the theory is probably best characterized by the summary published by Holland in 1973: Making Vocational Choices; A Theory of Careers. The following is a summary of the major definitions of Holland's Theory that has relevance for this investigation.

1. A person's behavior is determined by an interaction between his personality and the characteristics of his environment.

2. In our culture, most people can be categorized as one of six types--realistic, investigative, artistic, social, enterprising, or conventional. Each type is the product of characteristic interaction between a variety of cultural and personal forces leading to experiences, interests, and competencies which create a particular personal disposition that leads him to think, perceive, and act in special ways. By comparing a person's attributes with those of each model type, we can determine which type he resembles most. That model becomes his personality type.

3. There are six types of environments, each corresponding to and dominated by a given type of personality. Each environment is typified by typical settings posing special problems and stress. Because different types have different interests, competencies, and dispositions, they tend to surround themselves with
special people and materials and to seek out problems that are congruent with their interests, competencies, and outlook on the world.

4. People search for environments that will let them exercise skills and abilities, express their attitudes and values, and take on agreeable problems and roles.

5. Within a person or an environment, some pairs of types are more closely related than others, and degrees of consistency or relatedness are assumed to affect vocational preferences.

6. Some persons or environments are more clearly defined than others.

7. Different types require different environments. Incongruence occurs when a type lives in an environment that provides opportunities and rewards foreign to the person's preferences and abilities.

8. The relationships within and between types of environments can be ordered according to a hexagonal model in which distances between the types of environments are inverse proportionally to the relationships between them. (pp. 2-4, 24-26)

Holland (1966) has defined environmental models in terms of the situation or atmosphere created by the people who dominate a given environment. Thus, for each personality type there is a logically related environment. The following are the descriptions of the hypothetical environments:

1. The Realistic environment is characterized by dominance of environmental demands and opportunities for explicit physical and concrete tasks and expected behaviors. These include explicit, ordered, and systematic manipulation of objects, tool, machines, and animals. Tasks usually call for immediate behavioral action, and pressure does not exist for interpersonal skills or close interpersonal relationships.

2. The Investigative environment is characterized by the dominance of environmental demands and opportunities that entail thinking responses which are not only abstract in nature but require
the use of creativity and imagination. Occupational activities in this environment involve the observation and symbolic systematic creative investigation of physical, biological, or cultural phenomena and involves ideas and things rather than other people. A minimum of pressure for social skills exists and, as might be expected, the work setting is usually indoors.

3. The Social environment is characterized by the dominance of environmental demands and opportunities that entail the ability to interpret as well as to modify human behavior. There is caring, enlightening, and communicating and helping others. Occupational activity in this environment generally demands verbal facility with people rather than with things and rewards people for the display of social values.

4. The Conventional environment is characterized by the dominance of environmental opportunities and demands that require systematic, concrete, and conventional responses. Mental strength is required and work activities are carried out indoors. As work in this environment is mainly with things and materials, people are prone to cope with others in a controlling, conforming, and practical manner, and the pressure for interpersonal skills is not high.

5. The Enterprising environment is characterized by the dominance of environmental demands and opportunities that entail verbal responses and verbal persuasion and the manipulation of others to attain self-interest or organizational goals. The environment demands an interest in people and things and encourages
people to see themselves as possessing leadership and speaking ability and to construe the world in terms of power, status, responsibility, and stereotype constricted in independent and simple terms. Although the social skills are needed--because many work activities are people-oriented--the environment does not call for the ability to form close interpersonal relationships.

6. The Artistic environment is characterized by the dominance of environmental demands that entail the use of the imagination and personal competency as well as the personal interpretations of feelings, ideas, or fact to create art forms or products. Word activities usually require drawing upon a person's total resources with attention involved for long periods of time. While some work activities involve close interpersonal relationships, others may be complete in isolation. Although excellence is valued, the standards of excellence are often subjectively defined or defined subjectively.

Holland (1973) has summarized the evidence for the usefulness of his theory and its classification scheme, including all relevant information for the period 1959 through 1971 with few reports from 1972.

More recent studies have provided supportive evidence for Holland's theory. For example, Fabry (1974), in making multiple comparisons of adult samples of policemen, clergymen, life insurance salesmen, and gas station managers, found the samples usually showing the correct Holland codes for their occupations. Wasserman (1974), employing Holland's theory to test the personality and vocational choices of adolescent girls, concluded that it was more
appropriate for career-oriented than for homemaker-oriented women. However, when Morrison and Arnold (1974) found that an assessment of four samples from the nonprofessional occupations in Holland's theory produced more negative than positive evidence, they suggested that a revision of the classification be made. Holland and Gottfredson (1975), in testing the predictive value and psychological meaning of vocational aspirations, found that categorical and correlational analyses showed that a person's retrospective vocational aspirations had coherence and yielded efficient predictions. Fishburne and Walsh (1976) have checked the concurrent validity of Holland's theory for noncollege-degree workers by using the Vocational Preference Inventory and Self-Directed Search profiles for barbers, electronic technicians, photographers, bartenders, gas station managers, and accounting clerks.

However, Holland has been criticized (Prediger & Hanson, 1974) for using reporting procedures which are sex-restrictive. That is, sex interest differences are assumed by Holland and his co-workers to indicate that men and women are suited for different types of occupations. Holland and his co-workers maintain that interest score reports must be sex-restrictive to be valid (Gottfredson et al., 1975). Prediger argues that sex differences in response to many items, especially those with obvious sex-role connotations, reflect the effects of sex-role socialization without necessarily reflecting differences in basic interests. He asserts that interest reports based on the same sex norms result in similar (sex-balanced) career suggestions to both men and women (Hanson,
1975). According to Hanson, Prediger, and Schussel (1977), any reporting procedures providing similar career suggestions to men and women may be called sex-balanced.

Rayman (1976) demonstrated that interest inventory items on which there are only minor sex differences can be written and that interest scales developed from such items possess psychometric characteristics (e.g., scale homogeneity) similar to those of scales containing items that elicit large sex differences. Rayman constructed potentially sex-balanced items for each of Holland's six types. Following a pretest with 220 high-school seniors, the items were administered along with the ACT-IV raw scores. Rayman's UNIACT Interest Inventory (UNI-II) raw scores did not exhibit the large sex differences typically found. Nevertheless, the pattern of interscale correlations for the UNI-II corresponded to the hexagonal configuration expected for Holland types and correlations between the UNI-II scales and the ACT-IV scales showed the appropriate convergent and discriminant validity. For purposes of this study the Holland "personality types" are measured by the UNIACT Interest Inventory.
CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

Introduction

The purpose of this correlational study was to investigate the relationship between selected cognitive styles and "personal orientations" of selected junior college and college freshmen and sophomore students. The cognitive-style factors on which the cognitive measures were found to be loaded are the independent variables. The dependent variables are the eight UNIACT Scale Characteristics of which the first six scales correspond to the six basic types of interest (personal orientation) proposed in Holland's theory of careers (Holland, 1973).

The Population and Sample

The population for this study was defined as junior college students and college freshmen and sophomore students between the ages of seventeen and twenty-five. The sample involved in this study consisted of 213 junior college and college freshmen and sophomore students available at the local Michiana junior college and college campuses who acted as volunteers for this research project. Of the 213 students 134 were females and 79 were males. Specifically, freshmen students were obtained from Bethel College; junior college students comprising both freshmen and sophomore students
were obtained from Indiana University, South Bend. The fact that
the subjects were volunteers, and 63 percent of the sample were
female, places somewhat of a limitation upon the generalizability
to the population at large. It is necessary therefore to limit the
conclusion of this study to the population as described above.

Instrumentation

Group Embedded Figures Test

The specific measure of field-dependence/independence to be
used in this study is the Group Embedded Figures Test (GEFT) (Witkin,
Oldman, Raskin, & Karp, 1971). This instrument was designed to pro­
vide an adaptation of the original individually measured Embedded
Figures Test (EFT) which would make possible group testing. The
test contains twenty-five figures, seventeen of the eighteen complex
ones were taken from the Embedded Figures Test. The test contains
three sections; the first is made of seven very simple items and is
primarily for practice, and the second and third sections each con­
tain nine more difficult items. The test is designed to assess an
individual's ability to separate an item from the field in which it
is embedded. The subject is prevented from simultaneously perceiv­
ing the simple form in the complex figure containing it by being
required to look at the back cover of the booklet to see which sim­ple form he is to find. He is then required to trace in pencil the
simple form over the lines of the complex figure. The first section
of the test allows two minutes for completion. The second and third
sections which are more difficult allow five minutes for completion.
The total score is computed on the basis of the number of simple
forms correctly traced in the second and third sections combined. Omitted items are scored as incorrect.

The authors report several ways of assessing the validity of the GEFT. In one study where the EFT was used as the criterion measure, subjects were administered the second section in its group form and the third section as an individually administered test using the items in their original colored form. A second group was given the second section individually and the third section as a group test. The correlations, corrected for reduced test length and combined for the two groups, were -.82 for male undergraduates and -.63 for female undergraduates—using as the criterion variable individual EFT solution time. The authors report a second study in which a group of subjects taking the GEFT was subsequently tested on the Rod-and-frame Test, administered with the portable apparatus. Each subject's score on the Portable Rod-and-frame Test was the absolute size of errors summed over eight trials. For males a correlation of -.39 between the GEFT score and the criterion variable (PRFT, error) was obtained: for females a correlation of -.34 between the GEFT score and the criterion variable (PRFT, error) was obtained.

Studies by Witkin et al. (1962) and Faterson and Witkin (1970) provide additional validation studies for this test. Using the degree of articulation of body concept assessed by means of a scale (ABC) applied to human figures drawing, with the most articulated drawings receiving a score of 5 and the least articulated a score of 1, correlations were found between the GEFT and ABC to be .71 for fifty-five male undergraduates and .55 for sixty-eight.
female undergraduates. According to the authors these correlations are generally comparable with those that have been reported with the EFT.

In summarizing these studies the authors state the correlation of the first study to be reasonably higher, particularly for men. However, the correlations between GEFT and PRFT fall toward the lower end of the range of correlations typically found between EFT and RFT. The authors indicate the correlations between GEFT and ABC are substantial, particularly for male subjects, and were generally comparable with those that have been reported for the EFT.

Reliability studies used parallel forms with identical time limits with correlations between the nine-item first section scores and the nine-item second section scores corrected by the Spearman-Brown Prophecy formula. The resulting reliability estimate was .82 for both males (N = 80) and females (N = 97). According to the authors these reliability estimates compare favorably with those of the EFT.

The Figure Recognition Test

The Figure Recognition Test is a group administered paper and pencil test comprised of fourteen items, each containing five incomplete drawings which become increasingly more complete and are covered by removable paper tabs allowing the subject to choose successively more amounts of information. Subjects are instructed to lift as few tabs as necessary in order to reach what they think is recognition and to record their answers. The theory underlying this test assumes that subjects high in intolerance of ambiguity
tend to respond "prematurely," thus pulling few tabs. In addition each subject is requested to record the degree of confidence he feels concerning the correctness of his choice (certain = 4; fairly confident = 3; unsure = 2; and a wild guess = 1). Encouragement to use as little information as possible is provided through instructions which indicated that fewer tabs pulled would result in a higher score. Nine minutes are allowed for the completion of this test.

The three FRT measures obtained are: (1) mean number of tabs pulled per attempted item, (2) proportion-correct of items, and (3) mean degree of confidence. For purposes of this study, the mean number of tabs lifted per item attempted is the basic score for measuring degree of preferences for structure. This measurement is suggested by Pierson (1965, pp. 32-33) as appropriate for a preference for structure measure.

Using a group of 272 college preparatory seniors, Messick and Hills (1960) recorded a split half reliability using odd and even numbered items with content reliability regressed out as .63 for tab lifting. A correlation of .34 was obtained between the FRT tab score and the tab average of the Verbal Reasoning Test which Messick and Hills to suggest that this last relationship contributed to the construct validity of intolerance of ambiguity.

**The Verbal Reasoning Test**

According to Messick and Hills (1960), the test developers, the Verbal Reasoning Test purports to measure the tendency to
generalize quickly from specific clues. The Verbal Reasoning Test is a 28-item, group-administered, paper and pencil test. Each item consists of a difficult word, five possible answers, and five sentences covered by paper tabs in which the difficult word is used.

Subjects are instructed to uncover sentences which allow them to reason out the word meaning. Each additional sentence provides further information helpful in discovering the word meaning. The subjects are also instructed to lift as few tabs as necessary to record their answers after reaching what they believe is the correct word meaning. The theory for the test holds that ambiguity-intolerant subjects tend to generalize quickly from specific clues, thus responding prematurely at the expense of accuracy. Twenty-one minutes are allowed for the completion of this test. The three Verbal Reasoning Test measures obtained by this test are: (1) mean number of tabs pulled per attempted item, (2) proportion-correct of items attempted, and (3) mean degree of confidence. The mean number of tabs lifted per item attempted is the basic score measuring the degree of "preference for structure" in this study. This measurement is suggested by Pierson (1965, pp. 32-33) as appropriate for a "preference for structure" measure.

Messick and Hills (1960) from the developmental study report the following reliability and validity information: for the group of college preparatory seniors used in the FRT development reported above, the split-half reliability for VRT tab lifting (with content reliability regressed out) was found to be .82. Evidence of the construct validity for intolerance of ambiguity was the correlation...
of .34 between the FRT tab score and the VRT tab score. Additionally the VRT tab average correlated negatively (-.18) with a vocabulary measure and correlated positively with correct VRT responses (.36).

The Personal Opinion Scale

The Personal Opinion Scale is one result of the personality theory developed by O. J. Harvey, D. E. Hunt, and H. M. Schroeder. This theory was first described in a book called Conceptual Systems and Personality Organization which was published by John Wiley and Sons in 1961. This six-point scale is composed of sixty-seven items and is used to assign persons to various stages or levels of conceptual functioning. Although various revisions of this scale resulted in the development of a newer more refined instrument called the Conceptual Systems Test, the Personal Opinion Scale (POS), because it was available, was employed in this research study. However, as the POS was an initial instrument comprised of sixty-seven items in place of forty-eight items which made up the Conceptual Systems Test and differed in that it used a 6-point as compared to a 5-point scale, a number of factor analyses were performed involving the rotation of various numbers of factors from 6 to 8 using both orthogonal and oblique rotations. The oblique rotation of eight factors replicated completely four of Harvey's Six Factors, namely: DFC, NHP, NSO, and GP. Two factors combined to form his factor 6 (NHP), and two factors combined to form his factor 8 (GP). The results of this factor analysis replicated Harvey's factor structure and supported
his definitions of factors. The resulting matrix is shown in table 4 in the appendix.

According to Harvey, a sample of about 10,000 persons have responded to the current version of the CST. Information such as Cronbach's coefficient alpha is routinely captured on all six factors with results varying from .8 to .9 for all scales except interpersonal aggression and general pessimism, which range around .70. Validity data suggests that the CST scores can correctly identify eight of ten of those classified as concrete (on the This I Believe Test, System 1) as compared with those classified as abstract (Systems 2, 3, and 4).

UNIACT Interest Inventory

The UNIACT Interest Inventory is a sex-balanced, weighted scale, 90-item instrument recently designed by the American College Testing Service. Fifteen items are assigned to each of the six basic interest scales which correspond to Holland types; namely, the UNIACT scale of science corresponds to Holland's investigative; creative arts corresponds to Holland's artistic; social service to Holland's social; business contact with Holland's enterprising; business detail with Holland's conventional; and technical with Holland's realistic. Additionally, the UNIACT contains summary scales assessing two basic dimensions of work-related activity preferences—a data/ideas dimension and a things/people dimension. The UNIACT data/ideas and things/people scales consist of thirty items each, with things at the positive end of the things/people
scale, and data at the positive end of the data scale. These items are among the ninety used in the six basic interest scales. Hence, there is overlap in the item content of the two bipolar summary scales and the six basic interest scales.

The coefficient alpha reliability estimates extend from .85 to .92 for the six scales evaluating Holland types with a median value of .87. This is a rather high value in view of the fact of the relatively short length of the scale (15 items). The stability coefficients for the parallel 15-item scale extend from .80 to .89 for retesting after eight weeks in the ACT-IV, with the median being .85 (Hanson, 1974). In the Vocational Preference Inventory (also a precursor of the UNIACT) the median none-week stability coefficient for the parallel 15-item scale was .80 with the range being .73 to .85 (ACT, 1974). For the data/ideas and things/people scales the split-half estimates were .75 and .82 with considerable reliability. For both scales the standard error of measurement were less than .50 standardized score units. Therefore, the reliability of the scale seems to be quite sufficient for reports on World-of-Work Map regions (in contrast to exact scores).

Validity studies indicated that the concurrent correlations extended from .76 to .86 between the pairs of same-named scales on the UNIACT and ACT-IV with the median correlation being .80. Correlations for the same-named scales on the UNIACT and VIP extend from .72 to .81 with a median value of .74. According to the authors, these correlations denote a relatively high extent of relationship in view of the reliability levels of these short scales and differ-
ences in the sex balance of the item content. Additional validity evidence is provided by the intercorrelations of scales assessing basic interests. The intercorrelations of the eight UNIACT scales indicated a good correspondence with theoretical expectations with very few exceptions, and the pattern of correlation among the six Holland-type scales followed the theoretical expectations (Hanson et al., 1977). For example, Hanson et al., 1977 state:

"... the pattern of correlations among the six Holland-type scales follows the theoretical expectations. For example, the Business Contact scale correlates most highly with the Business Detail (.57) and Social Service (.55) scales, which are adjacent scales. The Business Contact scale correlates lowest with the Science scale (.16), which is located diagonally across the circular interest structure. Correlations with the Creative Arts scale (.31) and the Technical scale (.30) fall between these values, as expected" (ACT Research Report, p. 18).

Lastly, criterion-related validity evidence provided by Hanson et al. (1977) supported the construct validity of the sex-balanced scales used in the UNIACT.

Collection of Data

More than 200 selected junior college and college freshmen and sophomore students at the local Michiana Colleges participated in this study. Instructors offering courses in General Psychology and the general Social Studies areas were contacted and granted permission to use students in their classes on a voluntary basis. Students used the sign-up form and received class points for participating in the study. Students who were not present throughout the time of the administration of the test were tested within two or three days on an individual basis and in the same classroom.
Organization of Data

After gathering the completed tests from the subjects, a careful screening was made to make sure they had followed the instructions accurately. Responses were scored from opscan sheets provided to the subjects. The eight scores from the UNIACT and the several scores from the cognitive-styles tests, together with identification data from each subject, were placed in a data file for statistical analysis.

Statement and Analysis of Specific Hypotheses

This study related field-independence, the degree of preference for structure, and Harvey's Six Cognitive Factors to the several UNIACT Interest scales. The specific research hypotheses tested by this study in order to explore the general hypotheses stated below are stated in null form. The significance of their respective relationships was evaluated by noting their product-moment correlation coefficients in zero-order correlation table. There were sixty null hypotheses to be tested. Hypotheses one through eight list relationships between field independence and preference for structure and each of the eight UNIACT interest scales. In each case, the hypothesis was identified as "a", "b", and "c", where "a" relates field independence to the interest scale; "b" relates FRT TAB to the respective interest scale. Hypotheses nine through sixty relate Harvey's Six Cognitive Factors to the interest scales, respectively.

Hypothesis 1a. There is no significant relationship between field independence and interest in Science as measured by the UNIACT scale.
Hypothesis 1b. There is no significant relationship between FRTTAB measured "preference for structure" and interest in Science as measured by the UNIACT scale.

Hypothesis 1c. There is no significant relationship between VRTTAB measured "preference for structure" and interest in Science as measured by the UNIACT scale.

Hypothesis 2a. There is no significant relationship between field independence and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 2b. There is no significant relationship between FRTTAB measured "preference for structure" and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 2c. There is no significant relationship between VRTTAB measured "preference for structure" and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 3a. There is no significant relationship between field independence and interest in Social Service as measured by the UNIACT scale.

Hypothesis 3b. There is no significant relationship between FRTTAB measured "preference for structure" and interest in Social Service as measured by the UNIACT scale.

Hypothesis 3c. There is no significant relationship between VRTTAB measured "preference for structure" and interest in Social Service as measured by the UNIACT scale.

Hypothesis 4a. There is no significant relationship between field independence and interest in Business Contact as measured by the UNIACT scale.
Hypothesis 4b. There is no significant relationship between FRTTAB measured "preference for structure" and interest in Business Contact as measured by the UNIACT scale.

Hypothesis 4c. There is no significant relationship between VRTTAB measured "preference for structure" and interest in Business Contact as measured by the UNIACT scale.

Hypothesis 5a. There is no significant relationship between field independence and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 5b. There is no significant relationship between FRTTAB measured "preference for structure" and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 5c. There is no significant relationship between VRTTAB measured "preference for structure" and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 6a. There is no significant relationship between field independence and interest in Technical as measured by the UNIACT scale.

Hypothesis 6b. There is no significant relationship between FRTTAB measured "preference for structure" and interest in Technical as measured by the UNIACT scale.

Hypothesis 6c. There is no significant relationship between VRTTAB measured "preference for structure" and interest in Technical as measured by the UNIACT scale.

Hypothesis 7a. There is no significant relationship between independence and interest in Data/Ideas as measured by the UNIACT scale.
Hypothesis 7b. There is no significant relationship between FRTTAB measured "preference for structure" and interest in Data/Ideas as measured by the UNIACT scale.

Hypothesis 7c. There is no significant relationship between VRTTAB measured "preference for structure" and interest in Data/Ideas as measured by the UNIACT scale.

Hypothesis 8a. There is no significant relationship between field independence and interest in Things/People as measured by the UNIACT scale.

Hypothesis 8b. There is no significant relationship between FRTTAB measured "preference for structure" and interest in Things/People as measured by the UNIACT scale.

Hypothesis 8c. There is no significant relationship between VRTTAB measured "preference for structure" and interest in Things/People as measured by the UNIACT scale.

Hypothesis 9. There is no significant relationship between Harvey's Divine Fate Control and interest in Science as measured by the UNIACT scale.

Hypothesis 10. There is no significant relationship between Harvey's Divine Fate Control and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 11. There is no significant relationship between Harvey's Divine Fate Control and interest in Social Service as measured by the UNIACT scale.

Hypothesis 12. There is no significant relationship between Harvey's Divine Fate Control and interest in Business Contact as measured by the UNIACT scale.
Hypothesis 13. There is no significant relationship between Harvey's Divine Fate Control and interest in Business Detail as measured by the UNIAC T scale.

Hypothesis 14. There is no significant relationship between Harvey's Divine Fate Control and interest in Technical as measured by the UNIAC T scale.

Hypothesis 15. There is no significant relationship between Harvey's Need for Structure-Order and interest in Science as measured by the UNIAC T scale.

Hypothesis 16. There is no significant relationship between Harvey's Need for Structure-Order and interest in Creative Arts as measured by the UNIAC T scale.

Hypothesis 17. There is no significant relationship between Harvey's Need for Structure-Order and interest in Social Service as measured by the UNIAC T scale.

Hypothesis 18. There is no significant relationship between Harvey's Need for Structure-Order and interest in Business Contact as measured by the UNIAC T scale.

Hypothesis 19. There is no significant relationship between Harvey's Need for Structure-Order and interest in Business Detail as measured by the UNIAC T scale.

Hypothesis 20. There is no significant relationship between Harvey's Need for Structure-Order and interest in Technical as measured by the UNIAC T scale.

Hypothesis 21. There is no significant relationship between Harvey's Need to Help People and interest in Science as measured by the UNIAC T scale.
Hypothesis 22. There is no significant relationship between Harvey's Need to Help People and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 23. There is no significant relationship between Harvey's Need to Help People and interest in Social Service as measured by the UNIACT scale.

Hypothesis 24. There is no significant relationship between Harvey's Need to Help People and interest in Business Contact as measured by the UNIACT scale.

Hypothesis 25. There is no significant relationship between Harvey's Need to Help People and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 26. There is no significant relationship between Harvey's Need to Help People and interest in Technical as measured by the UNIACT scale.

Hypothesis 27. There is no significant relationship between Harvey's Need for People and interest in Science as measured by the UNIACT scale.

Hypothesis 28. There is no significant relationship between Harvey's Need for People and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 29. There is no significant relationship between Harvey's Need for People and interest in Social Service as measured by the UNIACT scale.

Hypothesis 30. There is no significant relationship between Harvey's Need for People and interest in Business Contact as measured by the UNIACT scale.
Hypothesis 31. There is no significant relationship between Harvey's Need for People and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 32. There is no significant relationship between Harvey's Need for People and interest in Technical as measured by the UNIACT scale.

Hypothesis 33. There is no significant relationship between Harvey's Interpersonal Aggression and interest in Science as measured by the UNIACT scale.

Hypothesis 34. There is no significant relationship between Harvey's Interpersonal Aggression and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 35. There is no significant relationship between Harvey's Interpersonal Aggression and interest in Social Service as measured by the UNIACT scale.

Hypothesis 36. There is no significant relationship between Harvey's Interpersonal Aggression and interest in Business Contact as measured by the UNIACT scale.

Hypothesis 37. There is no significant relationship between Harvey's Interpersonal Aggression and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 38. There is no significant relationship between Harvey's Interpersonal Aggression and interest in Technical as measured by the UNIACT scale.

Hypothesis 39. There is no significant relationship between Harvey's General Pessimism and interest in Science as measured by the UNIACT scale.
Hypothesis 40. There is no significant relationship between Harvey's General Pessimism and interest in Creative Arts as measured by the UNIACT scale.

Hypothesis 41. There is no significant relationship between Harvey's General Pessimism and interest in Social Service as measured by the UNIACT scale.

Hypothesis 42. There is no significant relationship between Harvey's General Pessimism and interest in Business Contact as measured by the UNIACT scale.

Hypothesis 43. There is no significant relationship between Harvey's General Pessimism and interest in Business Detail as measured by the UNIACT scale.

Hypothesis 44. There is no significant relationship between Harvey's General Pessimism and interest in Technical as measured by the UNIACT scale.

Statement and Analyses of General Hypotheses

Nine general null hypotheses were stated. The first eight were hypotheses which related cognitive-style variables with one of the UNIACT interest variables. Each of the eight hypotheses was tested by Stepwise Regression Analysis. The ninth hypothesis related the combination of cognitive-style scores to the combination of UNIACT Interest Inventory scores. This hypothesis was tested by a canonical correlation analysis. The nine general null hypotheses were as follows:
1. There is no linear combination of the cognitive-style scores which yields a statistically significant correlation with the Science type on the UNIACT Interest Inventory.

2. There is no linear combination of the cognitive-style scores which yields a statistically significant correlation with the Creative Arts type on the UNIACT Interest Inventory.

3. There is no linear combination of the cognitive-style scores which yields a statistically significant correlation with the Social Service type on the UNIACT Interest Inventory.

4. There is no linear combination of the cognitive-style scores which yields a statistically significant correlation with the Business Contact type of the UNIACT Interest Inventory.

5. There is no linear combination of the cognitive-style scores which yields a statistically significant correlation with the Business Detail type on the UNIACT Interest Inventory.

6. There is no linear combination of the cognitive-style scores which yields a statistically significant correlation with the Technical type on the UNIACT Interest Inventory.

7. There is no linear combination of the cognitive-style scores which yields a statistically significant correlation with the Data/Ideas Dimension on the UNIACT Interest Inventory.

8. There is no linear combination of the cognitive-style scores which yields statistically significant correlation with the Things/People Dimension on the UNIACT Interest Inventory.

9. There is no linear combination of cognitive-style scores and no linear combination of UNIACT Interest Inventory...
type scores which will yield a significant canonical correlation between the two sets.

For all tests, alpha was set at .05, following accepted practice of similar studies in the field.
CHAPTER IV

COGNITIVE STYLES AND OCCUPATIONAL PREFERENCES: RESULTS

This chapter presents the results of the several analyses which were made to test the hypotheses in chapter 3. Generally, only the results generated from the empirical data are presented; the principal discussion and conclusions drawn are presented in chapter 5. This chapter is organized into three sections: (1) Zero-Order Correlation Findings, (2) Step-Wise Linear Regression Analyses, and (3) Canonical Correlation Analysis.

Zero-Order Correlation Findings

In order to test the null hypotheses regarding single cognitive-style measures and occupational preference scores on the UNIACT Interest Inventory, Pearson Product-Moment Correlations were computed. The Zero-Order Correlation matrix arranged in table 1 presents the correlations between the fifteen cognitive-style variables, the six Holland-Type Interest Scales, and the additional UNIACT Data/Ideas and Things/People scales. To be statistically significant from zero at the .05 level, the zero-order correlation needed to be at least ±.134. Statistically significant Zero-Order Correlations are noted by an asterisk in table 1.
### Table 1

**PRODUCT-MOMENT CORRELATIONS BETWEEN COGNITIVE STYLE MEASURES AND UNIAC'T INTEREST SCALE**

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Notes: *p < .05
Cognitive Style/Measures UNIACT
Interest Correlations

The capitalized names in table 1 direct the reader's attention to the results obtained from the correlational analysis of the selected cognitive-style scores with occupational preferences on the UNIACT Interest Inventory.

Of the thirteen cognitive-styles measured, only seven correlated significantly with the various UNIACT Interest Scales. That is, of the forty-four specific null hypotheses, only hypotheses 1a, 1c, 2c, 12, 23, 30, and 36 were rejected, while the remaining hypotheses were not rejected. Of these seven rejected hypotheses, the Group Embedded Figures Test yielded a significant correlation ($r = .136$) with Science interest. Although not statistically significant, the correlation between the Group Embedded Figures Test (field independence) and Technical Scale interest approached significant ($r = .131$ obtained; $r = .134$ required). Since the trend was in the expected direction suggested by the research, this relationship appeared to warrant reporting.

Of the two major "preference for structure" measures, only VRTTAB yielded a statistically significant relationship ($r = -.164$) between this measure and Science interest. Although not statistically significant, a relationship closely approaching statistical significance ($r = .133$) was also obtained between VRTTAB and Creative Arts Interest and is reported because it appears to warrant consideration.

Of Harvey's Cognitive Factors, five yielded statistically significant correlations with the several UNIACT Interest...
Scales: Harvey's Need to Help People factor (NHP) yielded a significant statistical relationship \( r = .157 \) with UNIACT Social Service Interest; three of Harvey's cognitive factor measures, Divine Fate Control (DFC), Need for People (NFP), and Intrapersonal Aggression (IA) yielded statistically significant relationships \( r = -.154, r = .154, \) and \( r = .163, \) respectively with the UNIACT Business Contact Interest. None of the cognitive-style measures yielded statistically significant relationships with Data/Ideas Interests. One of Harvey's cognitive-style measures, Divine Fate Control (DFC) \( r = .157 \) yielded a statistically significant relationship with Things/People Interest, that is in the direction of Things Interest more than People.

From these results, the following points were noted:

(1) although the correlations reported were statistically significant, the highest of shared variance explained was less than 3 percent \( r = -.164 \) between VRRTAB and Science Interest. Thus, although the Zero-Order Correlations are statistically significant, only a modicum of the shared variance is accounted for, so limiting the practical applications of the findings. (2) Harvey's Six Cognitive Factors correlated significantly more frequently and consistently with occupational preferences than did any other cognitive-style measure. (3) Of the two major "preference for structure" measures, only the VRTAB measure yielded a statistically significant correlation (Science) with the UNIACT Interest Scales.

Figure Recognition measures were consistently unrelated to occupational preferences. The implication of these findings...
with respect to the hypotheses tested are presented and discussed in the following chapter.

**Step-Wise Linear Regression Analyses**

Using as independent variables the thirteen cognitive-style measures, and taking the eight UNIACT Interest Scales as criterion variables, Step-Wise Linear Regression Analyses made possible the examination of the effects of the linear combination of cognitive measures as they related to the six separate "Holland-Type" UNIACT Interest Scales and the additional Data/Ideas and Things/People Interest Scales.

For each of the interest scales, taken separately as criterion, a summary table (table 2) is shown. This table indicates the order in which the variables were included in the regression and the proportion of additional variance (i.e., increase in $R^2$) that was explained by the addition of that variable. The regression coefficients are reported for all variables included in the final step.

**Science**

The first section of table 2 gives the regression information when Science Interest is used as an independent variable. A multiple correlation of .2533 between Science Interest and the three measures collectively considered of VRRTAB, Embedded Figures, and Need for Structure-Order was statistically significant ($p < .05$) and explained approximately 6 percent of the variance ($R^2 = .064$). Column four of table 2 gives the regression coefficient for the cognitive-style
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* Regression coefficients at the final step for all variables that have been entered.
measures, VRTTAB, Group Embedded Figures Test, and Need for Structure-Order. These indicated that people with interest in Science tend to pull fewer verbal tabs, to be field independent, and to have a higher Need for Structure-Order.

Creative Arts

The second section of table 2 gives the regression information when Creative Arts Interest is used as the dependent variable. A multiple correlation of .2807 between Creative Arts Interest and five cognitive measures collectively considered was statistically significant (p < .05) and explained approximately 8 percent of the shared variance (R^2 = .0788). Column four gives the regression coefficients for the cognitive-style measures VRTTAB, NSO, NHP, Embedded Figures, and DFC, collectively considered, with interest in the Creative Arts area. That is, interest in the Creative Arts Scale tends to be associated with individuals whose cognitive styles are characterized by greater field independence and Need to Help People and less of a need for verbal information demand, less of a belief in Divine Fate Control, and less of a Need for Structure-Order.

Social Service

The third section of table 2 shows that a correlation of .2002 between Social Service Interest and the two cognitive measures of Need to Help People and Need for Structure-Order was statistically significant (p < .05) and explained approximately 4 percent of the shared variance (R^2 = .0461). Column four gives the regression coefficients for the cognitive-style measures, for Need to Help People and Need for Structure-Order, collectively considered, and interest in the Social
Service area. That is, Social Service Interest tends to be associated with individuals whose cognitive style is characterized with a higher Need to Help People and a lower need for Structure-Order.

**Business Contact**

The fourth section of table 2 shows the regression information when Business Contact Interest is used as the dependent variable. A multiple correlation of .3063 between Business Contact Interest and four cognitive measures collectively considered was statistically significant (p < .05) and explained 9 percent of the shared variance ($R^2 = .0937$). Column four of table 2 gives the regression coefficients for the cognitive-style measures, Need for People, Divine Fate Control, and Need for Structure-Order and Business Contact Interest. That is, interest in Business Contact tends to be characterized by cognitive style on the part of those with less belief in Divine Fate Control and greater Need for Structure-Order, greater Need for People, and greater Intrapersonal Aggression.

**Business Detail**

The fifth section of table 2 gives the regression information when Business Detail Interest is used as the dependent variable. A multiple correlation of .2816 between five cognitive measures collectively considered was statistically significant (p < .05) and explained approximately 8 percent of the shared variance ($R^2 = .0793$). Column four of table 2 gives the regression coefficients for the cognitive-style measures VRTCON, GP, FRTCON, NSO, NFP, and Business Detail.
Interest. That is, interest in Business Detail tends to be associated with a cognitive style on the part of those with greater verbal and figure recognition confidence, greater Need for Structure-Order, greater Need for People, and greater General Pessimism.

Technical

The sixth section of table 2 shows the regression information when Technical Interest is used as the dependent variable. A multiple correlation of .2266 between Technical Interest and the three cognitive measures of Embedded Figures, FRTPRO, and VRTTAB was statistically significant \( p < .05 \) and explained approximately 5 percent of the shared variance \( R^2 = .0514 \). Column four of table 2 gives the regression coefficients for the cognitive-style measures, Embedded Figures, FRTPRO, and VRTTAB and interest in the Technical area. That is, Technical interest tends to be associated with a cognitive style on the part of those with greater field independence, fewer correct FRTPRO, (i.e., low "preference for structure") and fewer VRTTAB (pull tabs on the Verbal Recognition Test, indicating high intolerance of ambiguity).

Data/Ideas

The seventh section of table 2 gives regression information, all the first step, when Data/Ideas Interest is used as the dependent variable. Of the thirteen collective cognitive measures, no combination reached statistical significance in relating to Data/Ideas Interest.
The last section of table 2 shows the regression information when Things/People Interest is used as the dependent variable. A multiple correlation of .2097 between Things/People Interest and the three cognitive measures of Divine Fate Control, Need for Structure-Order, and Need to Help People was statistically significant (p < .05) and explained approximately 4.4 percent of the shared variance (R² = .440). Column four of table 2 gives the regression coefficients for the cognitive-style measures Divine Fate Control, Need for Structure-Order, and Need to Help People, and Things/People Interest. That is, interest in Things rather than People tends to be associated on the part of those with a cognitive style characterized by a greater belief in Divine Fate Control, greater Need for Structure-Order, and a lesser Need to Help People.

Table 2 reveals that seven of the eight UNIACT Interest Scales were significantly correlated with selected cognitive factors, multiply considered. In some cases, only a single factor contributed significantly, while in others two or sometimes three or more provided significant contributions.

**Canonical Correlations Analyses**

Using as one set of independent variables the thirteen cognitive-style measures, collectively considered, and as a second subject of independent variables the eight UNIACT Interest areas, collectively considered, a canonical correlation analysis enabled
the investigator to study possible significant relationships between cognitive-style measures and the UNIACT Interest Inventory. The upper part of table 3 gives, for each of three canonical functions, the canonical correlation and the test of significance, using Bartlett's approximate Chi-Squares. The second and third sections of the table show the standardized coefficients for the first and second set of variables, respectively. The visual inspection of table 3 shows that the first function yielded a canonical correlation of .45034 with a probability of .0016 which is statistically significant. In interpreting this canonical function, it is customary to note the variables with the greater standardized coefficients. One rule of thumb is to note those variables for which the coefficient is at least 50 percent of the maximum one in the set.

Under this criterion the variables in the first set which contribute strongly to the canonical correlation are Need to Help People, Need for Structure-Order, and Field Independence; and the variables in the second set are Social Service, Business Detail, Science, and Things/People. That is, less interest in Social Service, greater interest in Business Detail and Science, and interest in Things rather than Persons tends to be associated with the cognitive style described as having less Need to Help People, greater Need for Structure-Order, and greater field independence.

Although not statistically significant at the .05 level, a second canonical function yielded a canonical correlation coefficient of .41508 which approached significance (p = .0610). The major variables contributing to the correlation in set 1 are: Field Inde-
### TABLE 3
CANONICAL CORRELATION ANALYSES

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<th>Test of Significance of Canonical Functions and Significance Values</th>
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<table>
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<th>Standard Coefficients for Canonical Variables of the First Set</th>
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<th>Standard Coefficients for Canonical Variables of the Second Set</th>
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pendence, Intrapersonal Aggression, Need for Structure-Order, and FRTCON; and in set 2, Business Contact, Creative Arts, and Interest in Data rather than Ideas, Interest in Persons rather than Things, and Technical interests. That is, less interest in Business Contact, greater interest in Creative Arts, interest in Data rather than Ideas, and interest in People rather than in Things, and Technical interest tend to be associated with the cognitive style described as greater in Field Independence, less in Intrapersonal Aggression, less in Need for Structure-Order, and less in FRTCON.

A third canonical function which was neither significant nor approached significance was included to show the lack of any further relationship approaching or achieving statistical significance.
CHAPTER V

CONCLUSIONS, IMPLICATIONS, RESEARCH SUGGESTION, AND GENERAL SUMMARY

Introduction

The relationship found between the cognitive-style measures and occupational preferences lends support to the suggestions in the research literature that significant relationships exist between these two important classes of variables. Although the variance accounted for by the zero-order findings and the multiple step-wise regression analyses was somewhat low, there was an increase in the shared variance as one progressed through the single-order analysis to step-wise regression analysis (taking the cognitive-style variables collectively and relating them to a single criterion interest), to a very respectable portion of explained variance in the canonical analysis, which not only considered the cognitive measures collectively but also the several interest measures collectively.

It is the purpose of this chapter to (1) present an organized discussion of the research findings; (2) point out conclusions and implications which research findings appear to permit; (3) point out a number of related research possibilities; and (4) present a summary of the research study.
The Relationship of UNIACT Interest Scores with Individual Cognitive Style Measures

Although the shared variance between individual cognitive-style measures and interests as measured by the UNIACT Interest Inventory was uniformly low (the highest correlation accounting for less than 3 percent of the shared variance), seven statistically significant zero-order correlations were found between the several cognitive-style measures and UNIACT interests. These statistically significant relationships appeared relatively consistent with those found in the literature. The fact that they were statistically significant and explained some of the variance when considered separately, and that when collectively considered step-wise they explained a greater proportion of the variance and a still greater in canonical, was the main reason for their being given a relatively stronger emphasis in the discussion than might otherwise have been given them. Zero-order findings and discussion are presented below.

Science

A statistically significant relationship between Science interest and field independence was found. The result is supportive of the findings repeatedly reported in the literature that the responses of more field-independent people on standardized interest inventories are consistent with those of people in mathematics and science domains (Witkin et al., 1977) as well as similar findings, for example, of Pierson (1965); DeRussy and Futch (1971); Holtzman, Swartz, and Thorpe (1971); Osipow (1969); and Peterson and
Sweitzer (1973). Although there was some support in the research literature for individuals with Science interest being higher in "preference for structure" (for example, Pierson, 1965), an inverse relationship was found between Science interests and VRRTAB--one of the major measures of "preference for structure" in this study. One possible explanation may be that individuals with Science interest are verbally more fluent and intellectually more articulate, thus they need less information before coming to a decision. Some indirect support for this interpretation comes from Wescott (1961) who posited that some individuals who demanded little information would be highly successful in solving problems and found that the two dimensions (information demand and successful problem solving) were consistently uncorrelated.

**Creative Arts**

No statistically significant relationship between Creative Arts interest and the thirteen cognitive style measures separately considered was found.

**Social Service**

A statistically significant relationship between Social Service interest and Harvey's Cognitive Factor for Need to Help People was found. This finding appears consistent with what one would logically expect, and, in addition, is indirectly supported by several studies in the research literature. For example, in investigating cognitive styles in the development of medical careers, Quinlan and Blatt (1972) predicted that moderately field-
dependent student nurses would perform better in psychiatric nursing (a loosely structured, higher intrapersonal-oriented activity), whereas field-independent student nurses performed better and experienced less anxiety in surgical nursing (highly structured, impersonal activity). The authors concluded that field dependence may be related to a capacity for empathy in that the greater social sensitivity of the moderately global field-dependent nursing students facilitated their functioning with severely disturbed patients even though greater anxiety was experienced. Scheibner (1969) found field-dependent subjects tending to have more personal-social orientation as reflected on their higher means score on the welfare, vocational counselor, playground director, social worker, probation officer, and physical education teacher types of occupations that appealed to them. According to the author, this finding was not unexpected as field-dependent individuals consistently have been found to be more sociable and sensitive to others' reactions and more reliant on interactions with others for self-definition.

Business Contact

There was a statistically significant relationship between Business Contact interest and Harvey's Cognitive Factor, Divine Fate Control. This appears to be logically consistent with what one might expect of individuals in the Business Contact field. For example, Sales, Insurance, Management people would depend more on themselves than external sources. Some indirect evidence for this interpretation comes from the study of Suziedelis et al. (1963),
who found a significant relationship between a dominance and Business Contact interest. A second statistically significant relationship was obtained between Business Contact interest and Harvey’s Cognitive Factor Need for People. Some support for this finding is given by Baker (1970) who found graduate students in business administration to be more field dependent. Witkin et al. (1967) reported that the literature has consistently shown field-dependent individuals to have a more personal-social orientation. Evidence regarding this relationship comes from studies such as that by Pierson (1965) who found that field-dependent individuals tend to favor interpersonal domains—this finding appears very consistent with literature. Business Contact interest was also found to be significantly correlated with intrapersonal aggression. While this at first glance may appear similar to inconsistency with one’s model in “over a Business Contact person,” there is some literature that does suggest some aspect of aggressiveness characteristic at least of certain occupations within the Business Contact area. For example, Nash (1966) described the more effective business manager in part as one who “prefers activities which involves independent, intensive thought, perhaps with some risk involved, and . . . enjoys activities which bring him into contact with others, especially those that afford him an opportunity to assume the leadership of a dominant role” (p. 254).

**Business Detail**

There was a statistically significant relationship between Business Detail interest and the “preference for structure” measure
VRTCON, which suggests individuals with Business Detail interest tend to feel very competent regarding their verbal performances. Some indirect support for this finding comes from a study of Siess and Jackson (1967) who identified a bi-polar factor labeled impulse control versus expression, which was positively associated with interest in creative writing and negatively associated with interest in accounting and office work.

**Technical**

Contrary to a positive relationship between Technical interests and field independence suggested by the literature (Witkins et al., 1977), there was no statistically significant linear relationship between Technical interest and field independence. There was, however, a relationship approaching significance ($r = .131$ obtained; $r = .134$ needed) between Technical interests and field independence. This result is somewhat difficult to understand given the wide number of studies in literature supporting a relationship between Technical interests and field-independence, e.g., Holtzman and Swartz (1971) and Witkin et al. (1977). However, it may be that the Technical interest as measured by the UNIACT Interest Inventory is less characteristic of those in Technical occupations and more characteristic of practical "handyman" activities. This is suggested by the nature of the items on the Technical Scale, e.g., "run a lawn mower," "package meat in a grocery store," "build a picture frame," "drive a bus," or "fix a toy."
Data/Ideas

There was no statistically significant relationship between Data/Ideas interests and the fifteen cognitive styles considered separately. However, a correlation approaching statistical significance (r = .131 obtained; r = .134 required) between the data/ideas interest and field independence lends some support to the proposition that individuals who tend to be higher in field independence are more oriented toward data. This finding would appear directly supported by Witkin et al. (1977), who describes field-independent individuals as analytical and likely to show an interest in impersonal domains where their cognitive skills—competence in articulation or in analysis and structuring—are called for (e.g., mathematician, physicist, chemist, biologist, architect, and engineer).

Things/People

There was a significant positive correlation between Things/People scale and Divine Fate Control. This result suggests that individuals who have a higher belief in Divine Fate Control or external control tend to relate to things rather than to people for their support and beliefs. This finding is supported by Harvey et al. (1961), who describe a pattern of high religiosity, high superstition, high absolutism, closeness of belief, high evaluativeness, and high identification with social position and conventionality as characteristic of Harvey's System I cognitively functioning person.
Step-Wise Linear Regression Analyses:
Main Conclusions and Discussion

The step-wise linear regression analyses performed in the study supported the concept that cognitive styles have significant relationships with occupational preferences. The particular variables used in these analyses were the thirteen cognitive-style measures comprising the Group Embedded Figures Test, "preference for structure" measures, Harvey's Six Cognitive Factors, and the eight UNIACT Interest Inventory Scales.

Science

As noted in chapter 4, there was a significant linear relationship between Science interest and the collectively considered cognitive-style measures of VRRTAB, Group Embedded Figures, and Need for Structure-Order. That is, people with Science interest tend to be field independent and have a higher Need for Structure-Order. The relationship of greater field independence and higher need for Structure-Order appears consistent with the literature. For example, Witkin et al. (1977) state "as a general principle that relatively field-independent persons taken as a group are likely to show interest in domains where their cognitive skills—competence, articulation, and structure are called for." These results are also indirectly confirmed by Chung (1966) who found individuals in the Natural Science area to be more field independent and to require more precision and accuracy than persons in other academic areas. The finding of an inverse relationship between science interests and VRRTAB is more difficult to explain, since this
inverse relationship implies an intolerance of ambiguity. However, in looking at the same measure in another way, it may be that the VRTTAB low average is associated with individuals who are verbally and intellectually more fluent and do not need much information to make decisions because of their stronger verbal and intellectual abilities.

Creative Arts

As noted in chapter 4, there was a significant linear relationship between Creative Arts interest and the collectively considered cognitive-style measures of VRTTAB, Need for Structure-Order, Embedded Figures, and Divine Fate Control. That is, Creative Arts interest tends to be associated with individuals whose cognitive style is characterized by greater field independence as suggested by the high Embedded Figures scores found to be characteristic of some people in the Creative Arts field (Holtzman and Swartz, 1971; Witkin et al., 1967). However, the relationship of greater Need to Help People, lower need for Verbal Information and demand, lower belief in Divine Fate Control, and lower Need for Structure-Order, collectively considered, are rather more difficult to explain. While it is not too difficult to understand that an artist may have some Need to Help People, may be low on Divine Fate Control (that is, depends on one's self and not on an external source), and low on Need for Structure-Order, the inverse relationship between Creative Arts interest and VRTTAB averages is somewhat more difficult to explain. One possibility is that the inverse relationship with VRTTAB's
(which is generally considered to be related to ambiguity intolerance) is in this case really reflecting a low Need for Structure-Order. Indirect support for this explanation was suggested by the concurrent, significant inverse relationship with Need to Structure-Order. Partial confirmation from lower Need for Structure-Order comes from the study of Scott and Day (1972) who found high scores on the ego control factor of the Adjective Checklist Test associated positively with the SVIB basic interest scales of art and writing and negatively correlated with office practices and mathematics. These results are consistent with the fact that the high-ego control person is one who abhors the routine and seeks to involve himself in self-expressive activities. Seiss and Jackson (1976) also identified a similar but bi-polar factor, labeled impulse control versus expression, and found it to be positively associated with interest in creative writing and negatively associated with interest in accounting and office work.

Social Service

As noted in chapter 4 there was a significant linear relationship between Social Service interest and collectively considered cognitive-style measures Need to Help People and lower Need for Structure-Order. This finding is indirectly supported by several studies in the research literature. For example, Goodenough et al. (1979) investigating cognitive styles in the development of medical careers found that field-dependent people would choose vocations that required greater social-interpersonal involvement. Suziedelis
and Steimel (1963) in studying the relationships of need hierarchies to inventoried interests found a statistically significant relationship between the Edwards Personal Preference Scale affiliation need and the SVIB (group V) Social Service interests. However, Watson (1978), using Harvey's Conceptual Systems Test (CST) in studying undergraduate nursing students as compared with both university students at large and practicing nurses, found more nursing student than practicing nurses reporting a Need to Help People. However, in two of the three area institutions college students having higher scores on Need to Help People than did the other two groups suggesting that although this may be true in terms of the general category of Social Service, specific occupations and groups may differ on this need. The associated statistically significant relationship of lower need for structure is indirectly supported by Witkin et al. (1977), who describe field-independent persons as a group likely to favor domains with a "people" emphasis featuring social content and involving interpersonal relations, and for which analytical/structuring competence does not particularly matter.

**Business Contact**

As noted in chapter 4, there was a significant linear relationship between Business Contact interest and the collectively considered cognitive-style measures of Divine Fate Control, Need for Structure-Order, Need to Help People, and Intrapersonal Aggression. That is, interest in Business Contact tends to be characterized by a cognitive style on the part of those with less belief in
Divine Fate Control, greater Need for Structure-Order, greater Need to Help People, and greater Interpersonal Aggression. This appears to be logically consistent with what one might expect of individuals in the Business Contact field. For example, Sales, Insurance, and Management people would depend more on themselves than external sources. Some indirect evidence for this interpretation comes from the studies of Scott and Day (1972) who found graduate students in Business characterized by significantly higher scores on the Adjective Checklist Test scales of achievement and dominance, among others.

A second statistically significant relationship in this linear combination was obtained between Business Contact interest and Harvey's cognitive factor Need for People. Some support for this interpretation is given by Scott and Day (1972) who in analyzing the Adjective Checklist Test found three significant factors, one of which they labeled self-assertiveness. These authors found that individuals scoring high on the dimension of self-assertiveness exhibited interest in vocations which would provide the opportunity for leading and directing others and found a significant correlation between scores on self-assertiveness in the "managerial orientation" and the managerial orientation key developed by Nash (1966) from SVIB items. Significant correlations were found between the factor of self-assertiveness and Sales, Merchandising, and the Business Management areas (p < .01; p < .05; and p < .01, respectively). (Additional evidence supporting this relationship comes from studies such as Pierson [1965] who found that field-dependent individuals tend to
favor interpersonal domains.) Business Contact interest was also found to be significantly correlated with Interpersonal Aggression. While less of a belief in Divine Fate Control and a greater Need for People appears consistent with the research literature, a tendency for individuals with Business Contact interests to have an Interpersonal Aggression appears somewhat more difficult to explain. However, it does appear that Business Contact people are self-assertive have a point of view, and may resist confrontation to their system of belief. Some support for this view is given again by Scott and Day (1972) who found graduate Business students to be characterized by significantly higher scores on the Adjective Checklist scale of achievement and dominance, and significantly lower scores on succorance and abasement. These authors found additionally a significant correlation between scores on self-assertiveness with Sales, Merchandising, and Business Management interest areas. The relationship between Business Contact interests and a greater Need for Structure-Order appears to be the most difficult of the four cognitive measures related to Business Contact interest to explain. However, it would appear logical and feasible that individuals in such areas as insurance agencies, business management, and sales management would have a higher Need for Structure-Order; whereas other more general areas in the Business Contact field may require less of a degree of this particular cognitive style. It is interesting to note that a study by Scott and Day (1972) on the factor of self-assertiveness derived from an Adjective Checklist Test correlated at only .17 with the self-
assertiveness dimension, while the latter appeared to be significantly related to the author's graduate business student sample.

**Business Detail**

As noted in chapter 4, there was a significant linear relationship between Business Detail interest and the collectively considered cognitive-style measures of Verbal Reasoning Test (degree of response confidence), General Pessimism, Figure Recognition Test (degree of response confidence), Need for Structure-Order, Need for People, and Embedded Figures (Figure Recognition Test Proportion correct). That is, interest in Business Detail tends to be associated with cognitive style on the part of those with greater verbal and figure recognition competence, greater Need for Structure-Order, greater Need for People, and greater General Pessimism. These results appeared to be consistent as one would expect individuals involved with Business Detail interest to have greater verbal and figure recognition competence and Greater Need for Structure-Order. Some support of these two factors being related to Business Detail is given by Scott and Day (1972) who found scores on ego control (a high ego-control person defined as one who abhors routine and seeks to involve himself in self-expressive activities) on the Adjective Checklist Test to be negatively correlated with Office Practices and Mathematics interests. The relationship of a greater Need for People, and greater General Pessimism associated with Business Detail interest is more difficult to explain, but it appears logical that people who do work with other people in office
environments, and given the type of work they do (e.g., accounting), though they may have a higher Need for People, they may not necessarily be considered optimistic types. However, with regard to this finding and the related stepwise-regression findings, the extent of the shared variance is so low that the cognitive factors collectively considered in relation to the particular interest are more apt to represent tendencies than characteristic traits of the individuals.

Technical

As noted in chapter 4, there was a significant linear relationship between Technical interest and the collectively considered cognitive-style measures Embedded Figures (Figure Recognition Test Proportion correct) and Verbal Reasoning Test Tab Average. That is, Technical interests tend to be associated with a cognitive style on the part of those with greater field independence, fewer correct FRTPRO—that is, low "preference for structure," and fewer FRTTAB pulled—implying high tolerance of ambiguity. Studies in the literature, for example, Witkin et al. (1967), document relatively well the relationship of field independence to Technical interests. The relationship of Technical interests to ambiguity intolerance appears somewhat more difficult to explain. However, partial support for this finding comes from the study by Hansen and Johansson (1974) who found the groups highest on the SVIB dogmatism scale to be skilled trades occupations such as farmer, carpenter, and tool and die maker.

Data/Ideas

As noted in chapter 4, there was no significant linear
relationship between the Data/Ideas interest and the collectively considered thirteen cognitive-style measures.

**Things/People**

It was noted in chapter 4 that there was a significant linear relationship between Things/People interest and the collectively considered cognitive-style measures Divine Fate Control, Need for Structure-Order, and Need to Help People. That is, interest in things rather than people tends to be associated on the part of those with the cognitive style characterized by a greater belief in Divine Fate Control, greater Need for Structure-Order, and less of a Need to Help People. This combination of cognitive-style measures and greater interest in things rather than people appears indirectly supported by Harvey's et al. (1962) characterization of the Type I System individual, whom he describes as having high absolutism and closeness of thought and belief, high evaluativeness, high positive dependence upon representatives of institutional authority; high identification with social roles, and status position, high conventionality; high ethnocentricism or strong beliefs in American superiority.

**Canonical Correlational Analyses**

**Main Conclusions and Discussion**

Using as independent variables the thirteen cognitive-style measures collectively considered and the eight UNIACT Interest areas collectively considered, a canonical correlation analysis made possible the study of significant relationships between cognitive-style measures and the UNIACT Interest Inventory. The first function
yielded a canonical correlation of .45034 with a probability of .0016, which is statistically significant. The variables in the first set which contributed to the canonical correlation were Need to Help People (negative coefficient), Need for Structure-Order, and Field-Independence; and the variables in the second set were Social Service (negative coefficient), Business Detail, Science, and Things/People. That is, less interest in Social Service, greater interest in Business Detail and in Science, and interest in Things rather than People tend to be associated with that cognitive style which might be described as having less Need to Help People, greater Need for Structure-Order, and greater field independence.

This canonical relationship appears very consistent with studies of interests reported by Witkin et al. (1967) who, in summarizing the studies, state that

. . . as a general principle, relatively field-independent persons, taken as a group, are likely to show interest in domains where their cognitive skill-competence in articulation or in analysis and structuring--are called for and where relations with people are not particularly involved. In contrast, relatively field-dependent persons, as a group, are likely to favor domains with a "people" emphasis; that is, which feature social content and which involve interpersonal relations in daily ongoing activities, and for which analytical/structuring competence does not particularly matter. (p. 40)

It is interesting to note that the pattern of cognitive styles closely approximated the location patterning that would be predicted following Holland's hexagonal model.
Conclusion

The main focus of this study centered around how selected cognitive styles may be related to measured UNIACT occupational preference patterns. Discussion of this section is limited to considering the contributions of the three major cognitive-style measures which were studied: (1) field independence/dependence; (2) preference for structure; and (3) Harvey's Six Cognitive Factors.

Field independence was related significantly to two of the eight interest patterns, those of Science and Technical interest. Both relationships appear very consistent with a large number of studies that examined the relationship of vocational interests and cognitive styles and found repeatedly that the responses of greater field independence were associated with people in the Technical and Science domains. The statistically significant correlation between field independence and creative arts appears consistent with the type of items measuring this interest on the UNIACT Interest Inventory (for example, write a movie script; prepare drawings to illustrate a magazine story). Thus, those demonstrated relationships can be considered a partial confirmation between field-independence correlations with other interest patterns cited in earlier research. However, the lack of statistically significant relationships between cognitive styles and other interest patterns remains to be explained. Pierson (1965) provides one possible explanation by indicating that "bi-polar constructs such as field independence-dependence may not only oversimplify complex situations, but also omit pertinent ways of conceptualizing the occupational world" (p. 75).
Of particular interest in this study was the lack of differentiation between the field-independent and "impersonal interest" type represented by Physical Science and Technical interests and field-dependent "personal interest" types represented by Sales and Social Service occupation preferences.

"Preference for structure" was found to be only minimally related to the UNIACT Interest patterns. Several reasons may be advanced for this lack of relationship, namely: (1) the Verbal Reasoning and Figure Recognition Tests used to assess this style in this study were inadequate to discriminate significant differences or (2) "preference for structure" is essentially unrelated to the general occupational preference patterns investigated in this study.

Harvey's Six Cognitive Factors yielded by far the most statistically significant relationship both when considered separately --as well as considered collectively--in relation to each of the interest scales. The single linear statistically significant relationships indicated by the zero-order correlation findings between Harvey's Factors and the several UNIACT Interest scales appeared consistent with the literature. That is, the significant relationship between Harvey's Need to Help People and Social Service interests would appear consistent with the findings that field-dependent individuals tend to be people oriented, and it is particularly consistent with the studies by Witkin (1967) who describes field-dependent persons as those who "express interest in interpersonal domains that particularly requires social skills. One cluster of
interests they frequently express falls in the welfare-helping-humanitarian domain, including Social Worker, Minister, Rehabilitation Counselor, Probation Officer" (p. 41). The significant relationships between Business Contact interest, Divine Fate Control, Need for People, and Interpersonal Aggression considered separately also appear consistent with the literature and particularly consistent with the earlier reported findings of Scott and Day (1972). The statistically significant relationship between Need for People more than things and Divine Fate Control was also consistent with Harvey's conceptualization of System Type I individuals.

Stepwise-correlation findings like the zero-order correlation results were uniformly low explaining only a limited amount of the shared variance between the interest measure and the collectively considered cognitive styles. This lack of significant-shared variance may to some extent account for the cognitive "mix" of the relationships observed. A number of relationships, however, did appear consistent with the research literature: the relationship between Science interest, field independence, and Need for Structure-Order; the relationship of Creative Arts interest with field-independence and less Need for Structure-Order; the relationship of Social Service with Need to Help People and low Need for Structure-Order; the relationship between Business Contact with less belief in Divine Fate Control, greater Need for People, and greater Interpersonal Aggression; the relationship between Technical interest, greater field independence, and low "preference for structure"; the
relationships between Things interest and Divine Fate Control, greater Need for Structure-Order, and less Need to Help People; and the relationships between Business Detail and the several cognitive measures which appeared less clear. The canonical correlation findings appeared consistent with the "summary" of the literature (Witkin et al., 1977) regarding field-independent/field-dependent vocational interests and occupational choices.

Although the zero-order correlations were low and explained a limited amount of the shared variance, the significant relationships obtained appeared consistent with the research literature. Progressing from the zero-order relationships to the stepwise regression (in which a combination of cognitive-style measures were related to a specific interest), a more specific understanding of the relationship of the pattern of cognitive measures to interests was obtained. Additionally there was a progressive increase in the shared variance noted. Progressing once more from the stepwise-regression analysis to the canonical correlation (in which the combination of both the cognitive style measures as well as the combination of interests were related to each other), a significant increase of the shared variance was explained, making greater prediction possible. Additionally, the canonical-correlation finding appeared to establish the relationship between the cognitive-style measures and a pattern of interest which appeared very consistent with what one would expect in terms of the interest placement on the "hexagon" following Holland's theory. Although the canonical-correlation analysis established relationships between cognitive-
style measures and a particular pattern of interests and explained a moderate amount of shared variance, the limited amount of shared variance between zero-order and stepwise regression point out the need for a more adequate theory and research. Considering the limited amount of shared variance in the occupational preference patterns accounted for by the three major cognitive styles investigated, a more inclusive explanation seems needed. Perhaps the most important generalization arising from this study is that where "experimental" arrangements do not preclude it, individuals use more than one cognitive style. Davis (1971), for example, found that less than one-third of children and adults used one style consistently. His results and the multiple analyses in particular of this study suggest what characterizes an individual is the pattern of responses, and the likelihood of how the different tasks and situations would be dealt with. Why, then call these patterns of behavior cognitive styles; would not cognitive-style patterns be a more appropriate conceptualization? Perhaps Brunner, Goodnow, and Austin (1956) were right when they proposed that one look at the differences in the way people think in terms of cognitive strategies that are available to them and that they like to use, other than consistently considering individuals to be characterized by a single style of conceptualization. Multivariate techniques such as canonical correlation which takes in simultaneous combination, not only cognitive-style measures but also interest areas, would appear to be a most promising technique to further our understanding and to relate to existing theory how cognitive style and interest patterns in combination relate to each other.
It is the desire of this researcher that additional studies in various parts of the country using significantly larger samples would continue to investigate potential relationships existing between these two important classes of variables utilizing multivariate techniques and, in particular, canonical-correlation analyses.

**Implications**

A number of psychological and educational implications are suggested from the results of this study. First, it seems possible that selection of students for such academic areas as natural science, mathematics, architecture, engineering, creative arts and social service could be more effective if such cognitive styles as field-independence/field-dependence, preference for "structure" and Harvey's six cognitive factors are taken into consideration along with the other criterion measures. Second, it may be desirable for counselors and guidance specialists who are in a position to assist students with career exploration and choice to recognize cognitive style as one of the variables related to college success in various academic areas. Third, cognitive style measures appear to provide an effective way of predicting appropriate college-academic/vocational-career areas if included among predictor variables, and used in conjunction with other variables such as intellectual ability, age, sex, and occupational preference. The results of this study suggest that there are some differential cognitive-style patterns exhibited by various interest groups, but this should be confirmed by additional studies of persons already in specific occupational fields. Fourth, given that individuals have different cognitive styles, it would appear that some types
of counseling approach would be more appropriate and incongruent with some cognitive styles than others. With regard to this, research in which clearly identifiable cognitive styles (e.g. field-independence/field-dependent) are paired with counselees of varying cognitive styles with the course of counseling process followed and rated for success of outcome, might further be of considerable value.

**Suggested Research**

The results of the present study pointed to directions for further research both in cognitive-style measures and occupational preference fields.

1. Further study is needed to cross-validate the obtained findings with more representative but larger samples.

2. Development of more adequate measures of cognitive-styles used for group testing is strongly recommended.

3. A further refinement of measuring devices seems to be essential, particularly in the "preference for structure" measures.

4. Further research relating cognitive styles to those characteristic of various occupational success to maximize the effectiveness of occupational choice is needed.

5. Studies of the relationship of cognitive styles to vocational maturity are suggested, particularly in light of the "differentiation" hypothesis that Field Independent cognitive-style should be related to greater vocational maturity.

6. Comparatively little research on cognitive styles has been done with female subjects. Such studies may prove an insightful and fruitful line of research.
7. Further investigation of the possible relationships of cognitive styles to academic achievement, in general, and to achievement in specific subject matter area would appear warranted.

8. The results of this study suggest there are some differential cognitive-style patterns exhibited by various interest groups, but this should be confirmed by a study of persons already in the fields, specific fields in particular.

9. Further elaboration of the present study seems to be needed also to control experimentally such confounding variables as sex and age which Chung (1966) reported as confounding variables when he studied the relationship among measures of cognitive style, vocational preference, and vocational identification.

Summary

A number of earlier studies provided direct and indirect evidence of relationships between cognitive styles, intellectual functioning, personality variables, and vocational interests and choice. The present investigation was undertaken in an attempt to explore the nature and extent of relationships between three cognitive styles and the eight UNIACT Interest Scales, the first six comprising Holland's six personal orientations and the latter two scales measuring Data/Ideas and Things/People dimensions.

Three cognitive styles, namely, field independence/dependence, "preference for structure," "intolerance for ambiguity," and Harvey's Six Cognitive Factors were taken as a measure of independent variables in a stepwise-regression analysis, while occupational preferences measured by the UNIACT Interest Scale and the
additional scales of Data/Ideas and Things/People were taken as the dependent variables. A canonical-correlation analyses enabled the investigator to study possible significant relationship between cognitive-style measures, the thirteen cognitive-style measures collectively considered, and the eight UNIACT Interest areas collectively considered. Field independence/dependence was measured with the Group Embedded Figures Test (GEFT), while major measures for the "preference for structure" cognitive styles were the VRRTAB average and the FRTTAB tab average. Harvey's Six Cognitive Factors were measured by means of the Personal Opinion Scale. Occupational preferences were designated as those measured interests as manifested on the UNIACT Interest Inventory.

The sample consisted of 139 females and 74 male junior college freshmen and sophomore students available at the local Michiana junior colleges and college campuses. The age range of the students was 17-25. Each student was given a battery of cognitive-style measures and the UNIACT Interest Inventory.

Stepwise linear regression analysis enabled the examination of which measures collectively considered were related to a specific UNIACT Interest category. A canonical-correlation analysis enabled the investigator to study possible significant relationships between the thirteen cognitive-style measures collectively considered and the eight UNIACT Interest categories collectively considered.

Results of the study indicated that field independence was related significantly to two of the eight interest patterns, those of Science and Technical interest, both of which relationships appear
very consistent with a large number of studies that examined the relationships of vocational interests and cognitive styles and found repeatedly that the responses of greater field independence were associated with people in the Technical and Science domains. A statistically significant correlation between field independence and Creative Arts appears consistent with the type of items measuring this interest on the UNIACT Interest Inventory (for example, write a movie script; prepare drawings to illustrate a magazine story). Thus these relationships can be considered to be a partial confirmation of a relationship between field-independent cognitive style and occupational preferences, as suggested by the literature. Failure to find significant correlations with other interest patterns (e.g., Social Service, Business Contact, Business Detail) however, remains to be explained. Pierson (1965) provides one possible explanation by indicating that "bi-polar constructs such as field independence/dependence may not only over-simplify complex situations, but also omit pertinent ways of conceptualizing the occupational world" (p. 75).

Of particular interest in this study was the lack of differentiation between the field-independent and impersonal-interest type represented by the Physical Science and Technical interests as suggested by Pierson, and field-dependent personal-interest type represented by Sales and Social Service occupational preferences.

"Preference for structure" was found to be only minimally related to the UNIACT Interest patterns. Several reasons may be advanced for this lack of relationship, namely: (1) the Verbal
Reasoning and Figure Recognition Tests used to assess this style in this study were insufficient to discriminate significant differences or (2) "preference for structure" is essentially unrelated to general occupational preference patterns investigated in this study.

Harvey's Six Cognitive Factors yielded by far the most statistically significant relationship both considered separately as each factor related to the respective interest scale as well as collectively considered in relation to each of the interest scales. The single linear statistically significant relationships indicated by the zero-order correlation findings between Harvey's need and the several UNIACT Interest scales appeared consistent with the literature. That is, the significant relationship between Harvey's Need to Help People and Social Service interests would appear consistent with the findings that field-dependent individuals tend to be people oriented, and it is particularly consistent with the studies by Witkin (1967) who describes field-dependent persons as those who "expressed interest in interpersonal domains that particularly require social skills. One cluster of interests they frequently express fall in the welfare-helping-humanitarian domain, including Social Worker, Minister, Rehabilitation Counselor, Probation Officer" (p. 41).

The canonical-correlation analysis finding a significant canonical correlation between the variables in the first set, Need to Help People, Need for Structure-Order, and field independence, and the variables in the second set of Social Service, Business Detail, Science, and Things/Interest appeared very consistent with the reported research findings.
Implications of the research findings were pointed out and possible research directions in this area were discussed.
APPENDIX A

The Data
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Table showing the loadings of Harvey's 67 variables on 8 factors.
APPENDIX B

The Instruments
PLEASE NOTE:

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These consist of pages:

151-168: GROUP EMBEDDED FIGURES TEST.
169-180: VERBAL REASONING TEST.
181-185: FIGURE RECOGNITION TEST.
186-194: PERSONAL OPINION SCALE.
195: CONCEPTUAL SYSTEMS TEST.
196-197: THE ACT INTEREST INVENTORY.
BIBLIOGRAPHY

Books


Journals


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Guilford, J. P.; Christensen, P. R.; Frick, J. W.; and Merrifield, P. R. "The Relation of Creative Thinking Aptitudes to Non-Aptitude Personality Traits." Reports from the Psychological Laboratory 20 (1959).


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Dissertations, Unpublished Manuscripts, and Reports


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