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CHOICE OF LEARNING FORMAT AS A FUNCTION OF THREE CONSTRUCTS: PERSONALITY VARIABLES, COGNITIVE STYLE, AND LOCUS OF CONTROL

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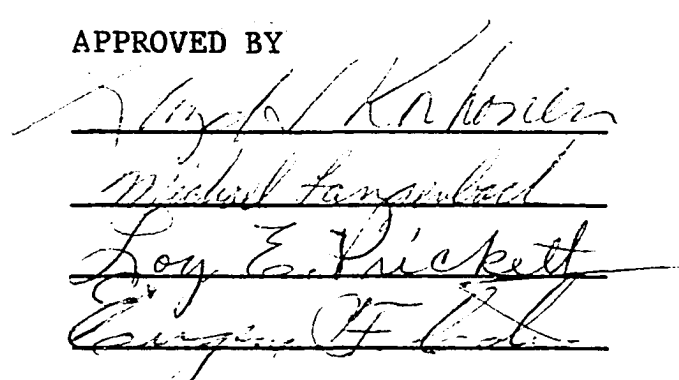

DISSERTATION COMMITTEE

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ABSTRACT

The purpose of this study was to investigate the relationship between choice of learning format and personality type, cognitive construct, and locus of control. The major problem was to determine if choice of learning format was a function of selected individual characteristics.

Personality types were measured by the Myers-Briggs Type Indicator, a self report inventory based on Jung's topology; locus of control was measured by Rotter's I-E Scale, a measure of generalized expectancy based on Rotter's Social Learning Theory; and cognitive style was measured by the Group Embedded Figures Test which assesses field-dependence-independence.

Two general areas were investigated:

1. There are significant differences between introverts and extraverts, thinking types and feeling types, intuitive types and sensing types, judging types and perceptive types, internals and externals, field-dependents and field-independents in choice of learning format.

2. Individuals enrolled in each of the two educational formats have consistent personality types, consistent cognitive styles, and consistent locus of control. Constructs of individuals enrolled in the traditional educational format vary significantly from the constructs of individuals enrolled in the nontraditional educational format.

Procedure

A sample of 70 undergraduate university students were tested using the Myers-Briggs Type Indicator, Group Embedded Figures Test, and Rotter's I-E Scale. An incidental sample of 35 subjects were tested at a residential seminar in a nontraditional learning format. A stratified random sample was taken from subjects attending undergraduate classes in a traditional university setting. Since the subjects attending the traditional university were, as a group, younger than the nontraditional format subjects,

age was run as a predictor variable in the analysis. The mean age for traditional format subjects was 26.9 and mean age for nontraditional format subjects was 41.

In the first stage of analysis a frequency distribution was developed to cross-tabulate demographic data. Categorical scores were used for the groupings. Females scored higher than males among feeling types which supports findings by Myers. There was an age trend in the I-E Scale showing more internals over age 33. Males scored higher among the perceptive type scores than females.

In the second stage a scatterplot was developed to assess curvilinear relationships and relationships within certain variable ranges. No curvilinear relationships were found nor were relationships within variable ranges found.

In the third stage of analysis individual Chi Square Tests were used to compare obtained frequencies of categorical scores with theoretical frequencies. For the MBTI scores the obtained frequencies were within the range of the theoretical distributions reported by Myers. For the GEFT there was no normative data available. However Witkin et al. showed no difference in the mean GEFT scores in college drop-outs and in non-science graduate students. From these data the writer assumed a normal distribution of the field-dependent-independent construct in undergraduate study. The Chi Square tests supported this assumption. For Rotter's I-E Scale, no studies were available that gave normative data for undergraduate students. The Chi Square test showed a significant difference ($p<.01$) in externals and internals among undergraduate students. The I-E Scale mean however for the sample was 9.23 which supports findings reported by Rotter.

In the fourth stage, a 2X2 Chi Square tested for significance between congruent and incongruent styles and level of satisfaction with the educational format. Studies by Lefcourt and Telegi found congruent subjects to be more accepting of themselves and better adjusted. The writer tested congruent and incongruent subjects for adjustment in the educational format using level of satisfaction. The Chi Square Test did not find a significant difference ($x^2=.417$) in level of satisfaction between congruent and

noncongruent styles. These findings do not support the above studies.

In the fifth stage a stepwise multiple regression tested for selected personality variable, cognitive construct, and locus of control as predictors of educational format. The stepwise multiple regression did not yield significant correlation coefficients. Locus of Control was entered at Step 1 and accounted for only 4% of the variance.

In a second stepwise multiple regression analysis, age was run as a predictor variable against test scores. This analysis was computed on the nontraditional educational sample which had an age range of 23-62. No significant correlations were found between age and test scores.

A stepwise multiple discriminant analysis tested for linear relationships in each format. The stepwise multiple discriminant analysis supported the stepwise multiple regression analysis in that no significant relationships were found between test scores and each of the formats.

Conclusions

This study indicates that subjects in the traditional educational format and subjects in the nontraditional educational format are samples from the same population, and that they are part of the population reported by Myers.

While the MBTI may predict those subjects who attend college from those who do not go to college, this study indicates that selected personality characteristics do not predict choice of learning format.

Since there is no normative data for cognitive style subjects and for locus of control subjects in an educational format, this study sets up a normative model for both tests.

No significant relationships were indicated between test scores and choice of format. In the second stepwise multiple regression analysis, age was tested against test

scores as a predictor variable. Age did not predict performance on any of the tests. These findings are at variance with studies on field-dependence-independence by Schwartz and Carp, Comalli, and DeCosmo, but support a report by Kogan.

The Stepwise Multiple Discriminant Analysis supports the other findings in this study.

CHOICE OF LEARNING FORMAT AS A FUNCTION OF THREE CONSTRUCTS: PERSONALITY VARIABLES, COGNITIVE STYLE, AND LOCUS OF CONTROL

CHAPTER I

INTRODUCTION

Recent studies in adult psychology have indicated the highly individualistic nature of the mature adult. This individualistic nature is the product of prior relevant experiences and influences within the societal context. Present events are judged and handled in the light of past experiences. On the other hand, meanings of past experiences are interpreted and reinterpreted in light of each new situation. These changes occur as the adult assumes each new role. Changes in roles bring about changes in perspective. In addition to being influenced by prior relevant experiences, the adult is also influenced by the societal context, both past and present. The adult is a product of his or her present and childhood societal context creating both

age-related differences and generation-related differences. These developmental changes result in an increasing range of learning abilities as the person grows older.[1]

Three factors have been found to influence learning abilities: personality, social class, and physical condition. Personality characteristics affecting learning include attitudes toward learning, feelings about change, and general adaptibility or rigidity. Social class level, coupled with educational background has been found to correlate more highly with learning ability than has age. Adults who remain healthy have gradual and slight decreases in mental performance till in their eighties while adults who are ill show a rapid decline in mental performance after age sixty. The varied and meaningful experiences, the socio-economic level, and a person's general health all interact with each other and with personality correlates to create an individuality not seen in children and young adults. In other words, children and young adults are more like each other than are adults like each other.[2]

Additionally the adult lives in a society whose

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[1]Alan B. Knox, Adult Development and Learning (San Francisco: Jossey-Bass Publishers, 1977), pp. 1-30.

[2]Ibid., pp. 405-469.

changing nature requires virtually all citizens to acquire new skills and intellectual orientations throughout their lifetime. The obsolescence of knowledge and the rapid growth of new knowledge is sending the mature adult back to traditional and nontraditional educational institutions for "recycling." "We have developed an educational system that is largely oriented to youth and is poorly equipped to reach the needs of adults."[3]

Choice of learning format may reflect not only the need for differential competencies but also may reflect individual differences. Aptitude Treatment Interaction (ATI) studies have looked at student-environmental matching. Aptitude is defined as ". . . any aspect of an individual that predicts response to instruction, including prior achievement, special ability, personality, and stylistic characteristics . . . ."[4] Treatment is defined as ". . . variations in instructional methods or media, variations in classroom or teacher characteristics, or even as differences

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[3]Theodore M. Hesburg, Paul A. Miller, and Clifton R. Wharton, Patterns for Lifelong Learning (San Francisco: Jossey-Bass, 1973), p. 3.

[4]Samuel Messick and Associates, ed., Individuality in Learning (San Francisco: Jossey-Bass Publishers, 1976), p. 271.

in departmental or institutional environments."[5] Research studies from ATI have shown that environment and individuals interact with each other in various ways. The individual's choice of learning format can also be understood as a result of affective and cognitive characteristics. Matching students to format is one method of responding to the diversity of learning styles in adults.

> In this century, educators often have adapted and diversified their treatments. An example is the change in American colleges . . . . Colleges have become less standardized, and now cater to a variety of styles and talents. Even so, the matching of students to colleges is almost entirely thoughtless and disorderly. There is little reason to assume, for example, that the person who scores highest on the College Boards should go to the most selective college. His personal style may be such that he will reach a higher peak of fulfillment or social contribution if he goes to say, a small experimental school that is not especially selective.[6]

ATI studies have shown that individuals respond differentially to the same environment. Do individuals choose certain learning formats based on individual characteristics? Can individual attributes be used to predict choice of learning environment? The goal of this study was

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[5]Ibid.

[6]Lee J. Cronbach and Richard E. Snow, Aptitudes and Instructional Methods (New York: John Wiley and Sons, 1977), p. 11.

to explore predictors of choice between a traditional educational format and a nontraditional educational format.

Statement of the Problem

The problem of this study was as follows: Is choice of learning format among selected adult students a function of personality variables, cognitive style, and locus of control?

The Purpose of the Study

It was the purpose of this study to determine the relationship between choice of learning format and selected individual characteristics. These selected characteristics are personality types, locus of control and cognitive style. Personality types were measured by the Myers-Briggs Type Indicator,[7] a self report inventory based on Jung's topology; locus of control was measured by Rotter's I-E Scale,[8] based on Rotter's Social Learning Theory; and cognitive style was measured by the

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[7]Isabel Briggs Myers, The Myers-Briggs Type Indicator (Palo Alto: Consulting Psychologists Press, Inc., 1962).

[8]Julian B. Rotter, June E. Chance, and Jerry Phares, Applications of a Social Learning Theory of Personality (New York: Holt, Rinehart and Winston, Inc., 1972), pp. 272-295.

Group Embedded Figures Test[9] which assesses field-dependence-independence.

In this study, two general areas were investigated.

1. There are significant differences between introverts and extraverts, thinking types and feeling types, intuitive types and sensation types, judging types and perceptive types, internals and externals, field-dependents and field-independents in the choice of learning format.

2. Individuals enrolled in each of the two educational formats have consistent personality types, consistent cognitive styles, and consistent locus of control. Constructs of individuals enrolled in the traditional educational format vary significantly from the constructs of individuals enrolled in the nontraditional educational format.

Specific Hypotheses

The following were the hypotheses tested in this study:

H_1 There are significantly more introverts than extraverts enrolled in a nontraditional educational format.

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[9]Herman A. Witkin, Philip K. Oltman, Evelyn Raskin, and Stephen A. Karp, A Manual for the Embedded Figures Test (Palo Alto: Consulting Psychologists Press, Inc., 1971).

H_2 There are significantly more extraverts than introverts enrolled in a traditional educational format.

H_3 There are significantly more thinking types than feeling types enrolled in a nontraditional educational format.

H_4 There are significantly more feeling types than thinking types enrolled in a traditional educational format.

H_5 There are significantly more intuitive types than sensation types in the nontraditional educational format.

H_6 There are significantly more sensation types than intuitive types in the traditional educational format.

H_7 There are significantly more judging types than perceptive types enrolled in a nontraditional educational format.

H_8 There are significantly more perceptive types than judging types enrolled in a traditional educational format.

H_9 There are significantly more field-independents than field-dependents enrolled in a nontraditional educational format.

H_{10} There are significantly more field-dependents

than field-independents enrolled in a traditional educational format.

H_{11} There are significantly more internals than externals enrolled in a nontraditional educational format.

H_{12} There are significantly more externals than internals enrolled in a traditional educational format.

H_{13} Significantly more subjects with congruent styles than incongruent styles are enrolled in a nontraditional educational format.

H_{14} Significantly more subjects with incongruent styles than congruent styles are enrolled in a traditional educational format.

H_{15} Subjects with incongruent styles enrolled in each educational format express dissatisfaction with the format and subjects with congruent styles, enrolled in each program, express satisfaction with the format.

H_{16} Subjects who are intuitive, thinking, and judging types, introverts, internals, and field-independent choose the nontraditional educational format.

H_{17} Subjects who are sensing, feeling, and perceptive types, extraverts, externals, and field-dependent choose the traditional educational format.

Limitations of the Study

One limitation of the study was that the College of Liberal Studies sample consists of all students attending the winter seminar at the University of Oklahoma and the traditional format sample consists of mature adult students attending evening classes in the regular University of Oklahoma undergraduate program. Generalizations beyond these samples is valid only to the extent that the populations sampled are representative of these populations.

A second limitation was that the subjects in the sample taken from the College of Liberal Studies live in many different geographic regions. The subjects in the sample taken from the traditional educational format live in central Oklahoma.

A third limitation is that the undergraduate classes contacted were overrepresented by younger students. Age differences have not been established for the I-E Scale. While children show more externality than adults, age-related differences beyond adolescence have not been established. Some studies indicate a possible relationship between age, past middle age, and introversion. Age-related studies using the Group-Embedded Figures Test show conflicting results. Early cross-sectional studies showed more age-related differences than later longitudinal studies have

shown. Age-related differences seem to exist but there is a question whether increasing field-dependence begins at age 30, 40, or later (see pages 25-28 of this study). To check for age as a possible confounding variable, test scores were run against the age variable in the College of Liberal Studies group.

Operational Definition of Terms

The following operational definitions are used in this research:

Intuitive type: Subjects scoring higher on the intuition scale than on the sensing scale on the Myers-Briggs Type Indicator are classified as intuitive types.

Sensing type: Subjects scoring higher on the sensing scale than on the intuitive scale on the Myers-Briggs Type Indicator are classified as sensing types.

Thinking type: Subjects scoring higher on the thinking scale than on the feeling scale on the Myers-Briggs Type Indicator are classified as thinking types.

Feeling type: Subjects scoring higher on the feeling scale than on the thinking scale on the Myers-Briggs Type Indicator are classified as feeling types.

Perceptive type: Subjects scoring higher on the

perceptive scale than on the judging scale on the Myers-Briggs Type Indicator are classified as perceptives.

Judging type: Subjects scoring higher on the judging scale than on the perceptive scale on the Myers-Briggs Type Indicator are classified as judging types.

Introvert: Subjects scoring higher on the introvert scale than on the extravert scale on the Myers-Briggs Type Indicator are classified as introverts.

Extravert: Subjects scoring higher on the extravert scale than on the introvert scale on the Myers-Briggs Type Indicator are classified as extraverts.

Field-independent: Subjects who score 16 to 18 for males and 15 to 18 for females in the Group Embedded Figures Test are classified as field-independent.

Field-dependent: Subjects who score 0 to 9 for males and 0 to 8 for females on the Group Embedded Figures Test are classified as field-dependent.

Internal: Subjects who score in the lower one-third of Rotter's I-E Scale are classified as internals.

External: Subjects who score in the upper one-third of Rotter's I-E Scale are classified as externals.

Nontraditional educational format: The College of Liberal Studies at the University of Oklahoma.

Traditional educational format: The regular undergraduate program at the University of Oklahoma.

Congruent styles: Subjects who are field-independent/internal and subjects who are field-dependent/external as measured by the Group Embedded Figures Test and I-E Scale.

Incongruent styles: Subjects who are field-independent/external and field-dependent/internal as measured by the Group Embedded Figures Test and the I-E Scale.

Significance of the Study

This study is designed to investigate characteristics of adults enrolled in two different educational formats. Specific relationships between choice of learning format and cognitive and personality characteristics will be examined. Educators are creating programs that are less standardized, gearing them more to individual characteristics. If it is known that a student with a specific personality characteristic consistently chooses a specific learning format, then much can be done to help the student reach his or her educational goals. Counseling in choice of general educational program and specific learning plans can be done with student characteristics in mind. Additionally, differential counseling or training could help prepare students for specific learning or study methods.

Advisors or teachers can be assigned who seem best suited to the students' special educational and psychological needs. Variations can be made in instructional methods or media and learning environments based on individual characteristics. Much more research is needed on the characteristics of the mature adult and his or her optimum learning environments. This study will add to the body of knowledge.

CHAPTER II

SURVEY OF RELATED LITERATURE

This chapter contains a review of the literature relating choice of learning format to personality and cognitive constructs.

Field-Dependent and Field-Independent Cognitive Styles

Studies of cognitive styles came from the laboratory experiments and only later were associated with personality theory. To date the most studied applied cognitive style construct in education has been Witkin's field-dependence/field-independence dimension. Witkin originally called the construct "perceptual field-dependence-independence." When subsequent studies revealed that intellectual functioning as well as perceptual functioning was involved, the term "global-analytical" was applied. Further research which uncovered dimensions of personality function resulted in the use of "global vs. articulated" functioning, or "psychological differentiation."

More recently Witkin observed,

> From such evidence it became clear that we were dealing with a broad dimension of individual differences that extends across both perceptual and intellectual activities. Because what is at issue is the characteristic approach the person brings with him to a wide range of situations--we call this his "style"--and because the approach encompasses both his perceptual and intellectual activities--we spoke of it as his "cognitive" style.[1]

All of the above terms are used interchangeably in the literature.

Beginning in the late 1940s, the first studies by Witkin and Witkin and Asch were concerned with how the individual determined the upright in space. Some people were found to rely on bodily sensations while others depended on the visual field. These marked differences in the way individuals perceived were measured by three tests, the Rod-and Frame Test (RFT), the Body-Adjustment Test (BAT), and the Embedded-Figures Test (EFT). In the RFT the subject is presented with a luminous square frame in a completely darkened room. The frame can be rotated clockwise or counterclockwise about its center. Attached to the frame's center is a luminous rod which can also be

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[1]H. A. Witkin, C. A. Moore, D. R. Goodenough, P. W. Cox, "Field-Dependent and Field-Independent Cognitive Styles and Their Educational Implications," Review of Educational Research, Vol. 47, No. 1, Winter 1977, p. 10.

rotated clockwise and counterclockwise independent of the frame. The subject's task is to adjust the rod to the upright position while the frame remains in its initial position.[2]

The BAT places the subject in a chair that can be tilted clockwise or counterclockwise. The chair is projected into a small darkened room which can also be tilted, independent of the chair, clockwise or counterclockwise. The task is to adjust the chair to the upright position. The purpose of the test is the subject's accurate perception of the body as upright rather than perception of an external object as upright (as in the RFT).[3]

The EFT presents the subject with a simple geometric figure and a complex geometric design. The task is to locate the simple figure in the complex design. The score in the RAF and in the BAT is the number of degrees of tilt of the rod and of the body. The score in the EFT is the time taken to locate the embedded figure. In all three tests there are marked differences among individuals in being able to perform the tasks. The field-independents are the most accurate while the field-dependents are the

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[2]Ibid., pp. 2-3.

[3]Ibid., pp. 4-5.

least accurate. All three tests measure the extent to which the surrounding organized field determines a person's perception of material within it. Individual differences are very similar to each other in all three tests.[4]

Two more recent tests developed for field-dependence-independence are the GEFT[5] and the Articulation-of-Body-Concept Scale (ABC) developed by Marlens.[6] The GEFT was developed from the EFT and is constructed to be administered in groups. The ABC is developed to assess the "differentiated self."

> . . . the following characteristics of a high level of differentiation had been found to cluster together: an articulated way of experiencing the world (including field-independent perception), a differentiated self, reflected in an articulated concept of the body and a developed sense of separate identity; and the use of structured, specialized defenses, such as intellectualization and isolation.[7]

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[4]Ibid., pp. 6.

[5]Herman A. Witkin, et al., Manual.

[6]H. A. Witkin, R. B. Dyk, H. F. Faterson, D. R. Goodenough, S. A. Karp, Psychological Differentiation: Studies of Development (Potomac, Md.: Lawrence Erlbaum Associates, 1974).

[7]Hanna A. Faterson and Herman A. Witkin, "Longitudinal Study of Development of the Body Concept," Developmental Psychology, Vol. 2, No. 3, 1970, p. 429.

Research on Characteristics of Field-Dependence - Independence

Individuals who are field-independent are able to perceive part of an organized field as separate from the whole, and are sometimes referred to as analytic or articulated. Field-dependent persons are those who perceive the field as a whole. Their perceptions determined by the surrounding field, field-dependents are said to perceive globally.[8]

Field-dependence-independence represent polarities of the articulated-global continuum. While attributes of individuals from one polarity are not considered superior to, or more adaptive than individuals at the other extreme, significant implications for education become evident. Certain types of problem situations favor field-dependent individuals over field-independent individuals and vice versa.[9]

Individuals who are perceptually global (field-dependent) are unable to keep an item separate from its surrounding field. It follows that these people have difficulty with the type of problem that requires taking some

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[8]Ibid., pp. 7-10.

[9]Ibid.

critical concept out of its context and placing it within another context. This suggests rigidity of thinking for this type of problem. "It is clear from this and other evidence that the individual differences dimension first picked up in perception shows itself equally in the problem-solving domain."[10]

Field-dependent individuals tend to leave the field as it is not only for stimuli that is unorganized and ambiguous but for verbal materials as well. Fewer distinctions are made among concepts which cluster into loosely organized groups. In one study involving a social studies course in a high school, field-dependent teachers did not clearly differentiate the curricular concepts, but left them loosely clustered together. Field-independent teachers, on the other hand, clustered the concepts into distinct groups.[11]

The preferred global style is also apparent in social behavior where field-dependent individuals use

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[10]Witkin, et al., "Cognitive Styles--Educational Implications," p. 10.

[11]Cathleen Stasz, Richard J. Shavelson, David F. Cox, Carol A. Moore, "Field Independence and the Structuring of Knowledge in a Social Studies Minicourse," Journal of Educational Psychology, Vol. 68, No. 5, 1976, pp. 550-558.

surrounding frames of reference within the social context. They attend to social stimuli such as facial expressions, and verbal social messages. Having a more globally experienced self, social cues often act as referents for the field-dependent person in defining feelings and attitudes. This is especially true in ambiguous situations.[12]

Additionally the field-dependent person is attracted to people, enjoying their company, even preferring physical closeness. They are considered by others to be warm, affectionate, and sensitive to people. Areas of vocational preference for field-dependents tend to be people-centered in which both context and subject matter centers around people.[13]

In contrast to the field-dependent person's global style, the field-independent (perceptually articulated) person is able to overcome the organization of the field and if the stimuli are ambiguous, to impose a structure on it. In working with verbal materials, the field-independent

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[12]Herman A. Witkin, Donald Goodenough, and Stephen Karp, "Stability of Cognitive Style from Childhood to Young Adulthood," Journal of Personality and Social Psychology, 1967, Vol. 7, No. 3, p. 291.

[13]Witkin, et al., "Cognitive Styles--Educational Implications," pp. 10-13.

person is able to differentiate concepts clearly, making sharp distinctions among them.[14]

Not only is the field-independent person able to articulate concepts clearly but the self is also clearly articulated. The field-independent person uses an internal frame of reference in social situations. Feelings, attitudes, and needs are experienced as distinctly theirs and separate from others.[15]

> In the separateness of self from nonself, such people may be said to have a self which is experienced as segregated; and, with the availability to them of distinctive internalized frames of reference, they may be said to have a self which is experienced as structured.[16]

In areas of social behavior field-independent people tend to be more impersonal and to prefer psychological distance from others. They are also considered to be individualistic.[17] Studies have shown them to be more interested in the abstract and theoretical.[18]

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[14]Ibid., p. 7.

[15]Ibid.

[16]Ibid., p. 13.

[17]Ibid., pp. 12-13.

[18]J. B. Biggs, D. Fitzgerald, Sonia M. Atkinson, "Convergent and Divergent Abilities in Children and Teachers' Ratings of Competence and Certain Classroom Behaviours," British Journal of Educational Psychology, 1971, Vol. 41, pp. 277-286; and R. W. Heath, "Curriculum, Cognition, and Educational Measurement," Educational and Psychological Measurement, 1964, Vol. 24, pp. 239-253.

Witkin lists four characteristics that are common to cognitive style in general and specifically to the field-dependent-independent dimension. First, cognitive styles are concerned with the form rather than the content of cognitive activity. They point to individual differences in the way we think. Second, cognitive styles are pervasive dimensions. They are known to measure some aspects of what has been traditionally known as personality yet they can be objectively assessed by nonverbal perceptual methods. Liking to be among people, being attentive to what others say and do, and defining one's own beliefs in accordance with information gained from others is a feature of personality, not of cognition alone. A third characteristic of cognitive styles is that they are stable over time. Longitudinal studies have shown that individuals may vary on the continuum somewhat, but stay within the same style. Fourth, cognitive styles are bipolar, each pole having adaptive value under certain conditions. The most obvious distinction is the social competence plus less skill in articulation at the one end of the global dimension and the competence in cognitive articulation plus a social orientation that is impersonal and insensitive

at the articulated end.[19]

Studies of Cognitive Styles and Sex Differences

Studies have found small but persistent sex differences in field-dependence-independence cognitive style. There is evidence that sex-role assignment may override the effects of cognitive style on career differentiation.[20] In the longitudinal study by Witkin et al., majors in the education group were chosen by 33% of the women and by 3% of the men. In the science and mathematics group, 29% were men and 11% were women.[21]

In a study by Witkin women science majors had a mean of 11.5 on the GEFT and men had a mean score of 12.1, significant at the .10 level.

> . . . in their academic choices, male college students very strongly favor mathematics and the

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[19]Witkin, et al., "Cognitive Styles--Educational Implications," pp. 15-17.

[20]Witkin, et al., "Cognitive Styles--Educational Implications," p. 51; and Volet H. Perney, "Effects of Race and Sex on Field Dependence-Independence in Children," Perceptual and Motor Skills, 1976, Vol. 42, pp. 975-980.

[21]H. A. Witkin, Carol Ann Moore, Philip K. Oltman, Donald R. Goodenough, Florence Friedman, David Owen and Evelyn Raskin, "Role of the Field-Dependent and Field-Independent Cognitive Styles in Academic Evolution: A Longitudinal Study," Journal of Educational Psychology, 1977, Vol. 69, No. 3, 197-211.

> natural sciences over education, whereas the reverse is true for female college students. Beyond that, the data suggest that women who enter the science domains are likely to be exceptional in academic aptitude . . . . Thus, women who are found in the natural sciences and mathematics, domains which are not traditional for their sex, are outstandingly competent.[22]

Patrick found that women working for advanced degrees in male-dominated professions (lawyers, doctors, architects, and scientists) were more field-independent than female college graduates who were, at the time of the study, engaged in full-time homemaking.[23]

One study differs unexpectedly from the usual trend in studies on sex differences. Fifteen men and 24 women were compared on a visual orienting task requiring observers to set a luminous line to a vertical position while viewing from a laterally tilted body position. No visible frame of reference was available. Women made no significant errors as a group, but the men's average settings deviated approximately 7 degrees from vertical, in the same direction as body tilt.

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[22]Witkin, et al., "Longitudinal Study," p. 201.

[23]T. A. Patrick, "Personality and Family Background Characteristics of Women who Enter Male-Dominated Professions" (Doctoral dissertation, Colombia University, 1973), Dissertation Abstracts International, 1973, Vol. 34, 2396A.

> The results of the present study are at variance with this expectation. While personality factors cannot be ruled out as a source of sex differences in visual orientation, the direction of the difference seen here clearly limits the applicability of the field dependence concept as a general predictor of sex differences in spatial performance.[24]

DeCosmo, in a study of older adults (age 22 and older) attending evening school in a community college, found no association between sex and field-dependence-independence:

> . . . sex tells you nothing about either age or cognitive style of a subject . . . the association between age and cognitive style is unaffected by whether the subject is male or female.[25]

Studies of Cognitive Style and Age Differences

Kogan, summarizing numerous studies on cognitive style and age states:

> In sum, the published evidence on the field-independence-dependence dimension is rather discouraging from the point of view of drawing firm conclusions

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[24]Colin Pitblado, "Superior Performance by Women in a Visual Orienting Task: A Limit on the Concept of Field Dependence," Perceptual and Motor Skills, 1976, Vol. 24, p. 1200.

[25]Richard Donald DeCosmo, "A Study of Field Dependence-Independence Selected Curricular Choices and Preferred Guidance Strategies of Adult, Evening Community College Students" (Doctoral dissertation, Loyola University of Chicago, 1977), p. 75.

concerning age versus cohort effects within a life-span perspective.[26]

Early cross-sectional studies indicated a consistent decline in field-independence from age 17 to age 21. After several longitudinal studies had been conducted, Witkin et al. later attributed the cross-sectional results to special cohort characteristics in their 21 year old sample. Comalli extended these studies into advanced ages. Figure No. 1 shows the curvilinear relationship between early childhood and old age and EFT scores.[27] A similar relationship exists using the RFT.

Schwartz and Karp investigated three different age groups: 17 year olds, 30-39 year olds, and 58-82 year olds. The results show a steady increase in field-dependence with increasing age. However the subjects differed markedly in educational level, occupation, and country of birth. The means on the BAT, RFT, and EFT, while showing a uniform increase of field-dependence with age, show an inverse

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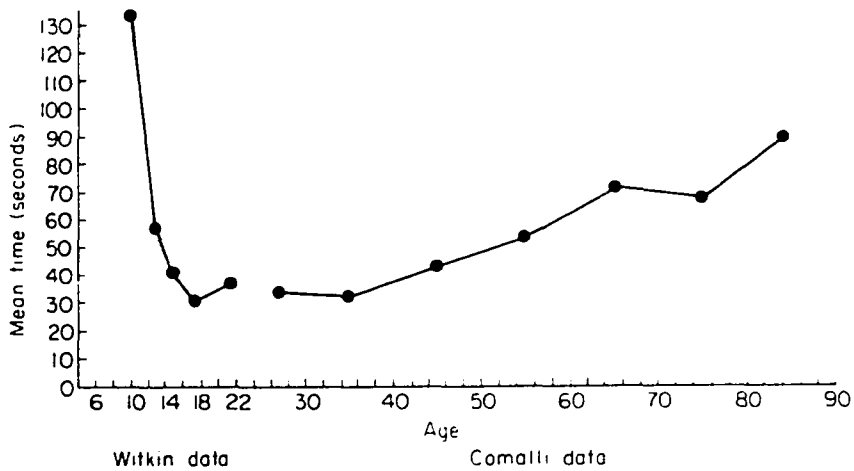
[26]Nathan Kogan, "Creativity and Cognitive Style: A Life-Span Perspective," in Life-Span Developmental Psychology Personality and Socialization, ed. by Paul B. Baltes and K. Warner Schaie (New York: Academic Press, 1973), p. 167.

[27]Peter E. Comalli, Jr., "Life-Span Changes in Visual Perception," in Life-Span Developmental Psychology Research and Theory, ed. by L. R. Goulet and Paul B. Baltes (New York: Academic Press, 1970), pp. 211-226.

FIGURE 1

Age Changes to Embedded-Figures Test



SOURCE: Peter Comalli, p. 222.

relationship with level of education.[28] Kogan comments on these findings,

> That education rather than age constitutes the major detriment of the observed differences is suggested by the uniformly greater field dependence of the 30-39 relative to the 17-year old group. The former group, after all, is in the prime of adulthood, and hence their deficit very likely can be attributed to their educational disadvantage.[29]

DeCosmo found an association between age level and cognitive style. Adult subjects enrolled in a community college

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[28]D. W. Schwartz and S. A. Karp, "A Field Dependence in a Geriatric Population," Perception and Motor Skills, 1967, Vol. 24, 495-504.

[29]Kogan, "Life-Span Perspective," p. 166.

that were over the median age of 29.4 were more field-dependent than younger subjects.[30]

Comalli et al. found scores of older adults (ages 67 to 81) on the Perception of Verticality test similar to scores of children.[31] Note that all the above mentioned studies are cross-sectional studies.

In studies of intellectual performance, a combination of cross-sectional and longitudinal studies has been required to control for intergenerational differences, environmental treatment effects, and maturational status. The same may be true for cognitive styles.[32] Since there is an absence of longitudinal studies of cognitive styles extending into middle-age and old age, Kogan's statement seems applicable.

Studies of Cognitive Style and the Educational Format

The field-dependence-independence dimension has been found to be unrelated to learning ability, memory or

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[30]DeCosmo, "Curricular Choices," p. 44.

[31]Peter E. Comalli, Jr., Donald M. Kries, and Seymour Wapner, "Cognitive Functioning in Two Groups of Aged: One Institutionalized, the Other Living in the Community," Journal of Gerontology, Vol. 20, No. 4, Oct. 1965, 9-13.

[32]K. Warner Schaie, "Age Related Changes in Cognitive Structure and Functioning," in Life-Span Developmental Psychology Research and Theory (New York: Academic Press, 1970), p. 487.

overall academic achievement.[33] However, field-dependent persons tend to be better at learning and remembering social material than persons who are field-independent.[34] Additionally field-dependent individuals are better at learning social material when the material is peripheral to the task at hand ". . . people with a global perceptual orientation show a superior ability to remember incidental material that is socially relevant . . . ."[35] Field-dependent people are better able to learn non-task-related material that has a social significance and tend to perform poorly on an assigned focal task.[36] In contrast, field-independent people show better learning on task-related materials.

Field-dependent and field-independent people respond differentially to the kind and amount of reinforcement.[37]

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[33]Witkin, et al., "Longitudinal Study," pp. 197-211.

[34]Witkin, et al., "Cognitive Styles--Educational Implications," pp. 17-19.

[35]David Fitzgibbon, Leo Goldberger, and Morris Eagle, "Field Dependence and Memory for Incidental Material," Perceptual and Motor Skills, 1965, 21, p. 749.

[36]Ibid.

[37]Stephen A. Karp, Benjamin Kissin, and Frank E. Hustmyer, "Field Dependence as a Predictor of Alcoholic Therapy Dropouts," The Journal of Nervous and Mental Diseases, Vol. 150, No. 1, 1970, pp. 77-83.

Field-dependents, being more global, depend on the external environment for self-definition. A study using 38 fourth grade children with an "approving" and a "disapproving" examiner showed a generally poorer performance by field-dependent subjects under the disapproval condition. In contrast the interjection of disapproval had no such effect on field-independent subjects.[38]

> A great deal of evidence is now available, from experimental situations, on the relation between field-independence-dependence and the effects of various kinds of reinforcement. The evidence suggests, as expected, that field-independent persons tend to learn more than field-dependent persons under conditions of intrinsic motivation.[39]

This indicates that people who are field-independent would tend to choose an educational format that is self-paced and involves a great amount of independent study.

Persons with an articulated cognitive style tend to analyze a field when the field is organized and impose structure on the field when it is unorganized or ambiguous. Persons with a global style tend to go along with the field as it is. Field-dependent people are likely to have

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[38]Norma Konstadt and Elaine Forman, "Field Dependence and External Directedness," Journal of Personality and Social Psychology, 1965, Vol. 1, No. 5, p. 490-493.

[39]Witkin, et al., "Cognitive Styles--Educational Implications," p. 20.

difficulty in learning material that is not structured.[40]

Fleming conducted a study using two word lists. One was structured hierarchically from a superordinate to subordinate sequence. The other list reversed the order of structuring, e.g., from subordinate to superordinate. It was found that field-independent persons performed significantly better on the task in which the sequence was reversed (from subordinate to superordinate). The results of this study show the articulated person's superiority in performance on a cognitive task that is ambiguous.[41]

Koran, Snow, and McDonald[42] conducted a study using 121 teacher interns. Video-modeling of the desired teacher behavior was used with one group, written-modeling was used with a second group, and no modeling was used with the control group. Subjects in the video-modeling and the written modeling groups produced significantly better

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[40]Witkin, et al., "Cognitive Styles--Educational Implications," p. 21.

[41]M. L. Fleming, J. O. Knowlton, B. B. Blain, W. H. Levie, and A. Elerian, "Message Design: The Temporal Dimension of Message Structure. Final Report," Bloomington, Indiana: Indiana University, 1968.

[42]Mary Lou Koran, Richard E. Snow, and Fredrick J. McDonald, "Teacher Aptitude and Observational Learning of a Teaching Skill," Journal of Education Psychology, 1971, 62, pp. 219-228.

results than subjects in the control group. Field-independent students performed equally well in the both video-modeling and the written-modeling groups, while field-dependent students learned the desired skills better in the video-modeling group. The authors explained these results by stating that the video-modeling technique provided a concrete representation of the teaching skill to be learned and that it provided "a behavioral representation for the learner that he could not generate for himself if given the written-modeling treatment.[43] The field-independent subjects appeared to make use of a mediator not readily used by field-dependent subjects. They appeared able to analyze the written material and create in their mind a representation of the skill to be learned.

In a study which used programmed instruction, each subject (university students) was required to learn to draw an "exact" ellipse. In one version of the text, subjects were not given feedback about their performance when they attempted to draw the ellipse. In the second version, a correctly drawn ellipse was provided as an overlay in the text. Results indicated that the performance of relatively

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[43]Ibid., p. 226.

field-independent university students was not influenced by whether or not they received feedback in the text. On the other hand, field-dependent students performed significantly better when feedback was provided in the text.[44] "The evidence we have reviewed suggests that their lesser use of structuring as a mediator may handicap field-dependent students in unstructured learning situations."[45] Findings of this nature in research indicate that field-dependent students would perform better and therefore prefer to study in a format in which the material is organized sequentially as in a traditional classroom setting.

Studies on Cognitive Style and Academic Majors

Extensive studies have been conducted on academic choice and performance among field-dependent-independent studies.[46] Witkin summarizes,

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[44]N. B. Renzi, "A Study of Some Effects of Field Dependence-Independence and Feedback on Performance Achievement" (Doctoral dissertation, Hofstra University, 1974), Dissertation Abstracts International, 1974, 35, 2059A.

[45]Witkin, et al., "Cognitive Styles--Educational Implications," p. 25.

[46]Dennis Hunt and Bikkar S. Randhawa, "Relationship Between and Among Cognitive Variables and Achievement in Computational Science," Educational and Psychological Measurement, 1973, Vol. 33, pp. 921-928.

> 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.[47]

A longitudinal study of 1,548 students (787 men and 761 women) in which the subjects were followed from college entry into graduate professional school is reported by Witkin et al. The students were grouped into four major fields. The first field consisted of the natural sciences and mathematics,

> . . . which clearly require cognitive restructuring skills, are not social in content, and do not depend particularly upon interpersonal relations for their conduct.[48]

The second field consisted of education majors, early-childhood education, education, speech therapy, and nursing. The third field consisted of disciplines considered broad-gauged in the sense that there exists within them the opportunities for either field-dependent or field-independent persons. For example, in psychology

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[47]Witkin, et al., "Cognitive Styles--Educational Implications," p. 43.

[48]Witkin, et al., "Longitudinal Study," p. 200.

the clinical psychologist is oriented toward clinical-personality-social areas, and the experimental psychologist is oriented toward psychophysiological-methematical areas. Finally, the fourth group consisted of majors which did not seem to draw upon the competencies of either field-dependent or field-independent persons.[49]

Significant differences between the two major groups (natural sciences and education) was found in the GEFT means. Science majors scored the highest and education majors scored the lowest on the GEFT. The authors concluded that cognitive style does make an independent contribution in predicting final major choices at college graduation as well as graduate school field of specialization. The findings on cognitive style and achievement showed some tendency for field-independent students to do better in mathematics and the natural sciences. "The evidence on performance of field-dependent students in educational courses was not clear, however."[50]

Only a few studies have investigated the learning format and cognitive styles. Moore conducted a study on cognitive style and attitudes to independent study.

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[49]Ibid., pp. 200-201.

[50]Ibid., p. 209.

The independent study programs were classified as "Learner Autonomy" and "Distance." It was found that field-independence did not predict participation in the program of high autonomy, but did predict participation in the program of high distance from teaching institution. Learners in the program of high autonomy had unfavorable attitudes toward all dependent learning concepts. Further, there was no interaction effect between field-independence and attitude to independent study in general.[51]

DeCosmo explored the association of cognitive styles and curriculum choice of older adults enrolled in evening classes at a community college. There were 298 subjects, age 22 and older. The curriculum was divided into two major categories, occupational program and transfer program. Subject areas in the occupational program were: 1) business-management, 2) business-technical, 3) mechanical and engineering technology and 4) public service. The transfer program was divided into: 1) liberal arts, 2) business and 3) science. Both age and cognitive style were

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[51]Michael G. Moore, "Investigation of the Interaction Between the Cognitive Style of Field Independence and Attitudes to Independent Study Among Adult Learners Who Use Correspondence Independent Study and Self Directed Independent Study" (Doctoral dissertation, University of Wisconsin--Madison, 1976).

associated with program choice. Students enrolled in the occupational program were significantly more field-dependent than were students enrolled in transfer programs. Within the two programs significant differences existed also. Public service students tended to be field-dependent while science-transfer and business-technical subjects tended to be field-independent.[52]

Field-independent subjects tended to prefer self-help counseling strategies while field-dependent subjects preferred individual consultation strategies and group activities. This study supports Witkin's longitudinal study[53] which found that articulated subjects tend to choose science and math subjects while global subjects tend to choose people-oriented subjects. Additionally,

> This study determined that there was an association between program choice and field dependence-independence for a population not previously studied: older adult, evening students enrolled in a community college. Further, students from this population enrolled in occupational programs were determined to be more field dependent than were transfer students.[54]

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[52]DeCosmo, "Curricular Choices," p. 20.

[53]Witkin, et al., "Longitudinal Study."

[54]DeCosmo, "Curricular Choices," p. 110.

Locus of Control

Theoretical Base of the Locus of Control Conduct Construct

Locus of control is based on Rotter's social learning theory. Social learning theory attempts to synthesize S-R reinforcement theory and cognitive or field theory. Using theories of Lewin, Adler, Kantar, Tolman, Thorndike, and Hull, Rotter attempted to integrate a theory of personality based on the interactions of the individual and his meaningful environment. Focusing on learned behavior, social learning theory holds that the individual tends to select new experiences and to interpret reality on the basis of previous experiences and previous conceptualizations.[55]

Rejecting cause-effect relationships as an explanation of behavior, social learning theory looks for antecedent conditions to explain behavior. Behavior is inherently goal-directed behavior and the directional nature of behavior accounts for selective response to cues. The directionality of behavior is based on social learning theory's "empirical law of effect." This principle states that "any stimulus complex has reinforcing properties to

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[55]Rotter, Chance, and Phares, Social Learning Theory, p. 9.

the extent that it influences movement toward or away from a goal."[56]

Social learning theory does not accept the drive reduction theory of reinforcement. The drive reduction theory cannot be used to explain complex social behavior. Needs such as recognition, love, and social acceptance are not cyclical, and therefore a time of deprivation cannot be used as an operational measure of drive state.[57]

Social learning theory holds to four principles to explain motivation:

First, the person's needs as described by personality constructs are learned or acquired. Additionally, early, acquired goals in humans appear as the results of satisfactions and frustrations that are controlled by other people. This leads to a recognition of the importance of others in goal acquisition. Mediation of early inborn needs underlies the importance people place on love, affection, recognition, status, and dependency.

The second principle states that in order for a behavior to occur regularly in a situation, it must have

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[56]Ibid.

[57]Ibid., pp. 7-10.

been available and have led to a reinforcement. Availability of behavior may have been based on direct experience or it may have come through observation and imitation.

Third, a person's behavior, needs and goals are not independent entities, but exist within functionally related systems. Prediction, therefore, should not be based on a single behavior-reinforcement sequence, but may involve groups of functionally related behaviors-reinforcements as well.

Fourth, not only is behavior a function of goals and reinforcements but also grows out of expectancies. The individual's anticipation that goals and reinforcements will occur are determined by previous experience.[58]

Expectancy is defined by Rotter as

> . . . the probability held by the individual that a particular reinforcement will occur as a function of a specific behavior on his part in a specific situation or situations. Expectancy is systematically independent of the value or importance of the reinforcement.[59]

In social learning theory expectancy is defined as a subjective probability. Individuals' statements about an event often differ with their actual experience of the

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[58]Ibid., pp. 1-43.

[59]Ibid., p. 12.

event. An event perceived by some individuals as reinforcing may not be seen as reinforcing by everyone.[60]

One determinant of a person's expectancy is the degree to which he perceives reward following from or being contingent on his own behavior. Another determinant of expectancy is the degree to which a person feels that the reward is controlled by forces outside himself such as luck, chance, or fate, and may occur independent of his own actions.

The locus of control construct as measured on Rotter's Locus of Control Scale (I-E scale) is referred to as a generalized expectancy. According to this construct, the probability of a given behavioral occurrence is a function of the expectancies that reinforcements can be achieved in a particular situation.[61]

When a person perceives events as being controlled by forces outside himself, this is a belief or expectancy in external control (externals). On the other hand when an individual perceives an event as being contingent on

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[60]Herbert M. Lefcourt, Locus of Control Current Trends in Theory and Research (New York: Lawrence Erlbaum Associates, Publishers, 1976), p. 29.

[61]Rotter, Chance, and Phares, Social Learning Theory, p. 9.

his own behavior, this is termed a belief or expectancy in internal control (internals).[62]

Research on Characteristics of Internals and Externals

Internals generally are more effective individuals in learning situations that require skill rather than chance.[63] They are generally less susceptible to social pressure in groups than externals.[64] They have been shown to know more about their environment, especially in recalling information relevant to the control of personal goals.[65]

A study on information-seeking by Davis and Phares divided 800 undergraduate students into three experimental groups: skill, chance, and ambiguous situations. The subjects were told that they would later attempt to influence the attitude of a person concerning the war in Vietnam. Skill subjects were told that success in influencing another person's attitude depends on the skill and ability of

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[62]Ibid.

[63]Lefcourt, Locus of Control, pp. 32-35.

[64]Ibid., pp. 40-46.

[65]Melvin Seeman, "Alienation and Social Learning in a Reformatory," American Journal of Sociology, Vol. 69, 1963, pp. 270-284.

the persuader. Chance subjects were told that attitude change is dependent on luck and chance factors. In the ambiguous situation, subjects were given neither chance nor skill instructions. The prime measure of information-seeking consisted of the number of written questions from the subject requesting information concerning the other person. Internals in the ambiguous and skill situation asked significantly more questions than externals. In the chance situation externals asked more questions than internals but not significantly more.[66]

> . . . individuals with a generalized expectancy that reinforcement is contingent upon their own behavior tend to actively engage in information-seeking to a greater degree than individuals who do not hold such a generalized expectancy.[67]

Internals are also reported to be more actively involved in change strategies. Activists in civil rights movements have been found to be more internal on the I-E Scale.[68] In addition, internals are reported to be more

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[66]William L. Davis and E. Jerry Phares, "Internal-External Control as a Determinant of Information-Seeking in a Social Influence Situation," Journal of Personality, 1967, Vol. 35, pp. 547-561.

[67]Ibid., p. 556.

[68]Bonnie Ruth Strickland, "The Prediction of Social Action from a Dimension of Internal-External Control," The Journal of Social Psychology, Vol. 66, 1965, pp. 353-358.

self-reliant and to experience themselves as a distinct source of causative power.[69]

Externals in a study by Rotter are described as preferring games of chance to skill, often succumbing to the "gambler's fallacy."[70] They are also characterized as more acquiescing and less able to influence others' attitudes. Generally they are more conforming in situations involving social pressure.

Crowne and Liverant used an Asch-like conformity situation in which subjects placed bets in a group. The subjects were then asked to rate how certain they felt about their own judgments. In the betting situation externals were significantly more conforming than internals. Additionally externals bet more when they conformed to their peers. Internals were more confident of their decisions but not significantly.[71]

> The Crowne and Liverant study indicates that when the stakes of success are of some value to the individual, persons characterized as internals

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[69]Lefcourt, "Locus of Control," pp. 1-39.

[70]Rotter, Applications of a Social Learning Theory of Personality, pp. 266-270.

[71]Douglas P. Crowne and Shepard Liverant, "Conformity Under Varying Conditions of Personal Commitment," The Journal of Abnormal and Social Psychology, Vol. 66, 1963, pp. 547-555.

> are more trusting of their own judgments than are externals. The difference between the groups was apparently due to the fact that externals have more confidence in the consensual judgments of others than they do in their own independent judgments.[72]

A study by Seeman found that externals are less adept at recalling and using relevant information for dealing with life situations. Inmates in a reformatory were tested for internality-externality and amount of information they had that would contribute to managing their own destiny. Information was categorized as: 1) the immediate reformatory situation, 2) achieving successful parole, and long-range prospects for a non-criminal career. He found a significant correlation, independent of intelligence, between internals and externals and the amount of information remembered about how the reformatory was run, parole, and long-range economic facts which might affect the person after they left the reformatory.[73]

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[72]H. Lefcourt, "Locus of Control and the Resistance to Influence," Locus of Control (New York: John Wiley and Sons, 1976), p. 41.

[73]Melvin Seeman, "Alienation and Social Learning in a Reformatory," American Journal of Sociology, 1963, Vol. 69, 270-284.

Studies on Locus of Control and Sex

Rotter reports six studies that list male and female I-E scores separately. In three of the studies females were more external than males and in the other three studies males were more external.[74]

Feather reports a study of undergraduate students in which females, average age of 17-18 years, were significantly more external (mean for females: 10.96, and mean for males: 8.90). In the older group with mean age of 27-28 years, the difference was reversed. The mean female score (7.67) was more internal than the mean male score (9.54).[75]

Studies on Locus of Control and Age

Studies of children and adolescents have shown a general tendency for people to become more internal with increasing age. Specific longitudinal studies across socioeconomic class and sex are not available. Howey found that the longer a person held an administrative

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[74]Rotter, "Social Learning Theory," pp. 277-280.

[75]N. T. Feather, "Some Personality Correlates of External Control," Australian Journal of Psychology, Vol. 19, No. 3, 1967, pp. 253-260.

position in the upper echelons of government, the more internal he scored on the I-E Scale. Mean scores on the I-E Scale were 5.4 for administrators holding positions of high status for eleven years or more and 7.2 for those with one to ten years experience.[76]

Rotter reports the following means on the I-E Scale: Peace Corp trainees, 5.94; undergraduate students, a range in six studies from 7.73 to 9.62; 8th grade students, 7.72; 18 year old subjects, 9.56; and high school students, 8.50.[77] Neither sex nor age-related differences have been established for the I-E Scale.

Studies on Internal and External Control and Performance

Studies of performance of adults and locus of control in traditional academic situations show two limitations. First, some adults who were initially highly competitive, and who continue to compete in classroom situations, have developed an external attitude as a defense against past failures. The other limitation is that the internal-external control attitudes may not generalize to specific

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[76]J. M. Howey, "Locus of Control Shift in Administrators," Perceptual and Motor Skills, 1971, Vol. 33, pp. 980-982.

[77]Rotter, Social Learning Theory, p. 280.

structured classroom situations where more specificity of response is required.[78] Since this study is concerned with adults in structured and in nonstructured situations, some of the findings appear to be applicable.

A study that shows no relationship between internality-externality and GPA in a traditional educational setting supports the two limitations discussed above. Hjelle compared I-E scale scores and GPA of 483 undergraduate students. The author states,

> Two distinct possibilities may account for the lack of relationship between the I-E and academic achievement variables. First, and along the same lines as suggested by Rotter, there may be an overabundance of college Ss who have arrived at an external view of the world as a defense against failure but who were initially highly competitive . . . . Second, the I-E dimension is probably not generalizable across situations, and in the highly structured academic achievement situations.[79]

Gonzali et al. conducted a study that tested response to a computer-recorded verbal ability test. It was found that internals used time in a manner more appropriately to the test-taking situations than do externals. As the items increased in difficulty, internals spent an

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[78]Rotter, Social Learning Theory, p. 288.

[79]Larry A. Hjelle, "Internal-External Control as a Determinant of Academic Achievement," Psychological Reports, 1970, Vol. 26, p. 326.

increasing amount of time on the items. Externals did not differentiate in the amount of time spent as item difficulty increased.[80] Appropriate use of time is vital for the non-traditional educational student who must manage his own time.

Internals and externals showed significantly different types of performances on a vigilance test involving a watch-keeping task. The subjects monitored a visual display for one hour to detect the occurrence of five dots which were presented periodically among flashes of four dots. External subjects missed significantly more signals during the entire tasks. Additionally internal subjects tended to progress in the monitoring task with very small decrements in performance while externals showed a consistently increasing performance decrement. The internal subjects' high performance indicates

> . . . that the internal subject strives for mastery of a task or situation . . . . It seems that the locus of control dimension would be an important measure to include in . . . (predicting independence-related behaviors).[81]

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[80]Harriet Gozali, T. Anne Cleary, G. William Walster, and Joan Gozali, "Relationship Between the Internal-External Control Construct and Achievement," Journal of Educational Psychology, Vol. 64, No. 1, 1973, pp. 9-14.

[81]Michael G. Sanders, Charles G. Halcomb, J. Michael Fray, and Jerry M. Owens, "Internal-External Locus of Control and Performance on a Vigilance Task," Perceptual and Motor Skills, Vol. 42, 1976, p. 943.

A five year study of high ability male students were studied from the undergraduate program to doctoral attainment. Forty-five freshmen males who indicated a desire to attend graduate school and 45 first year graduate students were tested initially and five years later information on degrees and grades were obtained. Correlation between grades and locus of control scores were nonsignificant. In contrast, significant relationships were obtained between graduate degree attainment and locus of control.

> For male graduate students at least, these findings imply that there is an internal control belief early in a graduate student's career which . . . partially determines whether or not he will earn the doctorate degree within five years . . . .[82]

Locus of Control and Learning Formats

Only two studies were found which investigated locus of control and traditional vs. independent learning formats. Each of these studies were conducted within a traditional educational setting. Both studies compared non-structured independent instructional methods and structured learning methods.

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[82]Mark W. Otten, "Inventory and Expressive Measures of Locus Control and Academic Performance: A 5-Year Outcome Study," Journal of Personality Assessment, 1977, 41, 6, p. 648.

Parent et al. studied 54 college students assigned to two teaching methods. The first method consisted of a high disciplined instructional mode in which students were subjected to a two hour mini-course on computer programming. This method generally resembled the traditional undergraduate class in which the teacher controlled student activity (e.g., no smoking, no leaving class without permission) and controlled the instructional pace (the teacher lectured and gave tests). In the second format the students were handed booklets and told to work at their own pace. In this format the teacher acted as facilitator, answering questions only when asked.

Students high in internal control performed better in the less structured method and students high in external control performed better in the traditional structured classroom method. Additionally, students who were assigned to the method of their choice showed greater satisfaction than those who were not. It appears that optimum student performance would be obtained when there is a complementary fit between students' level of internalized discipline and the external conditions of discipline in learning settings. The results of this study supports ATI research in which

the interactions between classroom teaching strategies and student characteristics are investigated.[83]

A study by Daniels and Stevens shows a disordinal interaction effect between externals and internals in a traditional vs. self-directed method of instruction.[84] In the study, 146 undergraduate students were given the I-E Scale. Using random selection, half of the externals were assigned to the traditional method of instruction and half were assigned to self-directed study methods in which the student contracted for a study plan and grade. The internals were assigned to the two methods of instruction in the same manner. At the conclusion of an eight week course in introductory psychology, all subjects were given a 75 item multiple-choice achievement posttest. A strong disordinal interaction was found showing that internals performed significantly better in a contract teaching

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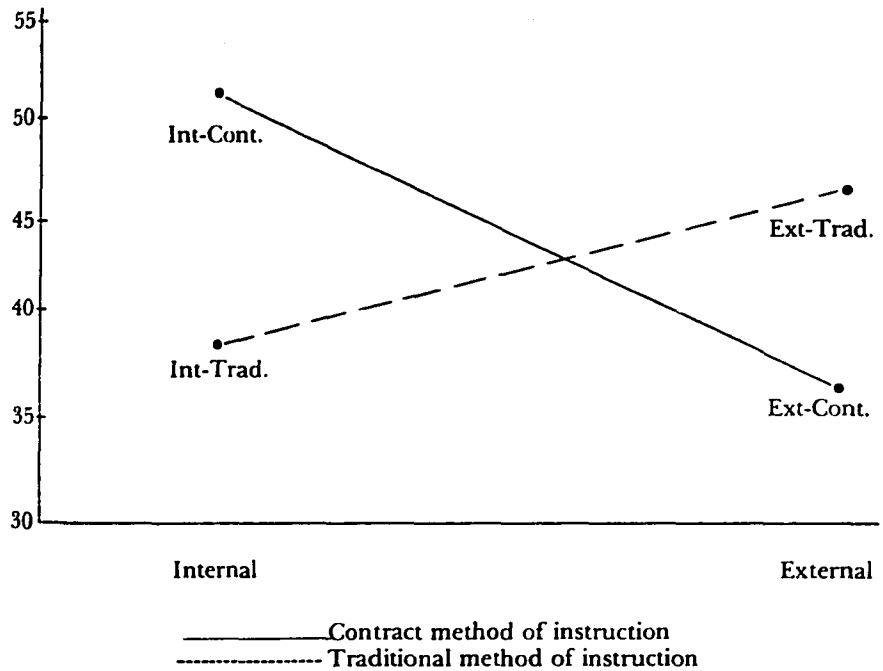
[83]Joseph Parent, John Forward, Rachelle Canter, and Judith Mohling, "Interactive Effects of Teaching Strategy and Personal Locus of Control on Student Performance and Satisfaction," Journal of Educational Psychology, Vol. 67, 1975, pp. 764-768.

[84]Richard L. Daniels and James P. Stevens, "The Interaction Between the Internal-External Locus of Control and Two Methods of College Instruction," American Education Research Journal, Vol. 13, No. 2, 1976, pp. 103-113.

method while externals performed significantly better in a traditional teacher controlled method.[85]

FIGURE 2

Graph of Adjusted Means Showing Disordinal Interaction



Source: Daniels and Stevens, p. 109.

Jungian Psychological Types

Theoretical Basis for Personality Construct

Jungian type psychology addresses itself to the fact that an individual develops a preferred mode of

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[85]Richard L. Daniels and James P. Stevens, "The Interaction Between the Internal-External Locus of Control and Two Methods of College Instruction," American Education Research Journal, Vol. 13, No. 2, 1976, pp. 103-113.

operating in the world. These modes of operating are called types or functions. Beginning in early childhood, basic preferences in attitude, perceiving, and judging are established. Once established, this mode or function becomes highly differentiated. According to Jung, the individual's most differentiated function determine that person's orientation and adaptation to life.[86]

According to Jungian typology, the processes or functions which are preferred by the individual, determines the personality. These processes fit into two basic categories. Each category is bipolar with the individual showing a preference for one of the poles. For example either introversion or extraversion is preferred by an individual. Those who are considered extraverts are said to maintain a positive relationship with the outside world of things, people, and ideas. His or her decisions and actions are determined by objective relations as his consciousness looks outward to the world. Extraverts are described as friendly, gregarious, and accessible.[87]

Introverts have an abstracting attitude concerning

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[86]C. G. Jung, Psychological Types or the Psychology of Individuation (Great Britain: Pantheon Books, 1923), pp. 412-413.

[87]Ibid., pp. 412-421.

themselves mainly with the inner world of ideas. Introverts are described as taciturn, impenetrable, and shy. They tend to be over-conscientious, pessimistic, and critical, keeping their best qualities to themselves. They are at their best in small and familiar groups. Their own judgment is more important to them than a generally accepted opinion and they tend to be nonconventional.[88]

Jung's functions are divided into two main categories: the perceptive (also called irrational), and judging functions such as feeling and thinking (also called rational).

The irrational functions, intuitive and sensation, are the processes used to perceive the world. A sensing person at one end of the polarity develops perception through the five senses. As this function becomes more differentiated with use, the sensing individual develops a practical orientation sustained by the senses. A person with a strong sensation orientation can be described as realistic, concrete and practical. Guided by the five senses, the sensation type is interested in facts and detail.[89]

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[88]Frieda Fordham, An Introduction to Jung's Psychology (Balitmore: Penguin Books, 1959), pp. 30-34.

[89]Joseph Campbell, The Portable Jung (New York: The Viking Press, 1971), pp. 215-247; 252-269.

Intuitives on the other hand, develop their perception using unconscious processes and subliminal contents. The intuitive sees beyond the immediate and practical to the possibilities, carrying with it a "certain attitude of expectation and a perceptive and penetrating vision."[90] Intuition is termed "an active creative process" used by people whenever a diagnosis or decision must be made in the dark.[91]

The two rational functions, thinking and feeling, determine the way an individual comes to conclusions. For those using the thinking function, decisions are made by ideational and intellectual methods. The person using the thinking process as a dominant function allows his intellectual formula to make the decisions about his actions. Considered by some as cold and indifferent, this individual is guided by facts and ideas. Decisions are made by intellectual and rational methods.

The feeling function evaluates, either positively or negatively. It is through this function that an individual experiences subjective feelings of joy, anger, fear,

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[90]Jung, Psychological Types or the Psychology of Individuation, p. 461.

[91]Fordham, An Introduction to Jung's Psychology, p. 43.

pain, love, sorrow, or pleasure. Relying on feeling to judge, these individuals are oriented toward personal relationships. They are sensitive to others' feelings and prefer harmonious relationships.[92]

One of the functions in each polarity is dominant. The dominant function, whether it is perceptive or judging, is always conscious. For example, since sensation and intuition are opposite polarities, only one of these functions will be dominant and therefore conscious. The other function will be in the unconscious. If the intuition function is dominant the intuitive characteristics will be well developed and presented in a positive manner. Sensation, in the unconscious, may show itself as primitive and archaic. The same applies to the thinking-feeling polarity. If one of the functions is in the conscious, then its opposite will be in the unconscious and underdeveloped.[93]

One further division of the types is between dominant and auxiliary or complementary function. If one of the judging functions is dominant then the strongest perceptive function will be considered an auxiliary.

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[92]Campbell, The Portable Jung, pp. 192-214; 237-252.

[93]Jung, Psychological Types or the Psychology of Individuation, pp. 412-517.

Thinking, as primary function, may pair with intuition as auxiliary, or with sensation. Feeling, as a dominant function, may pair with either intuition or sensation as an auxiliary function. The same process occurs if either sensation or intuition are dominant functions. Either may pair with thinking or feeling as auxiliary functions. The auxiliary function is different from, but not antagonistic to, the leading function.[94]

Mutual usefulness of opposite types can be stated,

> The clearest vision of the future comes only from an intuitive, the most practical realism only from a sensing type, the most incisive analysis only from a thinker, and the most skillful handling of people only from a feeling type.[95]

Studies on the MBTI and Educational Aptitude

Carlyn summarizes extensive research on type preference and individual characteristics that are applicable to educational settings. Studies show that extraverted types like action and getting involved in new situations. They are generally more competitive than introverts and are

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[94]Ibid., pp. 513-517.

[95]Isabel Briggs Myers, Introduction to Type, 2nd ed., (Gainesville, Fla.: Center for Applications of Psychological Type, 1976).

more likely to be rated as "active" by faculty members. In high school, extraverts report that they like to work on group projects, make reports to the class, and engage in team competitions. Introverts as a group are attracted to technical-scientific professions and other vocations which allow them to work alone.[96]

Sensing types place a high value on authority and work, and are likely to be rated by faculty as cooperative, and willing to take directions. Sensors have a factual orientation and a strong need for order. Research indicates that intuitors like to use their minds and have considerable tolerance for complexity. Compared with sensing types, intuitors spend more time each week on non-required reading, and they prefer teachers who give open-ended instructions and allow them to use their own initiative. Intuitives generally express a strong need for autonomy and usually prefer professions which allow them high autonomy such as psychologist, musician, minister, physicist, or chemist.[97]

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[96]Marcia Carlyn, "An Assessment of the Myers-Briggs Type Indicator," Journal of Personality Assessment, 1977, 41, 5, p. 469.

[97]Ibid., p. 470.

Thinking types report that they learn best from the lecture approach and do well on exams. Feeling types, on the other hand, prefer working on group projects and learn best in a setting that is harmonious. They are attracted to helping professions such as teaching, counseling, and customer relations.

Judging types tend to follow a daily schedule, apportion their time each day, and are seldom late in completing assignments. Perceptives express a high need for autonomy and enjoy change. They, like the intuitives, have a high tolerance for complexity.[98]

Cooper and Scalise in a study of a dissonance situation among introverts and extraverts showed that extraverts were highly conforming in a peer pressure situation and experienced cognitive dissonance when made to believe they acted independently. Introverts experienced dissonance when they were made to believe that they had conformed.[99]

Several studies show high correlations between intuition and creativity. Hatfield, using MBTI as one

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[98]Ibid., pp. 461-473.

[99]Joel Cooper and Charles Scalise, "Dissonance Produced by Deviations from Life Styles: The Interaction of Jungian Topology and Conformity," Journal of Personality and Social Psychology, Vol. 29, 1974, No. 4, p. 566-571.

measure of intuition with twelth grade students, concluded that the components of creativity, cognitive style, and self-concept have some relationships to learning, and some validity for being used as educational goals.[100] Myers reports a study of 115 creative men and 28 creative women. Of the 28 creative women, 96% were found to be intuitive and of the 115 creative men, 97% were found to be intuitive.[101]

> . . . sex seems to make no difference. The 28 creative women include only one who is not intuitive. The 115 men include only three. The field in which they work seems to make no difference. Among the men are 17 writers, 40 architects, 30 research scientists, and 28 mathematicians . . . . The writers tend to be NF (intuitive feeling), the scientists and mathematicians to be NT (intuitive thinking) . . . but in all four occupations intuition is the almost unbroken rule.[102]

Myers reports a study of the composition of student bodies in different colleges and professional schools by psychological type. The relative frequencies of the different kinds of colleges were compared with the relative

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[100]Robert C. Hatfield, "A Study of the Relationships of Selected Components of Creativity, Cognitive Style, and Self-Concept Identified in a Random Sample of Twelfth Grade Students in One High School with their Learning of Selected Information in the Social Studies" (Doctoral dissertation, Wayne State University, 1968).

[101]Myers, Myers-Briggs Type Indicator, pp. 14-15.

[102]Ibid., p. 32.

frequencies of high school students. The following ratios appear:

Liberal Arts:	For NF and IN, particularly INF; against EST. Reasonable on basis of NF's interest in language.[103]
Science:	For In; against ES. Reasonable on basis of highest intellectual and scholastic quality.
Engineering:	For NJ; against SP and ES. Reasonable, as demanding technical proficiency, hard work and exactness.
Business:	For ST and ES; against IN. Reasonable, as confirming interest of ST and ES types in business.
Medicine:	For F and IN, particularly INF; against ESTJ. Reasonable, as combining IN's interest in a profession and F's interest in Nurturance.[104]

Myers estimates that the frequency of intuitives in the general population is about 25%. Studies on students of liberal arts colleges show about 62% to 67% intuitives enrolled. Note that only business colleges show a predominance of sensation types, and extraverts. A group of non-college bound students investigated by Myers were predominately sensation (86% of males and 87% of females).

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[103]Myers uses the following abbreviations for psychological types: introverts: I; extraverts: E; sensation: S; intuition: N; thinking: T; feeling: F; judging: J; perception: P.

[104]Ibid., p. 46.

In the college-preparatory samples, 58% of both males and females preferred sensation.[105]

Students entering the physical sciences show a preference for intuition.

> The NT types are significantly more attracted to the physical sciences and engineering, and significantly less attracted to nursing and education. The SF types are significantly more attracted to nursing and education, and less attracted to arts and sciences.[106]

From 8th grade through graduate school, introverts with intuition tend to score highest on academic aptitude measures and extraverts with sensing score less. Judging types tend to achieve somewhat higher grades than perceptives. They also tend to be overachievers.[107]

A study of Conary supports the above findings relating the MBTI scores to grades and to choice of subject matter. In a study using 1,709 college freshmen, he found a significant correlation between high GPA and intuitive types; and low GPA and sensation types. Intuitive thinkers (NT) preferred engineering; sensing thinkers (ST) preferred

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[105]Ibid., pp. 32-33.

[106]Mary H. McCaulley, "Personality Variables: Model Profiles that Characterize Various Fields of Science," paper presented at 1976 Annual Meeting of American Association for the Advancement of Science, Boston, Mass., February 24, 1976, p. 4.

[107]Ibid., pp. 5-7.

business; and intuitive thinkers and intuitive feelers preferred architecture.[108]

Studies of MBTI and the Learning Format

Kooyumjian reports a study that compares students in an inservice summer institute with students in a university campus course. The degree of content information gained and changes in attitude were measured. Intuitives and extraverts were found to be high achievers in the workshop groups. Workshop participants who reported preferences of ENTP and ENFP were successful in learning the content and in meeting the workshop goals.[109]

Deines found that extraverted and introverted sensors preferred natural science, that introverted intuitors preferred natural science and extraverted intuitors preferred social science. Introverted thinkers preferred the humanities and extraverted thinkers preferred social

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[108]Franklin M. Conary, "An Investigation of the Variability of Behavioral Response of Jungian Psychological Types to Select Educational Variables" (Doctoral dissertation, Auburn University, 1965).

[109]Mary Louise Van Huele Kooyumjuan, "Cognitive Achievement Through Independent Study in Summer Programs in Continuing Education" (Doctoral dissertation, University of Illinois, 1969).

science and humanities equally. Introverted feelers preferred the social sciences while extraverted feelers preferred humanities. Deines grouped the types by dominant function.[110]

Williams, in a study of nursing graduates, found a significant relationship between scores on state board exams in medical, obstetrical, and psychiatric subjects and types.[111] No significance was found between type and surgical and pediatric scores. The highest scores in the medical, obstretric areas were made by INTJ type and the highest scores in the psychiatric area were made by INTJ and INFJ.

Two studies investigate the MBTI scores on students enrolled in independent study instructional modules. Smith et al. studied students enrolled in a self-paced course. The findings were as follows: there were no statistically significant correlations between introversion-extraversion and preference for various teaching methods; intuition was

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[110]John Thomas Deines, "An Investigation of the Relationship Between Three Categories of College Major and Selected Measures of Cognitive Style" (Doctoral dissertation, Michigan State University, 1974), p. 107.

[111]David Dean Williams, "An Analysis of Nursing State Board Scores According to Myers-Briggs Personality Types" (Doctoral dissertation, University of Florida, 1965).

associated with a preference for self-paced instruction, sensation was associated with a preference for group-paced instruction. Thinking was associated with a desire to learn by traditional methods; perceiving was associated with a preference for self-paced methods. Other findings show that feeling types attended more "help sessions" and that intuitives and perceptives were associated with later course completion dates.[112]

Griesen investigated the personality characteristics of 62 medical students who volunteered for a pilot (independent study) program and 133 students who chose the traditional study method. The 62 students who volunteered for the pilot program were found to be intuitive, perceptive, thinking, and introverted.[113]

Studies relating MBTI Scores to Age and Sex

Studies which investigate the relationship of age to the MBTI scores were not found. One study of 185

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[112]Albert B. Smith, Richard K. Irey, Mary H. McCaulley, "Self-Paced Instruction and College Student Personalities," Engineering Education, 1973, Vol. 63, No. 6, pp. 435-440.

[113]James V. Griesen, "Independent Study Versus Group Instruction in Medical Education: A Study of Non-Cognitive Factors Relating to Curricular Preferences and Academic Achievement" (Doctoral dissertation, The Ohio State University, 1971).

elderly people (age range 55-102; mean age 76.5) found that "age showed a significant correlation with only one dependent variable-introvert attitude. The older Ss were significantly more introverted."[114] No studies were found which investigated the relationship of the MBTI scores and sex differences.

Studies that Combine the GEFT, LOC, and MBTI

Initially it was assumed that the concept of field-dependence vs. field-independence would have a relationship with the variable internal versus external control of reinforcement. However, studies have shown that there is little or no relationship between the two concepts. Strahan and Huth, in comparing scores on the GEFT and Rotter's I-E Scale report: "These results thus are consistent with previous work indicating little or no direct relation between field-independence and locus of control."[115]

Lefcourt and Telegdi used a measure of field-

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[114]Jacqueline D. Driver, "Personality Differences in the Elderly as a Function of Type and Length of Residence" (Doctoral dissertation, University of Maryland, 1974), Dissertation Abstract International, p. 861.

[115]Robert Strahan and Helga Huth, "Relations Between Embedded Figures Test Performance and Dimensions of the I-E Scale," Journal of Personality Assessment, Vol. 39, No. 5, 1965, pp. 523-524.

dependence-independence (RFT) and Rotter's I-E Scale with the Remote Associates Test. No relationship was found between the RFT and the I-E Scale, but field-independent/internal and field-dependent/external scored highest on the Remote Associates Test. The incongruent groups, field-independent/external and field-dependent/internal scored the lowest on the Remote Associates Test.

> Both locus of control and field dependence provide some prediction of cognitive activity and verbal expressiveness when used cojointly. Internal-field-independent Ss were the most ready to engage in the kinds of cognitive activity which the tests demanded. However, the external-field-dependent group . . . were always a close second to the maximally performing internal-field-independent group. In contrast, the incongruent groups . . . scored lowest on each of the four measures obtained.[116]

In a follow-up study Tobacyk et al. tested subjects using the RFT, the I-E Scale, the Q Sort, and an autokinetic test. Subjects with congruent styles reported significantly more accurate autokinetic readings (depressing a switch in response to the autokinetic light), while subjects with incongruent styles made more errors. In addition, subjects with congruent styles produced scores

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[116]Herbert M. Lefcourt and Melanie Smith Telegdi, "Perceived Locus of Control and Field Dependence as Predictors of Cognitive Activity," Journal of Consulting and Clinical Psychology, 1971, Vol. 37, No. 1, 53-56.

indicative of significantly better adjustment on the Q Sort than the incongruent groups.

> . . . the present findings showed that congruent subjects were more accepting of themselves than were the incongruent subjects, as measured by the Q Sort. It should be noted, however, that the effect was much stronger for the field-independent than for the field-dependent groups.[117]

In another study, Murgatroyd et al. tested 135 white urban college men and women, using the RFT, Rotter's I-E Scale, Edward's Personal Preference Schedule, and Churchman's School Involvement Test. No personality variables were found common to both RFT scores and I-E scores.[118]

Lefcourt et al. tested undergraduate students using Rotter's I-E Scale, the RFT, a moral dilemma task, an objective awareness test, and a subjective awareness test. Subjective awareness was tested by using stories in which subjects were asked to respond on personal issues.

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[117]Jerome J. Tobacyk, Andrew Broughton, and Glen M. Vaught, "Effects of Congruence-Incongruence Between Locus of Control and Field Dependence on Personality Functioning," Journal of Consulting and Clinical Psychology, 1975, Vol. 43, No. 1, 81-85.

[118]Dorothy Murgatroyd, Irving Stuart, and Florence Denmark, "Perceptual Style, Locus of Control, and Personality in Urban White College Students," Social Behavior and Personality, Vol. 2, No. 2, 1974, pp. 204-211.

Objective awareness was measured by telling the subjects that they were being observed through a one-way mirror. Externals were more comfortable experiencing subjective self-awareness while internals were more comfortable experiencing objective self-awareness. Body movements and non-verbal cues, video-taped and scored, were the index of discomfort. The authors state:

> . . . specific awareness states may be preferred when those states are congruous with an individual's general orientation. That is, internals would favor situations in which feelings of personal control were maximized and would feel uncomfortable with those which engender a sense of being controlled; externals, on the other hand, would favor the opposite conditions.[119]

Field-independent subjects were unaffected by the awareness conditions, but field-dependent subjects were uncomfortable in the objective-awareness situation.

Two studies compared the introversion-extraversion scale of the MBTI and the field-dependence-independence construct. Stanfield found mixed results in a study of the relationship between the extraversion-introversion scale and the RFT. Two of three studies found significant

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[119]Herbert M. Lefcourt, Elizabeth Hogg, and Carol Sordoni, "Locus of Control, Field Dependence and the Conditions Arousing Objective vs. Subjective Self-Awareness," Journal of Research in Personality 9, 1975, 21-36.

relationships between introversion and field-independence.[120]

Eliot and Hardy tested 130 undergraduates, using the MBTI and Rotter's I-E Scale. Contrary to Stanfield's findings, they found a significant relationship (p=.007) between introverted and field-dependence subjects and between extraverted and field-independent subjects (p=.017).

> Results were interpreted as evidence that internals are extraverted in the sense that they are more at ease with interpersonal contact than externals.[121]

Bissiri found a significant relationship between field-independence and intuition on a study of three groups of adolescents.[122]

To summarize, although significant relationships were not found between internality-externality and field-dependence-independence, congruent styles in these dimensions

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[120]James Donald Stanfield, "The Jungian Typology, Neutroticism, and Field-Dependence" (Doctoral dissertation, Duke University, 1966).

[121]John Eliot and Robert C. Hardy, "Internality and Extraversion-Introversion," Perceptual and Motor Skills, 1977, 45, 430.

[122]Gerald Richard Bissiri, "Adolescent Negativism, Field-Independence and the Development of Integrated Structures" (Doctoral dissertation, Claremont Graduate School and University Center, 1971).

show higher self-esteem and higher productivity. Additionally there was no commonality found between internality-externality and field-dependence-independence in awareness conditions. Finally, mixed results were found in studies relating introversion-extraversion and field-dependence-independence. One study found a relationship between intuition and field-independence.

The Adult Learner

The previous three sections have covered studies relevant to three different theoretical perspectives: cognitive psychology, social learning theory, and Jung's psychological type theory. Studies and theories specific to the adult will be discussed in this section.

Until recently, the mature adult was assumed to learn under the same conditions and in the same way as children.

> Most scholars in the field of adult education itself have dealt with the problem of learning by trying adapt theories about child learning to the differences in degree among adults.[123]

Because of this orientation, the mature adult

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[123]Malcolm Knowles, The Adult Learner: A Neglected Species (Houston: The Gulf Publishing Co., 1973), p. 34.

returning to the academic setting is treated "like an adolescent."[124]

Adult learning theory traditionally has been based on studies of children and animals, or has come from the study of emotionally and mentally ill adults. For example, theories offered by Carl Rogers, Fritz Perls, or Rollo May are aimed specifically at the adult and offer insights into adult learning. As the field of adult education has emerged as a discipline of its own, offering not only literacy and remedial education but learning opportunities for the educated, a profusion of theories and studies on the adult have become available.

Early cross-sectional studies such as those conducted by Thorndike and Wechsler showed intelligence and learning ability to peak at about age 22 followed by a decline in each subsequent age group. These and other cross-sectional or cohort studies led to a "decrement" theory of aging.[125] Longitudinal studies however show

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[124]Steven Widman and G. Olswang, eds., Conference on the Adult Learner: Proceedings: May 23 and 24, 1975. Occasional Paper No. 25 (Seattle: Washington University, May 24, 1975).

[125]K. Warner Schaie and Iris A. Parham, "Cohort-Sequential Analyses of Adult Intellectual Development," Developmental Psychology, Vol. 6, No. 13, Nov. 1977.

that adults maintain a high degree of stability in learning between age twenty and fifty and even beyond.[126] These longitudinal studies revealed that the cross-sectional studies alone were inadequate for comparing the mature adult with the younger adult. Schaie et al. in reporting results from a 14 year study of adults concluded that earlier studies which had shown significant age decrements in cognitive behavior had not controlled for sociocultural change.[127] In a summary of several studies Knox states:

> . . . because older adults differ so much from young adults on extent and type of formal education, values internalized in youth, health condition, and interest in learning activities, cross-sectional findings provide an inadequate indication of age trends in learning ability.[128]

Cohort and cultural effects limit the interpretation of cross-sectional studies.

Longitudinal studies, however, have the problem

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[126]C. A. Furry and P. B. Baltes, "The Effect of Age Differences in Ability: Extraneous Performance Variables in the Assessment of Intelligence in Children, Adults, and the Elderly," Journal of Gerontology, Vol. 28, 1973, 73-80.

[127]K. W. Schaie, G. V. Labourie, and T. J. Barrett, "Selective Attrition Effects in a Fourteen Year Study of Adult Intelligence," Journal of Gerontology, Vol. 28, 1973, pp. 328-334.

[128]Alan Knox, Adult Development and Learning (San Francisco: Jossey-Bass, 1977), p. 415.

of increasing sampling bias due to selective drop-out in longitudinal research. People who perform poorly tend to be less available for longitudinal retesting than those who perform well. Superior-performing older people remain and this may bias the study.[129]

Learning and Intellectual Abilities of Adults

Adults of high ability show much more stability in learning performance than low ability adults.[130] Health is an important factor in the adult's learning ability, especially the older adult. Studies have shown that while healthy adults maintain their learning capacities with little decline till their eighties, ill adults show a rapid decline after their sixties.[131] Physiological changes also decrease learning in the mature adult. Impaired

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[129]Jack Botwinick, "Intellectual Abilities," Handbook of the Psychology of Aging, James E. Birren and K. Warner Schaie, eds., (New York: Van Nostrand Reinhold Company, 1977).

[130]J. E. Blum and L. F. Jarvik, "Intellectual Performance of Octogenarians as a Function of Educational and Initial Ability," Human Development, Vol. 17, 1974, 364-375.

[131]C. H. Granik and R. Patterson, eds., Human Aging II: An Eleven Year Followup Bromedical and Behavioral Study, DHEW Publication No. (ADM) 74-123 (Rickville, Md.: National Institute of Mental Health, 1971).

vision and hearing, plus slower response times handicap the adult in tasks that are fast-paced. This often results in a loss of self-confidence in learning new physical skills and in participating in classrooms with younger students.[132]

Much of the decline in educational performance, especially for older adults, is due to the decline in speed instead of a decline in learning power.[133]

Waugh et al. found that what may have been thought to be diminishing decision-making ability in later years reflects instead age-induced impaired psycho-motor efficiency.[134]

Gilbert in a 35 year study of 14 people found conflicting results. The subjects were tested in their 20's or early 30's and again in their 60's and 70's. They showed

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[132]Jack Botwinick, Aging and Behavior, A Comprehensive Integration of Research Findings (New York: Springer Publishing Co., Inc., 1973), pp. 120-176; and Michael Huberman, "Looking at Adult Education from the Perspective of the Adult Life Cycle," International Review of Education, Vol. 20, 1924, pp. 117-136.

[133]S. Gaylor, "Age Difference in the Speed of a Spatial Cognitive Process," Journal of Gerontology, Vol. 30, 1975, pp. 674-678.

[134]Nancy C. Waugh, James L. Fozard, George A. Tollard, and Donald E. Erwin, "Effects of Age and Stimulus Repetition on Two-Choice Reaction Time," Journal of Gerontology, Vol. 28, No. 4, 1973, pp. 466-470.

a slight insignificant rise in vocabulary level. However in intellectual efficiency, in initial learning, retention, and repetitious learning, all subjects showed a significant decrease.[135]

Furry and Baltes tested 80 adolescents, 80 young adults, and 80 elderly subjects for intellectual performance after a fatiguing treatment. Analyses of variance resulted in main effects for age and pretest-fatigue, and a complex interaction showing that the youngest and the oldest age group are particularly influenced by performance-related factors. Non-intelligence factors like the pretest fatigue may operate determining intelligence scores, often biasing elderly participants.[136]

Schaie and Parham report a cohort-sequential study over a seven year interval. Subjects were tested using the Primary Mental Abilities Test and the Test of Behavioral Rigidity. With the exception of the highly speed-related Word Fluency Test,

> . . . cohort variance is more important than age variance until the late 60's, while age changes are more heavily implicated in the 70's. But

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[135]Jeanne G. Gilbert, "Thirty-Five Year Follow-Up Study of Intellectual Functioning," Journal of Gerontology, Vol. 28, No. 1, pp. 68-72.

[136]Furry and Baltes, "Age Differences," pp. 73-80.

> even these such changes are not universal, with a number of variables showing little or no change over a 7-year interval into the early eighties.[137]

Memory ability has a major influence on learning. It is divided into three phases: registration, which includes exposure to the stimulus and encoding in the brain; retention, which includes the persistence of the encoded neural traces; and recall, which is the searching and retrieval process. As the person grows older, the registration phase of memory decreases in function for both auditory and visual memory. Memory retention remains fairly constant provided the material is meaningful.[138]

In a study of the nature of stored semantic material (semantic memory) on young (mean age 18.7 years) and old adults (mean age: 67.3 years), no difference was found in the precision of retained semantic information. However meaningful ideas were used in the study and the older subjects were a highly educated group of professionals.[139] Recall ability gradually declines in the adult, due partially

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[137]Schaie and Parham, "Cohort-Sequential Analysis," p. 652.

[138]P. A. Moerster, "Learning and Memory in Relation to Age," Journal of Gerontology, Vol. 27, 1972, pp. 361-363.

[139]David A. Walsh and Mariette Baldwin, "Age Differences in Integrated Semantic Memory," Developmental Psychology, Vol. 13, No. 5, 1977, pp. 509-514.

from interference from other information previously stored, and partly from general memory decay.[140]

Cross-sectional studies involving problem-solving abilities and critical thinking showed a decline with age. Critical thinking is defined as the ability to interpret data, weigh evidence, and engage in deductive thinking. A longitudinal study of critical thinking in adults showed a significant increase in ability.[141] Another group followed since they were four year olds were tested again at age 32. In the second testing their mean I.Q. changed from 113 to 124. They were tested again when they were 42 and their mean I.Q. was 130.[142]

Studies of Personality Factors Related to Adult Learning

Neugarten in an exhaustive review of studies of the adult stated: "In each area, the findings are notably

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[140] J. F. Brinley, T. J. Jovick, and L. M. McLaughlin, "Age, Reasoning, and Memory in Adults," Journal of Gerontology, Vol. 29, 1974, pp. 182-189.

[141] M. Glanzer and R. Glaser, "Cross-Sectional and Longitudinal Results in a Study of Age Related Changes," Educational and Psychological Measurement, Vol. 19, 1959, pp. 89-101.

[142] J. Kangas and K. Bradway, "Intelligence at Middle Age: A Thirty-Eight-Year Follow Up," Developmental Psychology, Vol. 5, 1971, pp. 333-337.

inconsistent from one study to the next, with some but not other investigators reporting age differences."[143]

In a study of persons aged 40 to 80, Neugarten found consistent age differences in intrapsychic dimensions, that is a change from active to passive mastery in relating to the environment and a change from outer world orientation to inner world orientation. No age-related differences were found in goal-directed and purposive behavior, coping styles, or satisfaction with life.[144]

A longitudinal study investigated adult interests over a 25 year span. The subjects were tested in college and then tested again 25 years later. The findings showed that cohort differences were larger than aging differences and that consistency rather than change was typical in the group.[145]

Houle formulated a profile of adults who engage to an outstanding degree in educational activities:

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[143]Bernice Neugarten, "Personality and Aging," in James E. Birren and K. Warner Schaie, eds., Handbook of the Psychology of Aging (New York: Van Nostrand Reinhold Co., 1977), pp. 626-644.

[144]Ibid., p. 637.

[145]D. W. Woodruff and J. E. Birren, "Age Changes and Cohort Differences in Personality," Developmental Psychology, 1972, Vol. 6, pp. 252-259.

> They have a high income
> they are from a large community
> they are fairly stable in their residential pattern
> they have had a varied education pattern
> they are from their late 20's to 50's
> they are married
> they perceive themselves as concerned with learning
> they are professional or white collar
> they are goal-oriented.[146]

In summary, learning in adults is shown to be affected by progressive physiological changes, the amount of previous formal education, the quality of health, and the individual's motivation to learn. Also the older adult learns at an increasingly slower pace than young adults.[147] Individual differences have been found to be "great enough to badly erode the predictive value of age and in addition, age has a differential impact for various ability dimensions."[148] The number of interrelated factors affective performance plus the inclusive evidence regarding aging prompted Atchley to conclude:

> Because research to date has not been able to isolate learning ability from other causes of performance and because very little longitudinal

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[146]As quoted in Widman, Conference on the Adult Learner, p. 33.

[147]Ibid.

[148]Botwinick, Aging and Behavior, A Comprehensive Integration of Research Findings, p. 191.

> research has been done in learning, we are in a poor position to say what effect age has on learning ability.[149]

The Learning Format

Studies that investigate the adult's choice of learning format were not found by this author. Surveys report increases or decreases in undergraduate enrollment and some point to the increase in older adults in traditional undergraduate programs. However, the American Council on Education, 1975, published two exhaustive studies on the demographic characteristics of undergraduate students in the 1970s without mentioning the ages of the students.[150]

The earliest national poll of adult learning interests was taken in 1945 by the American Institute of Public Opinion. Thirty-four percent of the total adult population indicated that they would like to enroll in adult education schools. The majority of those interested in going back to school were interested not in commercial

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[149]Robert C. Atchley, The Social Forces in Later Life: An Introduction to Social Gerontology, 2nd ed., (Belmont, Calif.: Wadsworth Publishing Co., Inc., 1977), p. 51.

[150]Jennie T. Roger and John A. Creager, "A Profile of 1968 College Freshmen in 1972," Vol. 10, No. 1, Washington, D. C.: American Council on Education, 1976; and Charles Andersen, Ed., "Fact Book on Higher Education: Institutions, Faculty and Staff, Students. Third Issue, 1975," Washington, D. C.: American Council on Education, 1975.

or vocational training but "want training of a more ambitious nature, along professional, scientific, or artistic lines, such as law, engineering, psychology, social welfare . . . ."[151]

The first comprehensive national survey of the nature of adult education in the U. S. was conducted by Johnstone and Rivera in 1962. One purpose of the study was to provide a comprehensive overview of various subjects studied, the methods of study used, and the institutional settings in which the studies occurred. Contacts were made with 11,957 households and information was gathered on 23,950 adults. "Adult" was defined as persons aged 21 or over.[152]

The study reported that between June 1962 and June 1963 over 17 million adults received some kind of adult instruction. This can be compared in a limited way to an HEW report in 1959[153] which showed 9 million adults receiving

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[151] Adult Education Journal, Vol. 4, No. 2, 1945.

[152] John W. C. Johnstone and Ramon J. Rivera, Volunteers for Learning (Chicago: Aldine Publishing Co., 1965), p. xxv-xxviii.

[153] U. S. Dept. of Health, Education and Welfare, "Participation in Adult Education," Circular No. 539, Washington, D. C.: U. S. Government Printing Office, 1959.

instruction. However the HEW study omitted areas of adult learning included in the Johnstone and Rivera study such as on-the-job training, correspondence studies, and educational extension courses.[154]

The 17 million adults participating in educational activities were divided into two categories. Full-time students were those enrolled full time in any type of school that awards diplomas, degrees, or certificates plus training in the armed services and business. Self-education students were those which were self-taught, not involving an instructor or tutor. Of the total sample, 2.3 percent were full-time students, and 7.9 percent were in independent studies.

Vocational education was by far the most frequently studied subject matter (32% of total courses) with hobbies and recreation second (19% of total courses). Academic subjects represented 12% of the total courses studied. Religion and home and family life courses each tied with academic courses to represent 12% also.[155]

Information was also collected on methods of study.

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[154]Johnstone and Rivera, Volunteers for Learning, p. 36.

[155]Ibid., pp. 39-52.

Traditional-type classes were most frequently used (56.2%), followed by group discussions (10.8%), lectures (10.5%), and correspondence study (8.4%).[156] Institutions attended for educational activities showed churches and synagogues to be slightly more frequently used than colleges and universities (both rounding out to be 21%), followed by community organizations (15%) and business and industry (12%).[157]

One distinguishing feature of adult education participants is that males were overrepresented overall. Additionally, there were trends in age participation that suggest life-cycle influences. Rates of participation for under age 35 show more males than females participating in educational activities. Both sexes participated equally in the 35-54 age interval, and more women than men engaged in educational activities over age 55. "One possible explanation is that the finding reflects differences in the life-cycle roles of young men and young women."[158]

Amount of adult participation was 28% between ages 20-29; 28% between ages 30-39; 22% between ages 40-49; and

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[156]Ibid., pp. 52-60.

[157]Ibid., pp. 60-70.

[158]Ibid., p. 90.

21% over age 49. For men under 35 who had one or more children, 5% studied academic subjects while 8% of men with no children were students. For males over 35 the presence of children did not change the rate of participation. Eight percent of males 35-54 and 1% of males over 55 took academic subjects.

For females the presence of children cut in half participation in academic studies. Those under age 35 with children showed 3% participation; without children, 6% participation. For those aged 35-54 with children participation was 2%, without children, 4%. For women over age 55 the presence of children did not effect the 1% participation. For men overall, the pattern of academic participation ranged from a high of 8% under age 35 to a low of 1% after 55. For women academic participation ranged from a high of 6% under age 35 to a low of 1% after age 55.

Other distinguishing characteristics showed that a majority of participants held jobs in white-collar occupations and the median income was $1,200 per annum higher than the average income in the U. S. In addition, participants were overrepresented with persons who had been to college by a ratio of two to one, and underrepresented with persons holding only grade-school education by a

factor of one to three. Persons living in large urban areas, especially in the suburbs, were overrepresented while people living in small towns and rural areas were underrepresented.[159]

When the factors affecting adult participation in educational study were compared, ". . . the most powerful factor by far is educational attainment, and although occupations and income do account for a little, their effects are quite secondary by comparison."[160] Age was also an important influence, but educational attainment contributes "approximately two-thirds of the impact and age about one-third."[161]

In a recent study Morstain and Smart tested 648 part-time students to develop a typological framework for assessing adult learners' reasons or motivations which influenced them to pursue further educational activity. The subjects test scores on the Education Participation Scale and demographic characteristics revealed the following information. The scores clustered into five groups. Group I (N=324) were found not to have clear reasons for their

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[159]Ibid., pp. 71-87.

[160]Ibid., p. 103.

[161]Ibid., p. 105.

educational activities and were called non-directed. Approximately 55% of the non-directed learners were female, and about 54% were under the age of 30, 51% had a family annual income of less than $12,000.[162]

Group II (N=55) sought the educational experience because of opportunities for social relationships. Fifty-six percent of Group II were female; 72% were under age 30, and 71% were from families with incomes less than $12,000 per year.

Group III (N=35) scored high on the escape/stimulation seeking scale. This group was 74% female; 46% were under 30, 26% were between 30 and 40; and 18% were over 40; and 47% were from families with per annum incomes of more than $15,000.

Group IV (N=155) scored high on the career oriented scale. Fifty-eight percent were male, ages 21 to 50 were represented fairly evenly with a slight larger percentage below age 30, with about 50% having family incomes less than $12,000 and 50% with family incomes more than $12,000.

Group V (N=57) scored high on life change (indicating

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[162]Barry R. Morstain and John C. Smart, "A Motivational Typology of Adult Learners," Journal of Higher Education, Vol. XLVIII, No. 6, Nov/Dec 1977, 665-679.

a strong desire to change social-personal interactions). This group was 57% male, 70% under age 30, and 62% from families with incomes of $8,500 to $15,000 yearly.[163]

Each group of adult learners, formed on the basis of motivations, exhibited a wide range of demographic characteristics of its members.

> The implication of this is that if one is interested in assessing the motivation of adult learners, it may be somewhat confounding to group individuals on the basis of demographic variables.[164]

Another study compared an independent study and a traditional study group, both within a traditional university setting. The purpose of the study was to determine whether or not personality differences as measured by the California Psychological Inventory existed between (1) successful independent study students and successful traditional study students, (2) successful independent study students and unsuccessful independent study students, (3) satisfied independent study students and unsatisfied independent study students, and (4) interactive combinations

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[163]Morstain and Smart, "A Motivational Typology of Adult Learners," p. 676.

[164]Ibid., p. 676.

of success and satisfaction within the independent study group.[165]

There were no significant personality differences between successful students in the traditional study program and students in the independent study program. Intellectual efficiency and responsibility were personality traits pertinent to independent study success. Within the group of successful independent study groups, those who enjoyed more social interaction tended to be the least satisfied.

Studies of Traditional Undergraduate Format

Hodgkinson stated that in 1965 there were 57.4 million Americans studying in educational institutions and 44.2 million people engaged in educational activities outside the educational system, such as in industry. In 1970 there were 63.8 million Americans studying in educational institutions (6.5 million were undergraduates) and 60.3 million studying in non-educational settings. This indicated a trend for learners to choose non-educational

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[165]Gordon S. Bigelow and Robert L. Egbert, "Personality Factors and Independent Study," Journal of Educational Research, Vol. 62, No. 1, September 1968.

settings over traditional educational settings.[166]

A survey by Hodgkinson of 1,230 institutions across the U. S. revealed an increasing diversity in characteristics among undergraduate students. This diversity included such factors as increasing age differences, variation in ethnic composition, an increase in the percent of married students (51%), an increase in the number of transfer students (50%), large differences in socio-economic background, a greater proportion of foreign students (36%), various religious backgrounds and various political affiliations.[167]

Recent studies have indicated that the undergraduate programs have an increasing number of older students. From 1960 to 1970 the male students in undergraduate programs between the ages of 22 and 34 doubled.[168]

As the result of a 1975 survey Shulman reports,

> Students' socioeconomic characteristics, abilities, interests, and patterns of participation are shifting in ways that may not coincide with

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[166]Harold L. Hodgkinson, Institutions in Transition (New York: McGraw-Hill Book Co., 1971), pp. 5-7.

[167]Ibid., pp. 6-15.

[168]Pamela J. Roelfs, "Teaching and Counseling Older Students," research paper (Princeton, N. J.: ETS, 1975).

> the traditional colleges and universities. For example, over the past 12 years the percentage of students of high ability and high socio-economic status going to college has decreased (from 90% in 1960 to 70% in 1972) while the percentage of women of high ability-low socio-economic status and men of low ability-high socio-economic status attending college has increased.[169]

Since 1969 there has been a marked decline in the proportion of college enrollment among 18 and 19 year olds. Between 1970 and 1974 high school graduates increased by 5% but there was no increase in college enrollments across the country. By contrast there was a sharp increase in enrollment among students aged 24 to 34. Enrollments in this age group increased by 63% between 1970 and 1974. By more than a 2 to 1 majority these older students enrolled as part-time students.[170]

The annual report from the U. S. Commissioner of Higher Education, released in May 1977, gave school enrollment trends of ages 5 to 34 from 1947 to 1975. Enrollment

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[169] C. B. Shulman, Enrollment Trends in Higher Education, ERIC/Higher Education Research Report No. 6, (Washington, D. C.: American Association for Higher Education, 1976).

[170] Jacob Stampen, Patterns in Undergraduate Enrollment Growth Among State Colleges and Universities 1969-1974 (Washington, D. C.: American Association of State Colleges and Universities, 1976).

for 18 to 24 years in undergraduate programs gradually reached a peak around 1967 and began a decline till 1974.[171] A more recent report, however, showed an 8.8% increase nationally in this age group in 1975 and 1976.[172] For older students over 25 there has been a steady increase in enrollment, growing by 35% between 1970 and 1973.[173]

In 1960 90% of high ability-high socioeconomic males went to college from high school. In 1970 70% of high ability-high socioeconomic status males went to college from high school.[174] Stampen reported a sharp rise in part-time students from 1969 to 1974.[175]

Interests are shifting from liberal arts to direct career preparations. The older student is motivated to

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[171]Annual Report of the U. S. Commissioner of Higher Education, Fiscal Year 1975, Office of Education (DHEW), Washington, D. C., 1976.

[172]James R. Mingle, Fact Book on Higher Education in the South, 1975 and 1976 (Atlanta, Ga.: Southern Regional Education Board, 1976).

[173]John Bishop and Jane Van Dyk, "Can Adults Be Hooked on College: Some Determinants of Adult College Attendance," Journal of Higher Education, Vol. XLVIII, No. 1 (Jan/Feb, 1977), p. 40.

[174]Shulman, Enrollment Trends in Higher Education.

[175]Stampen, Patterns in Undergraduate Enrollment Growth.

enter school by professional and occupational objectives. This includes certification requirements and upward job mobility opportunities.[176] Widman questioned whether traditional methodology is efficient when used with adults since studies show that the adult enters the educational system to learn job-related skills.[177]

Findings from a national survey of 247 post-secondary institutions in 1974 showed that enrollment patterns reflected the cost of attendance. Urban institutions grew faster than rural institutions and those institutions serving part-time and commuter students grew most rapidly of all.[178]

In summary, Hodgkinson's demographic picture of the traditional undergraduate student strongly supported Johnstone and Rivera's findings. Adults who went back to traditional college settings were primarily male, Caucasian, middle class with salaries of $12,000 to $15,000, had some

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[176]Shulman, Enrollment Trends in Higher Education.

[177]Shannon S. Widman, ed., Conference on the Adult Learner: Proceedings: May 23 and 24, 1975.

[178]Stampen, Patterns in Undergraduate Enrollment Growth.

previous college experience, and large numbers were in managerial or professional positions.[179]

Research on Nontraditional Learning Format

The major studies in nontraditional education in the U. S. were those conducted by the Commission on Nontraditional Study, funded by the Carnegie Corporation in 1972 and 1973.[180]

The first element consisted of plenary sessions out of which position papers were published. From these sessions and meetings Gould pointed out several patterns that characterize nontraditional studies as applied to traditional higher education.[181] The first set of patterns revolved around the philosophy of full educational opportunity for all adults. This included women resuming their studies, inmates of penal institutions, retirees, and

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[179]Harold L. Hodgkinson, "Planning and Management in the Face of the Changing Demographic Picture," from proceedings of the 1976 National Assembly, 1976.

[180]Samuel B. Gould, Chairman, Commission on Non-Traditional Study, Diversity by Design (San Francisco, Calif.: Jossey-Bass, Inc., 1973), p. XII.

[181]Samuel B. Gould and K. Patricia Cross, eds., Explorations in Nontraditional Study (San Francisco, Calif.: Jossey-Bass, Inc., 1972).

employed people wishing to improve their situations. The second set of patterns included the "elements of structure, method, content, and procedures that combine to create a new flexibility in education. Nontraditional study seeks to loosen the present rigidities in learning."[182] The third set of patterns included the emerging parallel educational system developed by business, industry, labor unions, cultural, government and social agencies, and military commands. There is little contact between traditional educational establishments and this growing parallel system, resulting in duplication of efforts. The final set of patterns involved individualized learning which included individual opportunity and individual responsibility. "If flexibility is a necessity for nontraditional study, then individualized learning is its most important component."[183]

Studies have shown that some groups of students who do not fit the traditional mold are handicapped by traditional education. Heist has found that creative students become "transients," having high attrition and transfer rates.[184]

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[182]Ibid., p. 5.

[183]Ibid., p. 8.

[184]P. Heist, "Creative Students: College Transients," in Paul Heist, ed., The Creative College Student: An Unmet Challenge (San Francisco: Jossey-Bass, 1968).

In five of the seven colleges studied intensively by Heist more potentially creative students dropped out than did regular students. In the other two colleges the drop-out rate was about the same for the two groups.[185] MacKinnon found that some of the most creative architects studied did not finish college.[186] For military personnel, almost continually on the move, completing a degree is extremely difficult. Another group handicapped by traditional educational programs are mothers of school-age children.[187]

From the findings Cross and Jones discussed three barriers to traditional education. First the notion that learning takes place in the physical presence of the classroom restricts access for those with physical handicaps, those in geographically remote areas, and those temporarily or permanently confined such as mothers of small children. Second, the concept that there is an accumulation of credit hours for degree requirements handicaps those whose lives are mobile such as servicemen or business transfers.

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[185]Ibid.

[186]D. W. MacKinnon, "The Nature and Nurture of Creative Talent," American Psychologist, 1962, Vol. 17, 484-485.

[187]Heist, "Creative Students."

Third, the idea that learning is the person's major activity and that it usually takes place between 9:00 A.M. and 5:00 P.M. on week days eliminates vast numbers of potential part-time learners.[188]

The second element of the Commission on Nontraditional Study consisted of hearings and conferences with people representing various agencies and institutions related to higher education. Attending these conferences were representatives of post-secondary education such as accrediting agencies, private colleges, public colleges and universities, and community and junior colleges. The third element of the study was the setting up of commissioned reports and research. Five extensive national studies were conducted including a survey of adult educational interests, a survey of college and universities, interviews with leaders of nontraditional education, and with leaders in the communications industry, and extensive reviews of the literature. Eight publications resulted from the research.[189]

One national survey planned as a followup to

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[188]K. Patricia Cross and J. Quentin Jones, "Problems of Access," in Gould and Cross, Explorations, pp. 43-49.

[189]Gould, Diversity, pp. 148-150.

Johnstone and Rivera reported adult learning interests in 1972. Seventy-seven percent of those surveyed expressed an interest in continued learning of some kind. These were divided into two subgroups labeled Learners and Would-Be Learners. Thirty-one percent of the population was engaged in some form of adult learning and 95% expressed the desire to continue learning. Johnstone and Rivera ten years earlier reported approximately 15% of the adult population engaged in some form of learning activity, double that of a study conducted in 1959. This information can only show trends in adult learners since each survey defined an educational activity in different ways, and since Johnstone and Rivera estimated the adult population in 1962 to be 114 million[190] and Carp et al. estimated the adult population in 1972, ten years later, to be 104 million.[191]

> Johnstone and Rivera found that, in the year preceding June 1962, approximately one in five adults was engaged in some kind of learning outside of full-time schooling. In the current survey, close to one in three adults (31 percent) reported

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[190]Johnstone and Rivera, Volunteers, p. 34.

[191]Abraham Carp; Richard Peterson; and Pamela Roelfs, "Adult Learning Interests and Experiences," in K. Patricia Cross, John R. Valley and Associates, Planning Nontraditional Programs (San Francisco: Jossey-Bass, 1974), p. 14.

part-time learning activities in the year preceding early summer 1972.[192]

As shown in the Johnstone and Rivera study learners were younger than the general population. Both interest and participation in learning declined in the thirties and dropped off sharply after age 55. Even so, more than one-half of the respondents over age 55 showed an interest in learning.

In 1972 neither sex was more oriented than the other in learning with 51% of the women engaged in learning and 49% of the men engaged in learning.[193]

The Carp et al. study divided respondents into Learners and Would-Be Learners. Learners (those engaged in learning) differed from Would-Be Learners in two ways. The Learners were people with a fairly high education background and were overrepresented among professionals and executives of large businesses. Geographically Learners resided in the West and in urban areas.

The highest percentage of Learners studied hobby and recreational subjects (42%) followed by technical and vocational skills (35%), then traditional educational

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[192]Ibid., p. 25.

[193]Ibid., p. 15.

classes on campus or at a school (25%), religion (14%), and public affairs (6%).

> One reasonably clear trend is for greater involvement in hobbies and recreation learning. A decade ago an estimated 24 percent of adults engaged in instruction were studying hobbies and recreation topics, compared with 42 percent of the present sample who were studying these subjects . . . . In contrast, study of vocational subjects seems to have declined slightly, from 39 percent to 35 percent of participants.
>
> . . . the study of general academic subjects may have increased somewhat in the past decade--from 15 percent in 1962 to 25 percent in 1972.[194]

Both Learners and Would-Be Learners showed a preference for the classroom over other methods of study. For Learners the second most frequently used method was independent study at home, followed by on-the-job training.

> Both Would-Be Learners and Learners chose lectures and classes most frequently . . . it is significant that "innovative" methods have not had much impact on other Would-Be Learners or Learners.[195]

Learners and Would-Be Learners showed a wide variety of choice of location with no clear predominant preference. Seventeen percent of the Learners studied at home, 14% studied at college or university, and 13% learned at his or her place of employment. Would-Be Learners chose colleges

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[194]Ibid., pp. 25-26.

[195]Ibid., p. 31.

or universities (21%), a public high schooi (16%), followed by study at home (10%).

> . . . it is worth drawing attention again to the relatively small numbers of adults who wish to learn in a college or university setting. Only 14 percent of the Learners pursued their studies on college campuses; only 21 percent of the Would-Be Learners report wanting to study at a college or university.[196]

When asked reasons for participating in learning, both Learners and Would-Be Learners indicated knowledge for its own sake. Compared with the 1962 study, a much larger percentage in 1972 indicated becoming better informed as a reason for learning (55% in 1972 to 37% in 1962). Job reasons were less important in 1972; 36% in 1962 had job-related reasons compared to 18% in 1972. However, several similarities existed among Learners in the 1972 surveys. Job-related considerations were still more important to men than to women; young adults learned more for job reasons than did older adults, who wanted to learn for less practical reasons.[197]

The fourth element of the Commission on Nontraditional Study emcompassed the placing of issues relating to

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[196]Ibid., p. 35.

[197]Ibid., pp. 43-45.

nontraditional study before national, regional, and state organizations as well as leaders of individual institutions. This involved presentations before groups, publication of a large body of reports, plans, analyses, and critiques, and in late January 1973 the Commission called together "people and organizations with ability, influence, and concern, in order to make certain that its recommendations came directly to their attention and to urge action on their part."[198]

One report made suggestions for education based on the extensive research conducted by the Commission. The recommendations can be summarized under broadening opportunities, reshaping organizations, and examining alternatives.

Cross summarized the findings in the studies,

> American higher education has worked hard to achieve educational opportunity for all. It looks very much as though we shall spend the remaining years of this century working to achieve education for each. . . . education has the obligation to offer all students the opportunity for high level achievement.[199]

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[198]Gould, Diversity, p. XIV.

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

CHAPTER III

Methodology

This study was an investigation of the relationship between choice of format and three constructs: personality variables, cognitive style, and locus of control. This chapter contains an outline of the methodology used to conduct the investigation.

Subjects for the Study

The sample consisted of two groups. The first group was students attending the College of Liberal Studies winter seminars at University of Oklahoma. All subjects were volunteers, ranging in age from 23 to 62. There were 14 male and 21 female subjects. All subjects were enrolled in the undergraduate program at the University of Oklahoma College of Liberal Studies at the time of the testing.

The College of Liberal Studies is a nontraditional program which offers two degrees: Bachelor of Liberal Studies and Master of Liberal Studies. The program allows

the individual student to proceed at "a pace reflecting his or her interest, motivation, ability, and time devoted to study."[1] The two basic formats of the program are independent study and residential seminars.

The undergraduate program offers three tracks:

1. The Bachelor of Liberal Studies. This track is for students with less than two years of college. After admission to the University of Oklahoma, the prospective student takes the required placements tests called SCAT-STEP Test (Sequential Test of Educational Progress and School and College Ability Tests). Upon acceptance the student chooses one of three independent study areas and begins the sequence of his or her choice (natural science, humanities, or social sciences). After completion of the independent study and successful completion of the independent study exam, the student attends the seminar of the same area of study. After all three areas of independent study and seminars have been completed, the student begins the upper division section of the program, called inter-area. At the completion of inter-area and after passing the exam, the student attends a final seminar. (See Figure 3)

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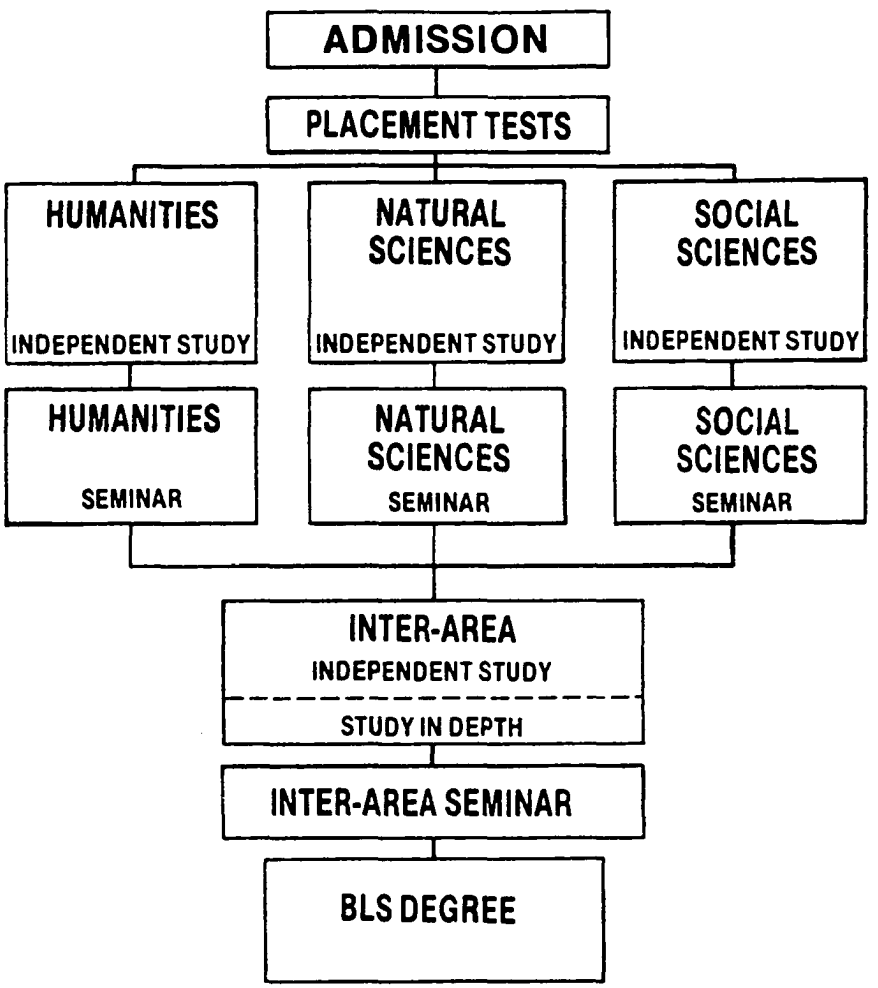
[1]The University of Oklahoma College of Liberal Studies Catalogue.

FIGURE 3

BACHELOR OF LIBERAL STUDIES



Source: College of Liberal Studies Bulletin, 1977-1978

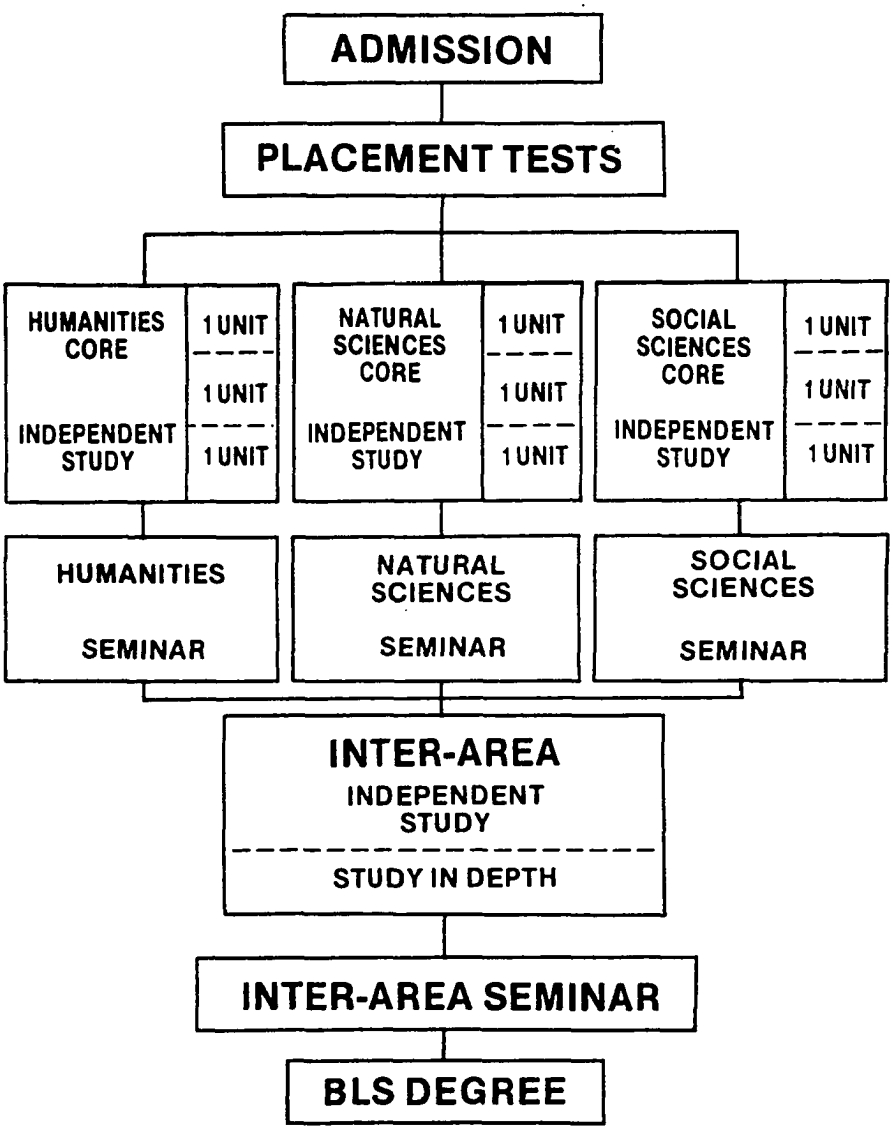
2. BLS Speciality Option Program. Speciality options are offered in management, education, and paralegal studies. This program is the same as the Bachelor of Liberal Studies program with the exception that the student selects the chosen specialty from the three basic core areas (humanities, natural sciences, and social sciences). (See Figure 4)

3. Upper Division Option (Formerly Junior College Option). This program admits only students with sixty hours or more of college credit. The student beings in the comprehensive area independent study and proceeds through the program as in the two previous tracks. (See Figure 5)

The two basic formats common to all College of Liberal Studies programs are the residential seminars and the independent study programs. During the independent study part of the program, materials are mailed to the student at home. This area is self-paced and self-directed. There are no time requirements and usually no writing assignments. Although an advisor is assigned, the student is expected to take the responsibility for on-going communication with the advisor. The student assesses his or her own readiness to take the independent area exam and makes the appropriate arrangements with the advisor.

FIGURE 4

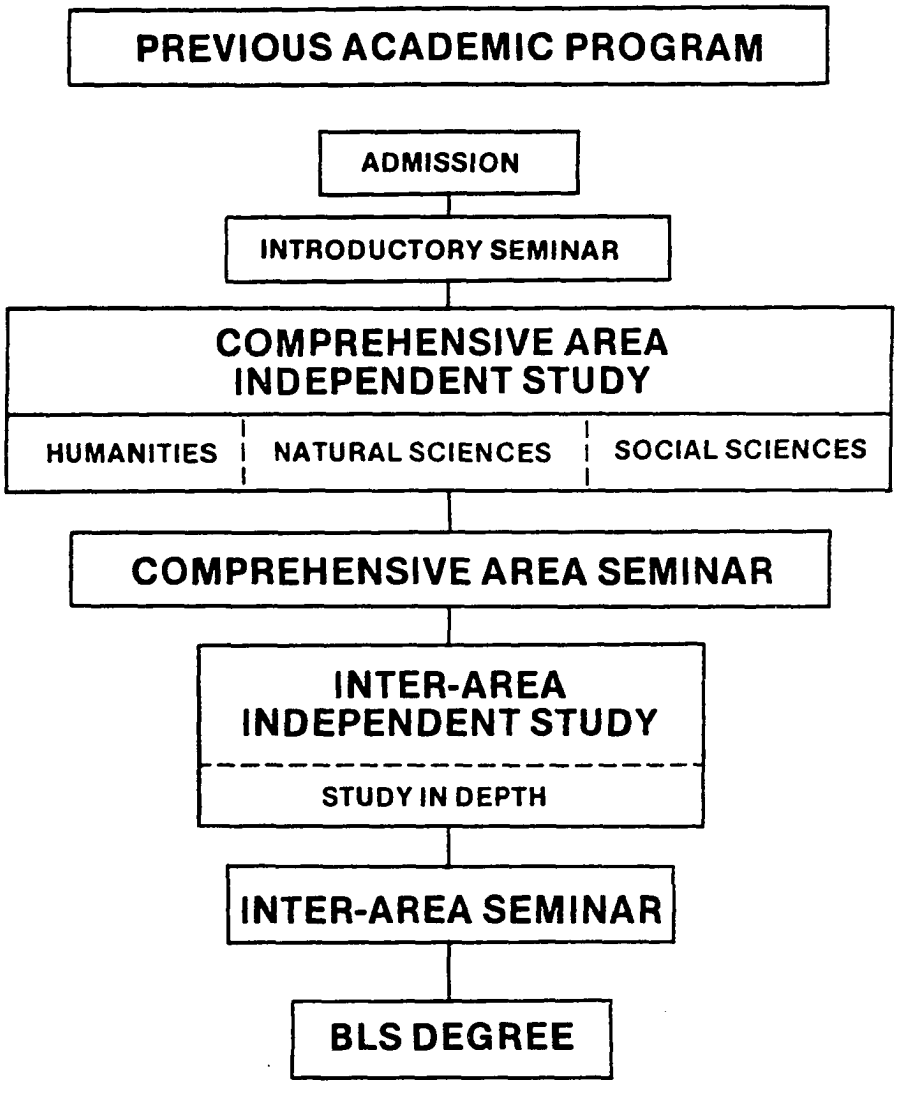
BLS SPECIALTY OPTION



Source: College of Liberal Studies Bulletin, 1977-1978

FIGURE 5

BLS/JUNIOR COLLEGE OPTION



Source: College of Liberal Studies Bulletin, 1977-1978

The seminars are set up in a traditional teaching format. The program is planned by the team of professors who lead the sessions. The professors give lectures, lead discussions, and make assignments. These sessions resemble the traditional classroom with the exception that students attend eight hours per day for five days a week.

The second group in the sample was undergraduate students attending classes that are part of the regular academic program at University of Oklahoma. This group was called traditional format subjects. This group differed from the nontraditional format subjects in the following ways. The student, once enrolled in a course proceeds at the pace determined by the program rather than at his or her own pace as in the nontraditional program. In the traditional program the course instructor schedules exams, and in the nontraditional program, the student schedules them when ready. Courses are taken in classes on the campus in the traditional program. In the nontraditional program students engage in independent study away from campus, and take courses on campus in intensive three week seminars.

In order to match the traditional with the three major areas in the nontraditional program, one-third of the subjects used were majors in the humanities, one-third

were majors in social sciences, and one-third were majors in the natural sciences. In addition to matching majors, subjects were matched for sex.

Testing Instruments Used

The subjects were given the Myer-Briggs Type Indicator (MBTI), the Group Embedded Figures Test (GEFT), the Rotters I-E Scale, and a personal data questionnaire (see Appendix A). A description of each instrument follows.

The Myers-Briggs Type Indicator

The MBTI is used to assess personality type according to Carl Jung's type theory. It is a self-report inventory consisting of 166 items. The items are scored on the following dimensions: extraversion-introversion (E-I), sensing-intuition (S-N), thinking-feeling (T-F), and judging-perceiving (J-P). The MBTI was scored for preference and for continuous data. Preference scores for each dimension were obtained by subtracting the lower score from the higher score. For example, the differences in the "S" items and the "N" items classify the subject either intuiting or sensing type. Since the difference scores are doubled and one point is added in the direction of the least predominate

type in the population, zero scores are eliminated. In the preference score the letter indicates direction and the number shows strength. Continuous scores are computed as follows. For I, N, F, P, the continuous score is the preference score plus 100. These scores range from 101 to 161, the stronger the preference the higher the score. For E, S, T, J, the continuous score is 100 minus the preference score. These scores range from 99 to 33, the stronger the preference the lower the score.

Reliability measures were found to vary with the MBTI. For gifted 7-9th grade students, National Merit Finalists, Brown College, Advanced 12th grade, and Pembroke College Students, the coefficients ranged from .80 to .94 for split-half reliabilities. Underachieving 8th grade, and non-prep 12th grades split-half reliabilities ranged from .44 to .80.

According to Myers:

> These reliabilities appear creditable for an instrument of this sort, representing in general the upper range of coefficients found in self-report instruments of similar length. It may be noted that while a wide range of age, intellectual ability and socioeconomic status is included, the only coefficients below .75 are for the under-achieving 8th grade and the non-prep 12th and that much the lowest values for these groups are on TF. The possibility

> would seem to exist that the relative uncertainty on TF may reflect a lesser development of judging process, which may prove to be a significant characteristic of such samples.[2]

In testing for validity Strickler and Ross reported a correlation between the MBTI and the 14th edition of the Gray-Wheelwright scales which also measure Jungian types. Correlations of EI, SN, and TF with the corresponding Gray-Wheelwright scales were .79, .58, and .60 respectively.[3]

Carlyn performed a comprehensive assessment of the Myers-Briggs Type Indicator which included an extensive review of intercorrelational studies, reliability studies, and validity studies conducted with the indicator. She concluded,

> Results of the studies indicate that the Myers-Briggs Type Indicator is an adequately reliable self-report inventory. The Extraversion-Introversion, Sensation-Intuition, and Thinking-Feeling scales appear to be relatively independent of each other, measuring dimensions of personality which seem to be quite similar to those postulated by Carl Jung.[4]

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[2]Myers, The Myers-Briggs Type Indicator, p. 20.

[3]Ibid., pp. 21-22.

[4]Carlyn, "Assessment of MBTI," p. 461.

The Group Embedded Figures Test

The GEFT[5] is an adaptation of the Embedded Figures Test (EFT)[6] which is individually administered. Evidence in the test manual indicated it is a reliable and valid measure of the field articulation construct. A split-half reliability of .82 for both males (N=80) and females (N=97) was obtained using the Spearman-Brown prophecy formula. These reliability estimates compared favorably with those of the EFT, which were .82 for men and .79 for women.[7]

The author used the Kuder-Richardson Method (KR_{20}) to test for reliability: $KR_{20} = \frac{n}{n-1} (\frac{SD^2-pq}{SD^2})$. Reliability coefficients were .89.

The test was assessed for validity by evaluating it in relationship to the EFT, the Portable Rod and Frame test (PRFT), and the Articulated Body Concept (ABC). For the EFT, correlations were -.82 for men and -.63 for women; for the PRFT, the correlations were -.39 for men and -.34 for women; and for the ABC tests, the correlations were

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[5]Witkin, et al., A Manual for the Embedded Figures Test.

[6]Ibid., pp. 26-29.

[7]Ibid.

.71 for men and .55 for women.[8] The negative correlations are the result of tests scored in reverse fashion.

The GEFT presents the subject with eighteen geometrically complex figures in which one of eight simple figures are embedded. The subject is asked to identify the simple figure within the complex figure by outlining it with a pencil. The test has three timed sections, one two-minute practice session and two five-minute testing sections. The score is the total number of simple figures correctly identified.

Preliminary normative data on the GEFT for men and women undergraduates in an eastern liberal arts college showed for men a mean of 12.0 and a standard deviation of 4.1, and for women a mean of 10.8 and a standard deviation of 4.2. Field articulation is classified in the following way. For men scores of 16 to 18 are classified as field-independent and scores of 0 to 9 are classified as field-dependent. For women scores of 15 to 18 are classified as field-independent and scores of 0 to 8 are classified as field-dependent. This classification was used to define field-independents and field-dependents in this research design.

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[8]Ibid.

Rotter's I-E Scale

The I-E Scale is a test of generalized expectancy based on Rotter's Social Learning Theory. The test is a forced-choice 29 item inventory with six filler items.

The I-E Scale is scored by counting the number of external answers. Scores range from 0 to 23. The higher the score the more external the subject's orientation. The upper one-third of the scores are considered externals and the lower one-third of the scores are considered internals.

Rotter reports nine reliability studies on college students. Internal consistency correlations using the Kuder-Richardson range from .70 to .76. Franklin reports a national stratified sample (N=1000) using the Kuder-Richardson with internal consistency of .69. Test-retest reliabilities for college students in a one-month interval show correlations of .60, .83, and .72 respectively.[9]

To test for validity, the I-E Scale was correlated with the Marlowe-Crowne Social Desirability Scale in ten studies of college students. Correlations ranged from -.35 to -.12. Studies with intellectual measures on

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[9]Rotter, Applications of a Social Learning Theory of Personality, pp. 270-285.

college students show correlations of -.22 to -.03.[10]

The author used the Kuder-Richardson (KR_{20}) to test for reliability. A reliability coefficient of .69 was found.

While no normative scores are suggested, means and standard deviations are given for a number of groups. Ohio State University male students showed a mean of 8.15 and a standard deviation of 3.88; Kansas State elementary psychology students, combined sex, showed a mean of 7.73 and a standard deviation of 3.82; Peace Corp trainees, combined sex, showed a mean of 5.94 and a standard deviation of 3.36; and a national stratified sample (Perdue opinion poll) showed a mean of 8.50 and a standard deviation of 3.74.[11]

Robinson and Shaver evaluated Rotter's I-E Scale from studies on reliability, convergent validity, and discriminant validity and conclude "Rotter's scale is still to be recommended as a measure of generalized I-E expectancy."[12]

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[10]Ibid.

[11]Ibid.

[12]John P. Robinson and Phillip R. Shaver, Measures of Social Psychological Attitudes, Ann Arbor: Institute for Social Research, The University of Michigan, 1973, p. 229.

Personal Data Sheet

The personal data sheet used fact-type questions to provide information about specific demographic characteristics. The questionnaire is brief and includes the areas that might possibly affect the research design, such as age, sex, and college major. The subjects were allowed to remain anonymous in that only a code number was requested on the personal data sheets and on the tests. Table 1 displays the variables controlled by the sampling procedure.

TABLE 1

VARIABLES CONTROLLED IN SAMPLES

	Traditional	Nontraditional
Sex		
Male	14	14
Female	21	21
Major		
Humanities	11	
Natural Science	12	
Social Science	12	
Age Intervals		
23-32	30	6
33-42	4	12
Over 42	1	17

Procedure

Nontraditional Learning Format Participants

Since the subjects were tested at the end of about eight hours of seminar, they were tested in groups of 10-15, on two different days each. The MBTI was administered in the first session. The GEFT, I-E Scale and Personal Data Sheet were given in the second testing session. All subjects attending the Winter BLS Seminar that volunteered were tested. Forty-five people attended and 35 volunteered to be tested.

Traditional Learning Format Participants

The second sample was taken from undergraduate classes that are part of the traditional academic program at the University of Oklahoma. One-third of the subjects used were majors in the humanities, one-third majors in social sciences and one-third majors in the natural sciences. In addition to matching majors, subjects were matched for sex. There were only five subjects in the traditional program over age 32. In contrast, the majority of the subjects in the nontraditional program were over age 32. To control for age as a predictor variable, test scores were run

against age categories in the nontraditional group. In order that both sets of subjects have the same testing experience, the Traditional Learning Format subjects were tested in groups of 10-15 in two testing sessions.

The stratified random sampling procedure consisted of three steps. In the first step, 135 subjects were grouped into the three major areas: humanities, social science, and natural science. In the second step only those over age 23 were chosen out of each subject area. In the third step a random sampling procedure with replacement was used to select thirty-five subjects.

For both samples instructions were read from MBTI test booklet, the GEFT test manual, and the I-E Scale test booklet. Each group was given an opportunity to ask questions for clarity before taking the tests. The subjects' answers were anonymous, and code numbers were used on the Personal Data Sheet and on the test booklets.

Statistical Design

The analysis of the data was performed in five stages. In the first stage a contingency table analysis was used to cross-tabulate demographic data and test scores. The contingency table displays data in frequency

groupings across categories or variables. These groupings give a summarization of all the data and show possible trends.

In the second stage of analysis a scattergram was constructed using GEFT, the I-E Scale and the MBTI against choice of learning format. The scattergram gives a visual representation of the bivariate distribution, test scores and choice of format. Curvilinear relationships and relationships only within certain variable ranges can be detected.

In the third stage H_1 through H_{14} were tested using Chi Square tests for goodness of fit. The purpose of this procedure was to determine whether the difference between expected and obtained frequencies were within the range of random sampling variation. Test score frequencies were tested using normative data when available. There was no normative data available on the GEFT. The MBTI scores were tested against normative data published in the Myers Briggs Type Indicator Manual. Myers studies[13] showed the following percentages of preference scores in a liberal arts college: Extravert, 54%; Introvert, 46%; Sensation,

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[13]Myers, Myers Briggs Type Indicator, pp. 14-15.

38%; Intuition, 62%; Thinking, 54%; Feeling, 46%; Judging, 53%; and Perceptive, 47%. If students enrolled in the traditional educational format and students enrolled in the nontraditional format were from the same population, then frequencies of test scores would fall within the range of normal sampling variation. On the other hand, if obtained frequencies ranged beyond normal sample variation, then the two samples were assumed to come from different populations. The Chi Square formula:

$$X^2=\sum\frac{(O-E)^2}{E}$$

$$df=c-1$$

was performed to verify that the obtained distribution of types were significantly different from the expected one.

In the fourth stage H_{15} was tested using a 2X2 Chi Square Test for goodness of fit. Displayed in a contingency table, the 2X2 Chi Square tested for significance between two variables. Congruent styles (field-independent/internal and field-dependent/external) and incongruent styles (field-independent/external and field-dependent/internal) were compared with satisfaction/dissatisfaction with the degree program. Np was used as expected frequency. The formula for degrees of freedom is: $df=(r-1)(c-1)$.

In the fifth stage H_{16} and H_{17} were tested using stepwise multiple regression analysis. The criterion variable, choice of learning format, was analyzed in relationship to the predictor or independent variables, test scores. The main focus of the analysis was the evaluation and measurement of the overall dependence of one variable, choice of learning format, on a set of other variables, test scores. In stepwise multiple regression sets of variables are included in steps. The variable that explains the greatest amount of variance in the dependent variable are entered into the equation first; the variable that explains the greatest amount of variance in conjunction with the first variable are entered into the equation second, and so on. In other words, the variable that explains the greatest amount of variance that hasn't been explained by the other variables in the equation enters at each step.

Additionally, a stepwise multiple discriminant analysis was run as a categorizing test for each format. The stepwise multiple discriminate analysis is a descriptive statistic that shows linear relationships for two groups. This procedure distinguishes between two groups, traditional and nontraditional format by selecting the

discriminating variables, test scores. The stepwise method selects each discriminating variable in descending order of strength. When the remaining variables do not contribute to discrimination, the stepwise procedure halts and performs analysis on the selected variables.

CHAPTER IV

Analysis of Data

In the first stage of data analysis a contingency table analysis was developed to cross tabulate test scores with age, sex, and educational format (see Table 2).

Internal locus of control was more frequently found over age 32. Also more internals were found in the non-traditional educational format. More females were internal than were males. More males than females were perceptive and more females than males were feeling types.

In the second stage of data analysis, test scores were plotted against choice of learning format (see Appendix B for the scatter plots). No curvilinear relationships were found.

Testing of Hypothesis 1 Through Hypothesis 14

In the third stage of statistical analyses H_{01} through H_{014} were tested with Chi Square tests. Each table contains two columns. These hypotheses are now stated in statistical form:

H_{01}: There is no difference between the obtained

TABLE 2.--Frequency distribution of subjects by age, sex, educational format and classification

	Age Intervals			Sex		Educational Format	
Classification	23-32 (N=36)	33-42 (N=16)	over 42 (N=18)	Males (N=28)	Females (N=42)	Traditional (N=35)	Nontraditional (N=35)
Sensation	12	8	9	11	18	12	17
Intuition	24	8	9	16	25	23	18
Thinking	21	8	8	18	19	19	18
Feeling	15	8	10	9	24	16	17
Judging	18	12	12	11	31	18	24
Perceptive	18	4	6	16	12	17	11
Extravert	19	4	10	12	21	18	15
Introvert	17	12	8	15	22	17	20
Internal	9	12	11	11	21	10	22
External	4	1	2	5	2	3	4
Field-Dependent	9	5	7	7	14	8	13
Field-Independent	15	8	7	11	19	14	16

and expected frequency of extraverts and introverts enrolled in a nontraditional educational format.

H_{02}: There is no difference between the obtained and expected frequencies of extraverts and introverts enrolled in a traditional educational format.

H_{03}: There is no difference between the obtained and expected frequencies of thinking and feeling types enrolled in a nontraditional educational format.

H_{04}: There is no difference between the obtained and expected frequencies of thinking and feeling types enrolled in a traditional educational format.

H_{05}: There is no difference between the obtained and expected frequencies of intuitive and sensation types enrolled in a nontraditional educational format.

H_{06}: There is no difference between the obtained and expected frequency of intuitive and sensation types enrolled in a traditional educational format.

H_{07}: There is no difference between the obtained and expected frequency of judging and perceptive types enrolled in a nontraditional educational format.

H_{08}: There is no difference between the obtained and expected frequency of judging and perceptive types enrolled in a traditional educational format.

H_{09}: There is no difference between the obtained

and expected frequency of field-independents and field-dependents enrolled in a nontraditional educational format.

H_{010}: There is no difference between the obtained and expected frequency of field-independents and field-dependents enrolled in a traditional educational format.

H_{011}: There is no difference between the obtained and expected frequency of internals and externals enrolled in a nontraditional educational format.

H_{012}: There is no difference between the expected and obtained frequency of internals and externals enrolled in a traditional educational format.

H_{013}: There is no difference between the obtained and expected frequency of congruent and noncongruent styles enrolled in a nontraditional educational format.

H_{014}: There is no difference between the obtained and expected frequency of congruent and noncongruent styles enrolled in a traditional educational format.

Chi Square tests computed on H_{01} through H_{010} and H_{012} through H_{014} were not statistically significant (alpha= .05). On H_{011} the Chi Square allowed rejection of the null hypothesis. The results of the Chi Square tests are summarized in Tables 3 through 16.

Expected values for Table 3 through Table 10 were

taken from normative data reported by Myers.[1] Since no normative data was available for Table 11 through Table 16, np was used for expected value.

TABLE 3.--Chi square test of goodness of fit on obtained and expected distributions of extraverts and introverts in the nontraditional educational format

Psychological Type	Expected N	Obtained N
Extraverts	18.9	20
Introverts	16.1	15
	Total N=35 df=1 x^2=.139 p>.05	

TABLE 4.--Chi square test of goodness of fit on obtained and expected distributions of extraverts and introverts in the traditional educational format

Psychological Type	Expected N	Obtained N
Extraverts	18.9	17
Introverts	16.1	18
	Total N=35 df=1 x^2=.415 p>.05	

[1]Myers, Myers-Briggs Type Indicator, pp. 14-15.

TABLE 5.--Chi square test of goodness of fit on the obtained and expected distributions of thinking and feeling types in the nontraditional educational format

Psychological Type	Expected N	Obtained N
Thinking	18.9	18
Feeling	16.1	17
	Total N=35 df=1 x^2=.091 p>.05	

TABLE 6.--Chi square test of goodness of fit on the obtained and expected distributions of thinking and feeling types in the traditional educational format

Psychological Type	Expected N	Obtained N
Thinking	18.9	19
Feeling	16.1	16
	Total N=35 df=1 x^2=.001 p>.05	

TABLE 7.--Chi square test of goodness of fit on the obtained and expected distributions of intuitive and sensation types in the nontraditional educational format

Psychological Type	Expected N	Obtained N
Intuitive	21.7	18
Sensation	13.3	17
	Total N=35 df=1 x^2=1.66 p>.05	

TABLE 8.--Chi square test of goodness of fit on the obtained and expected distributions of intuitive and sensation types in the traditional educational format

Psychological Type	Expected N	Obtained N
Intuitive	21.7	23
Sensation	13.3	12
	Total N=35 df=1 x^2=.205 p>.05	

TABLE 9.--Chi square test of goodness of fit on the obtained and expected distributions of judging and perceptive types in the nontraditional educational format

Psychological Type	Expected N	Obtained N
Judging	18.55	24
Perceptive	16.45	11
	Total N=35 df=1 x^2=3.405 p>.05	

TABLE 10.--Chi square test of goodness of fit on the obtained and expected distributions of judging and perceptive types in the traditional educational format

Psychological Type	Expected N	Obtained N
Judging	18.55	18
Perceptive	16.45	17
	Total N=35 df=1 x^2=.034 p> .05	

TABLE 11.--Chi square test of goodness of fit on the obtained and expected distributions of field-dependents and field-independents in the nontraditional educational format

Perceptual Type	Expected N	Obtained N
Field-Dependents	14.5	13
Field-Independents	14.5	16
	Total N=29 df=1 x^2=.310 p>.05	

TABLE 12.--Chi square test of goodness of fit on the obtained and expected distributions of field-dependents and field-independents in the traditional educational format

Perceptual Type	Expected N	Obtained N
Field-Dependents	11.0	8
Field-Independents	11.0	14
	Total N=22 df=1 x^2=1.636 p>.05	

TABLE 13.--Chi square test of goodness of fit on the obtained and expected distributions of internals and externals in the nontraditional educational format

Expectancy	Expected N	Obtained N
Internals	13	22
Externals	13	4
	Total N=35 df=1 x^2=12.461 p<.01	

TABLE 14.--Chi square test of goodness of fit on the obtained and expected distributions of internals and externals in the traditional educational format

Expectancy	Expected N	Obtained N
Internals	6.5	10
Externals	6.5	3
	Total N=35 df=1 x^2=3.769 p>.05	

TABLE 15.--Chi square test of goodness of fit on the obtained and expected distributions of congruent and noncongruent styles in the nontraditional educational format

Expectancy Style	Expected N	Obtained N
Congruent	10.5	10
Noncongruent	10.5	11
	Total N=21 df=1 x^2=.049 p>.05	

TABLE 16.--Chi square test of goodness of fit on the obtained and expected distributions of congruent and noncongruent styles in the traditional educational format

Expectancy Style	Expected N	Obtained N
Congruent	9.5	10
Noncongruent	9.5	9
	Total N=35 df=1 x^2=.052 p>.05	

Testing of Hypothesis 15

H_{015}: There is no difference in the expected and obtained frequency of congruent and noncongruent styles in satisfied and dissatisfied subjects.

The Chi Square Test computed on congruent styles, noncongruent styles, satisfied and dissatisfied subjects failed to reject the null hypotheses. Expected cell frequences were computed using the following formula:

$$fe_{(rk)} = \frac{f_r f_k}{N}$$

Table 17 shows the results.

TABLE 17.--Frequency of satisfied and dissatisfied subjects among congruent and noncongruent styles in combined educational formats

	Styles		
	Congruent	Noncongruent	Both
Satisfied	13	11	24
Dissatisfied	7	9	16
Both	20	20	40
		df=1 x^2=.417 p>.05	

Testing of Hypotheses 16 and 17

H_{016}: There is no linear relationship between non-traditional educational format and the set of scores for intuitive, thinking, judging, introvert, internal, and field-independent subjects.

H_{07}: There is no linear relationship between traditional educational format and the set of scores for sensation, feeling, perceptive, extraverts, externals, and field-dependent subjects.

The results of the stepwise multiple regression computed on educational format and test scores failed to reject null hypotheses H_{016} and H_{017}. Summaries of the results are given in Table 18.

TABLE 18.--Summary of stepwise multiple regression for test score variables and choice of format

Step	Variable	r	r^2	Increase in r^2
1	Locus of Control	.22012	.04845	.0485
2	Introversion-Extraversion	.26778	.07170	.0232
3	Judging-Perceptive	.29005	.08413	.0124
4	Sensation-Intuition	.29369	.08626	.0021
5	Field-Dependent-Independent	.29639	.08785	.0016
6	Thinking-Feeling	.29653	.08793	.0001

Ancillary Procedures

Age was run as a predictor variable against test scores in the nontraditional format sample. The results showed that age does not predict test scores. A summary of the multiple regression using age and test scores is found in Table 19.

TABLE 19.--Summary of multiple regression for age and test score variables

Step	Variable	r	r^2	Increase in r^2
1	Judging-Perceptive	.26198	.06863	.0686
2	Thinking-Feeling	.28254	.07983	.0112
3	Locus of Control	.28967	.08391	.0041
4	Extravert-Introvert	.29167	.08507	.0012
5	Sensation-Intuition	.29314	.08593	.0009
6	Field-Dependent-Independent	.29428	.08660	.0007

A stepwise multiple discriminant analysis showed one discriminant function, the locus of control variable at a nonsignificant level (p=.067). Introversion-extraversion was entered at step two: (p=.181). No other variables were entered.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to investigate the relationships between choice of learning format and personality type, cognitive construct, and locus of control. The writer sought to determine if choice of learning format was a function of selected individual characteristics.

A sample of 70 undergraduate university students were tested using the Myers-Briggs Type Indicator (MBTI), Group Embedded Figures Test (GEFT), and Rotter's I-E Scale. An incidental sample of thirty-five subjects was tested at a residential seminar in a nontraditional learning format. A stratified random sample was taken from subjects attending undergraduate classes in a traditional university setting. Since the subjects attending the traditional university were, as a group, younger than the nontraditional format subjects, age was run as a predictor variable in the analysis.

The mean age for traditional format subjects was 26.9 and mean age for nontraditional format subjects was 41.

In the first stage of analysis a frequency distribution was developed to cross-tabulate demographic data. Categorical scores were used for the groupings. Females scored higher than males among feeling types which supports findings by Myers.[1] There was an age trend in the I-E Scale showing more internals over age 33. Males scored higher among the perceptive type scores than females.

In the second stage a scatter plot was developed to assess curvilinear relationships and relationships within certain variable ranges. No curvilinear relationships were found nor were relationships within variable ranges found (see Appendix B).

In the third stage of analysis individual Chi Square Tests were used to compare obtained frequencies of categorical scores with theoretical frequencies. For the MBTI scores the obtained frequencies were within the range of the theoretical distributions.[2] For the GEFT there was no normative data available. However Witkin et al. showed

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[1]Myers, Myers-Briggs Type Indicator, p. 16.

[2]Ibid., pp. 14-15.

no difference in the mean GEFT scores in college dropouts and in nonscience graduate students.[3] From these data the writer assumed a normal distribution of the field-dependent-independent construct in undergraduate study. The Chi Square Tests supported this assumption. For Rotter's I-E Scale, no studies were available that gave normative data for undergraduate students. The Chi Square test showed a significance difference ($p<.01$) in externals and internals among undergraduate students. The I-E Scale mean however for the sample was 9.23 which supports findings reported by Rotter.[4]

In the fourth stage, a 2X2 Chi Square tested for significance between congruent and incongruent styles and level of satisfaction with the educational format. Expected frequencies were computed using $fe_{(rk)} = \frac{f_r f_k}{N}$. Lefcourt and Telegi[5] and Tobacyk[6] found congruent subjects to be more

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[3]Witkin, et al., Longitudinal Study, p. 205.

[4]Rotter, Chance, and Phares, Social Learning Theory, pp. 279-280.

[5]Lefcourt and Telegi, "Locus of Control and Field Dependence as Predictors," pp. 53-56.

[6]Tobacyk, Broughton, and Vaught, "Congruence-Incongruence Between Locus of Control and Field Dependence," pp. 81-85.

accepting of themselves and better adjusted. The writer tested congruent and incongruent subjects for adjustment in the educational format using level of satisfaction (see Personal Data Sheet, Appendix A). The Chi Square Test did not find a significant difference (x^2=.417) in level of satisfaction between congruent and noncongruent styles. The findings do not support the above studies.

In the fifth stage a stepwise multiple regression tested for selected personality variables, cognitive construct, and locus of control as predictors of educational format. The stepwise multiple regression did not yield significant correlation coefficients. Locus of Control was entered at Step 1 and accounted for only 4% of the variance (see Table 18).

In a second stepwise multiple regression analysis, age was run as a predictor variable against test scores. This analysis was computed on the nontraditional educational sample which had an age range of 23-62. No significant correlations were found between age and test scores (see Table 19).

A stepwise multiple discriminant analysis tested for linear relationships in each format. The stepwise multiple discriminant analysis supported the stepwise

multiple regression analysis in that no significant relationships were found between test scores and each of the formats.

Discussion and Conclusions

Chi Square Tests

Myers provided a theoretical basis for MBTI scores. A significant deviation from this theoretical basis would indicate that the student returning to college in either the traditional or nontraditional format would come from a different population than reported by Myers. This study indicated that both groups tested were from the same population and that they were part of the population reported by Myers. While normative data was not available on the general public for each type, Myers compared a vocational 12th grade group with an undergraduate liberal college group. She found a high percent of intuitive types in the college (70% intuitives, 30% sensation) and a high percent of sensation types in the vocational group (15% intuitives, 85% sensation).[7] While the MBTI may predict those subjects who attend college from those who do not go to college, this study indicated

[7]Myers, Myers-Briggs Type Indicator, p. 33.

that selected personality characteristics do not predict choice of learning format.

Since there were no normative data for cognitive style subjects and for locus of control subjects in an educational format, this study attempted to set up a normative model for both tests. For field-dependence-independence, there were approximately equal numbers of each type in the educational formats. Witkin's studies on choice of subject majors supported this finding.[8]

No studies were found that reported frequencies of internals/externals in educational formats. While means of college students were reported by Rotter,[9] no frequency distributions were given for internals/externals in the college population. This study provided normative data for the frequency of internals and externals in a college population (see Tables 13 and 14).

Parent et al.[10] and Daniels and Stevens[11] found

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[8]Witkin, "Cognitive Styles-Educational Implications," pp. 42-48; and Witkin, et al., "Longitudinal Study," pp. 197-211.

[9]Rotter, Chance, and Phares, Social Learning Theory, pp. 279-280.

[10]Parent, et al., "Interactive Effects of Teaching Strategy and Locus of Control," pp. 764-768.

[11]Daniels and Stevens, "Interaction Between Internal-External Locus of Control and College Instruction," pp. 103-113.

that internals performed better in independent study instructional formats. While this study did not test performance, the writer assumed that internals might prefer an independent study format. The Chi Square test shown in Table 13 using categorical data supported a trend in this direction (see Table 13, also see Stepwise Multiple Regression analysis below).

Stepwise Multiple Regression Analysis

The Stepwise Multiple Regression added support to the Chi Square tests. No significant relationships were indicated. Locus of Control was entered at Step 1 at a non-significant level. Locus of Control, however, did not predict choice of educational format. The difference in this analysis and in the Chi Square test shown in Table 13 was directly related to the use of categorical data in the Chi Square Test and the use of continuous scores in the regression analysis. Scores ranging between 9 and 15 were not used in the Chi Square Test, creating a difference in findings.

Stepwise Multiple Discriminant Analysis

The Stepwise Multiple Discriminant Analysis supported

the other findings in this study. Locus of Control, entered at Step 1 at the .067 level of significance suggests a trend for internals to prefer the nontraditional educational format. In the second stepwise multiple regression analysis, age was tested against test scores as a predictor variable.

Age did not predict performance on any of the tests. Studies showed contradictory results for age and field-dependence-independence. The findings of this study were at variance with Schwartz and Karp,[12] Comalli[13] and DeCosmo.[14] However, the findings supported Kogan's report.[15] There are no age-related studies on Rotter's I-E Scale. This study showed that age is not related to performance on the MBTI, the I-E Scale, and the GEFT.

Johnstone and Rivera[16] and Hodgkinson[17] showed strong relationships between previous educational background,

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[12]Schwartz and Karp, "Field-Dependence in a Geriatric Population," pp. 495-504.

[13]Comalli, "Life-Span Changes," pp. 221-222.

[14]DeCosmo, "Curricular Choices," p. 44.

[15]Kogan, "Creativity and Cognitive Style," p. 167.

[16]Johnstone and Rivera, Volunteers for Learning, pp. 71-87.

[17]Hodgkinson, "Changing Demographic Picture."

socioeconomic status, and sex and subjects returning to college. Some of these factors may have been operating in the sample tested in this study.

Recommendations

The first recommendation for further research concern replication for the present study. More studies are needed which investigate choice of learning format. These studies should include some of the factors found in the Johnstone and Rivera study, the study conducted by Hodgkinson, Stampen's study[18] and the study conducted by Carp et al.[19] If instruction is to be individualized the diversity of student characteristics must be understood.

The second recommendation for further research is that more aptitude treatment interaction studies (ATI) be made using educational format as the treatment. Subjects with selected individual characteristics may interact with types of educational format in areas such as level of performance, patterns of attrition and economic factors underlying choice.

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[18]Stampen, Patterns in Undergraduate Enrollment Growth.

[19]Carp, Peterson, and Roelfs, "Adult Learning Interests," p. 14.

The third recommendation for further research is that studies be made comparing subjects who continue from high school into college with subjects who stay out for a few years and reenter the educational system. These two groups of students may have individual differences that would result in different educational needs.

The fourth recommendation for further research is that studies compare three groups of subjects: those who drop out of college, those who drop out and reenter at a later date, and those who continue in the educational system from high school until completion of the college degree. At this time the dropout rate for beginning freshmen in four year universities is high. For some universities, it is approximately 50%. Studies that test for individual differences between dropouts and those who remain in the college are needed. Additionally, more information is needed about the characteristics of the adults who are reentering the educational system.

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APPENDIX A

PERSONAL DATA SHEET

Please check or answer the correct response. Answers will be used for research purposes only.

1. Code number _____ (1-4)

2. Sex: _____Female _____Male (5)

3. Age: record to last birthday _____ (6,7)

4. Place of residence (City, State only) _____ (8,9)

_____

5. Number of years enrolled in College of Liberal Studies _____ (10,11)

6. Area of Liberal Studies program in which you are enrolled: (12)

__Regular BLS __Specialty Option __Upper Division Option

7. To what extent are you satisfied with your degree program? (13)

___greatly satisfied ___greatly dissatisfied

___somewhat satisfied ___somewhat dissatisfied

8. Additional comments you would like to make: (14,15)

_____

_____

PERSONAL DATA SHEET

Please check or answer the correct response. Answers will be used for research purposes only.

1. Code number _____ (1-4)

2. Sex: _____Female _____Male (5)

3. Age: record to last birthday _____ (6,7)

4. Place of residence (City, State only)_____ (8,9)

_____

5. Number of years enrolled in University of Oklahoma _____ (10,11)

6. College Major _____ (12)

7. To what extent are you satisfied with your degree program? (13)

___greatly satisfied ___greatly dissatisfied

___somewhat satisfied ___somewhat dissatisfied

8. Additional comments you would like to make: (14,15)

_____

_____

APPENDIX B

TABLE 1 SCATTERPLOT

Y= VAR # 12 VAR. NAME=FD=T=CONT MEAN= 12.16 ST. DEV= 5.571 N=
X= VAR # 5 VAR. NAME=F FORMAT MEAN= 1.500 ST. DEV= 0.5000 N=
0 CASES OMITTED = MD IN X OR Y 0 CASES OMITTED BY FILTER VAR # 0 ; NO FILTER
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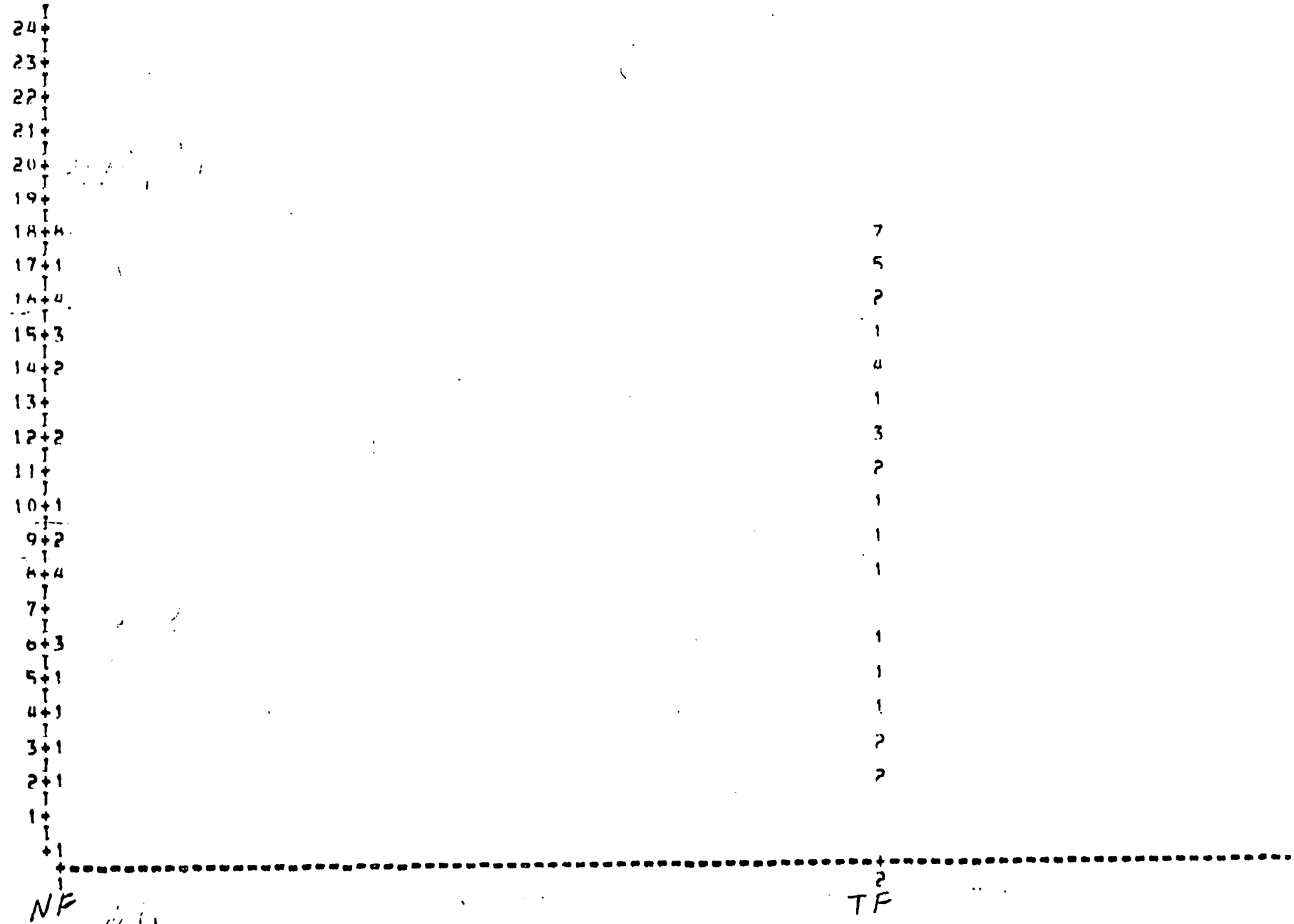

TABLE 2 SCATTERPLOT

= VAR # 13 VAR. NAME= LOC#CONT MEAN= 9.229 ST. DEV= 4.283 N= 7
= VAR # 5 VAR. NAME= F FORMAT MEAN= 1.500 ST. DEV= 0.5000 N= 7
0 CASES OMITTED - MD ID X OR Y 0 CASES OMITTED BY FILTER VAR # 0 (NO FILTER FOR THI
TNFILT= 0 MAXFILT= 0 WEIGHT VAR= 0 PEARS. R= 0.2201 REG. STAT= A = 6.40000

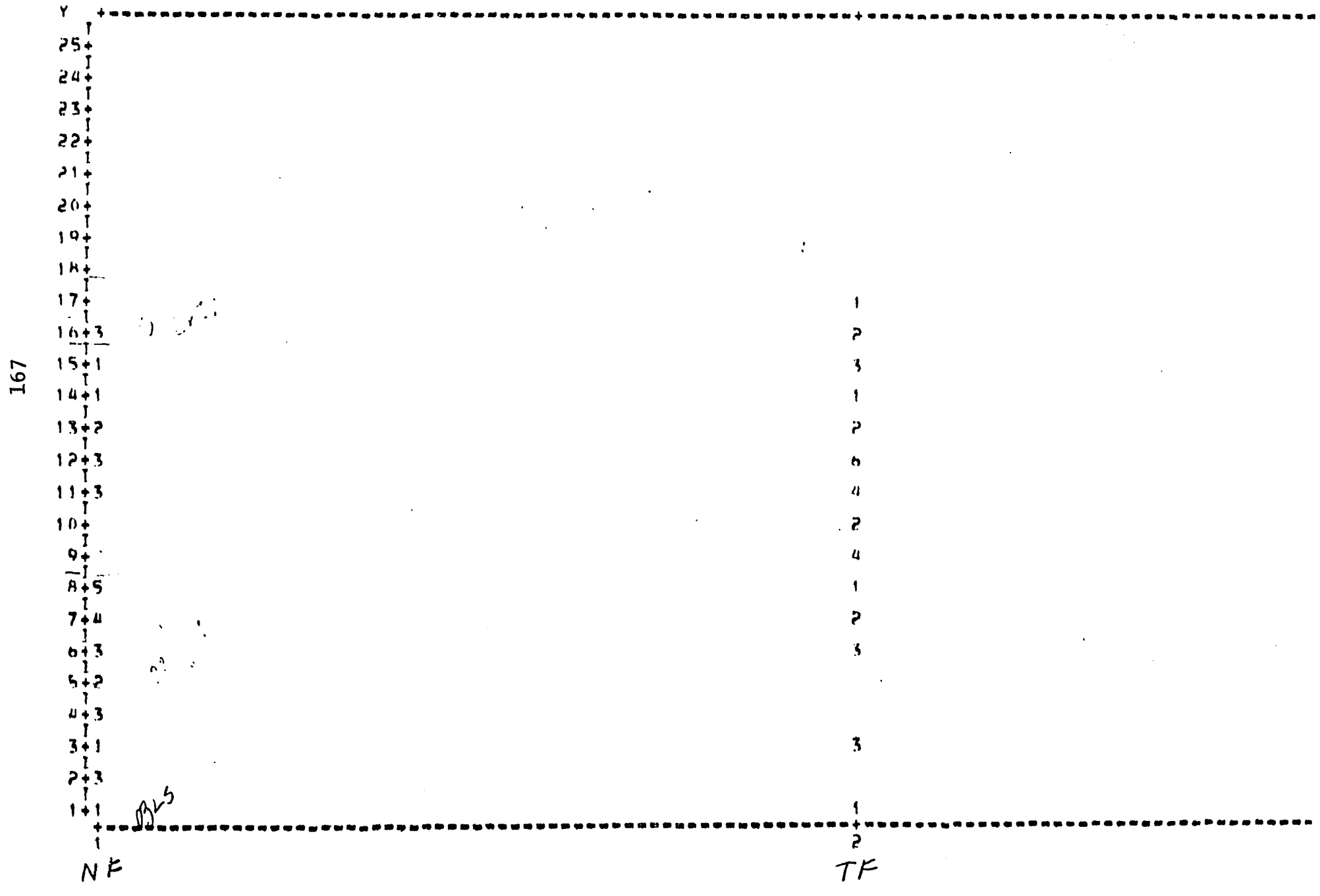

TABLE 3 SCATTERPLOT

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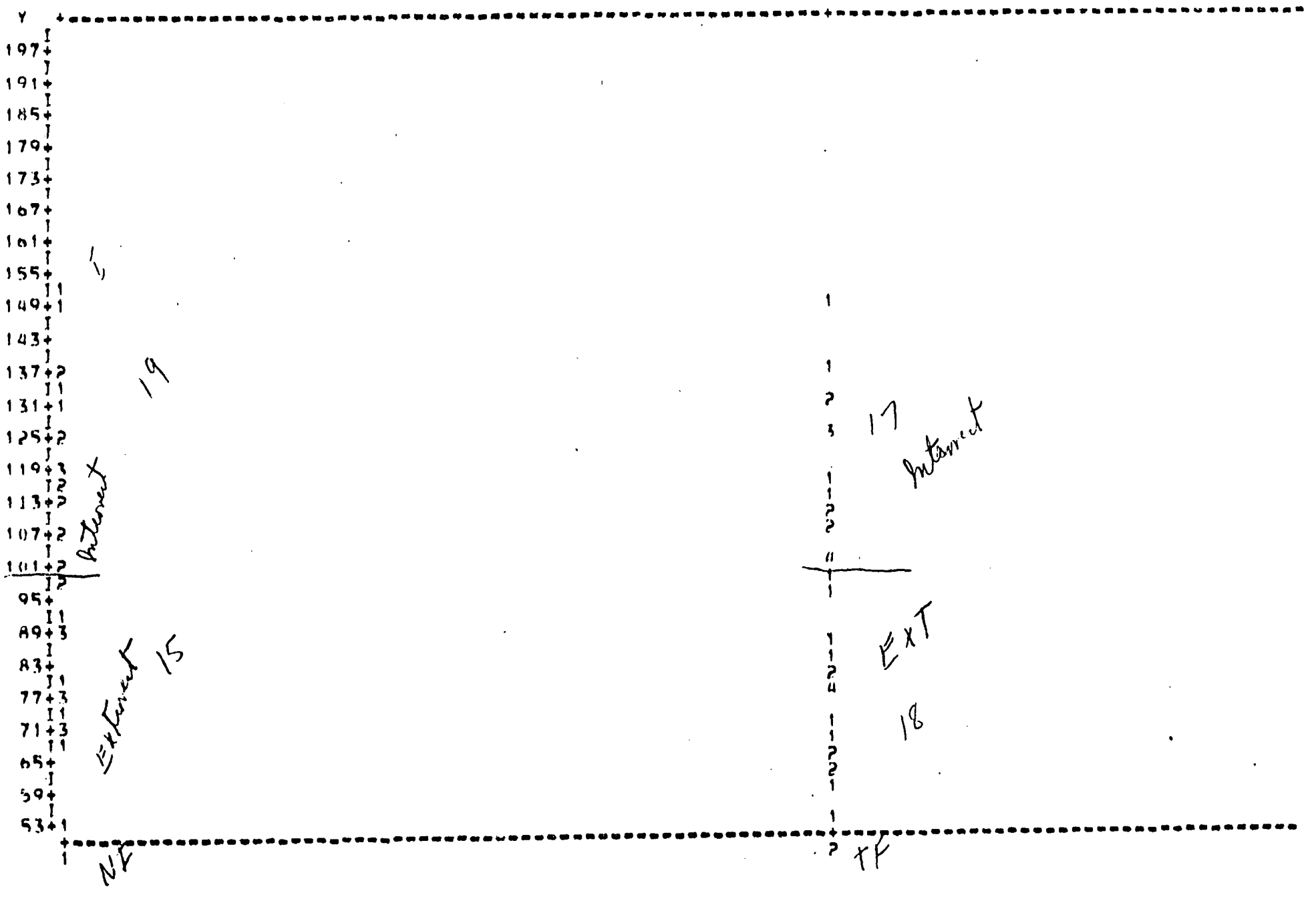

TABLE 4 SCATTERPLOT

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X= VAR # 5 VAR. NAME=E FORMAT MEAN= 1.500 ST. DEV= 0.5000 N= 7
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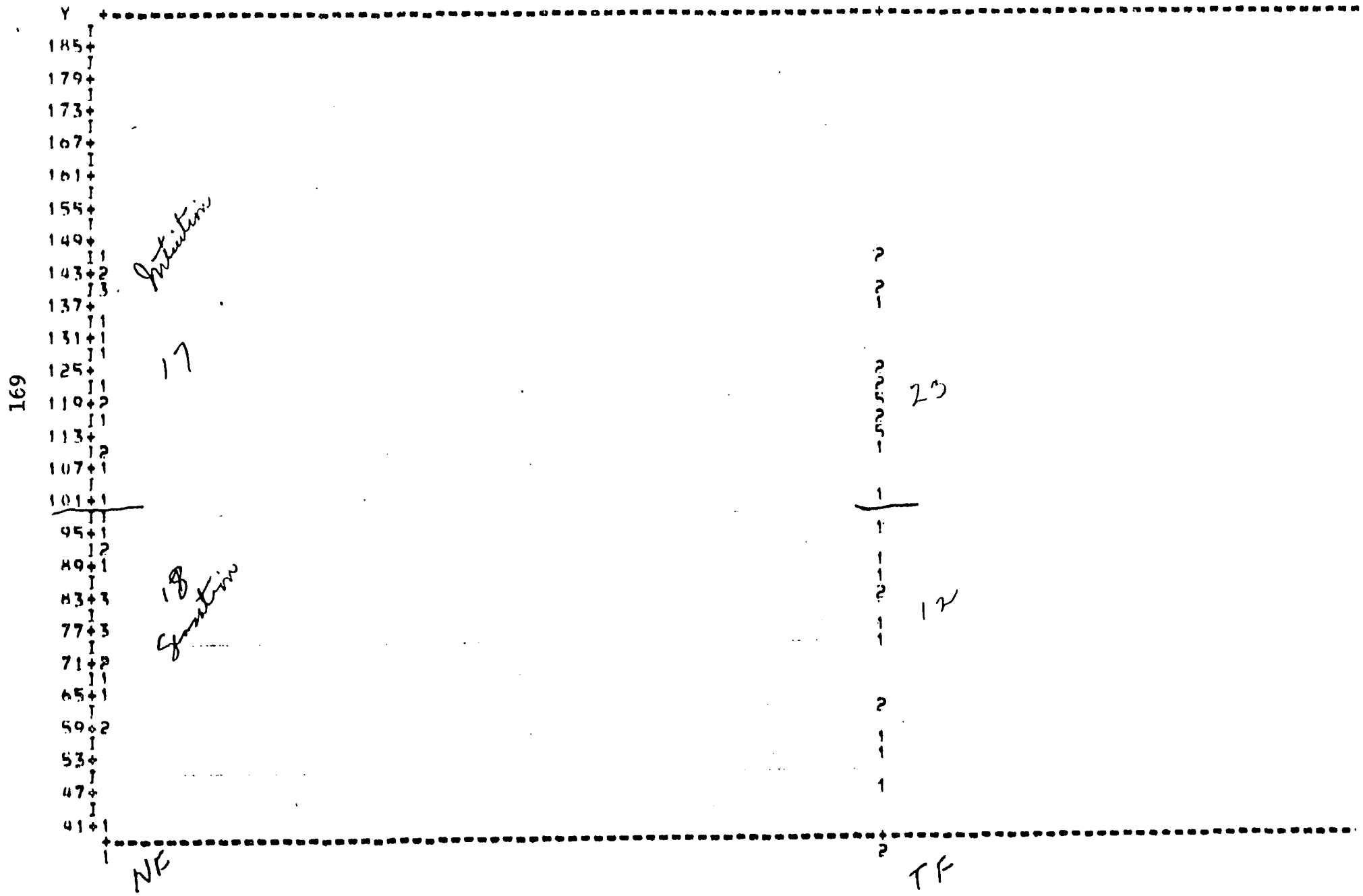

169

TABLE 5 SCATTERPLOT

Y= VAR # 16 VAR. NAME=TF COUNT MEAN= 98.71 ST. DEV= 23.35 N= 7
X= VAR # 5 VAR. NAME=F FORMAT MEAN= 1.500 ST. DEV= 0.5000 N= 7
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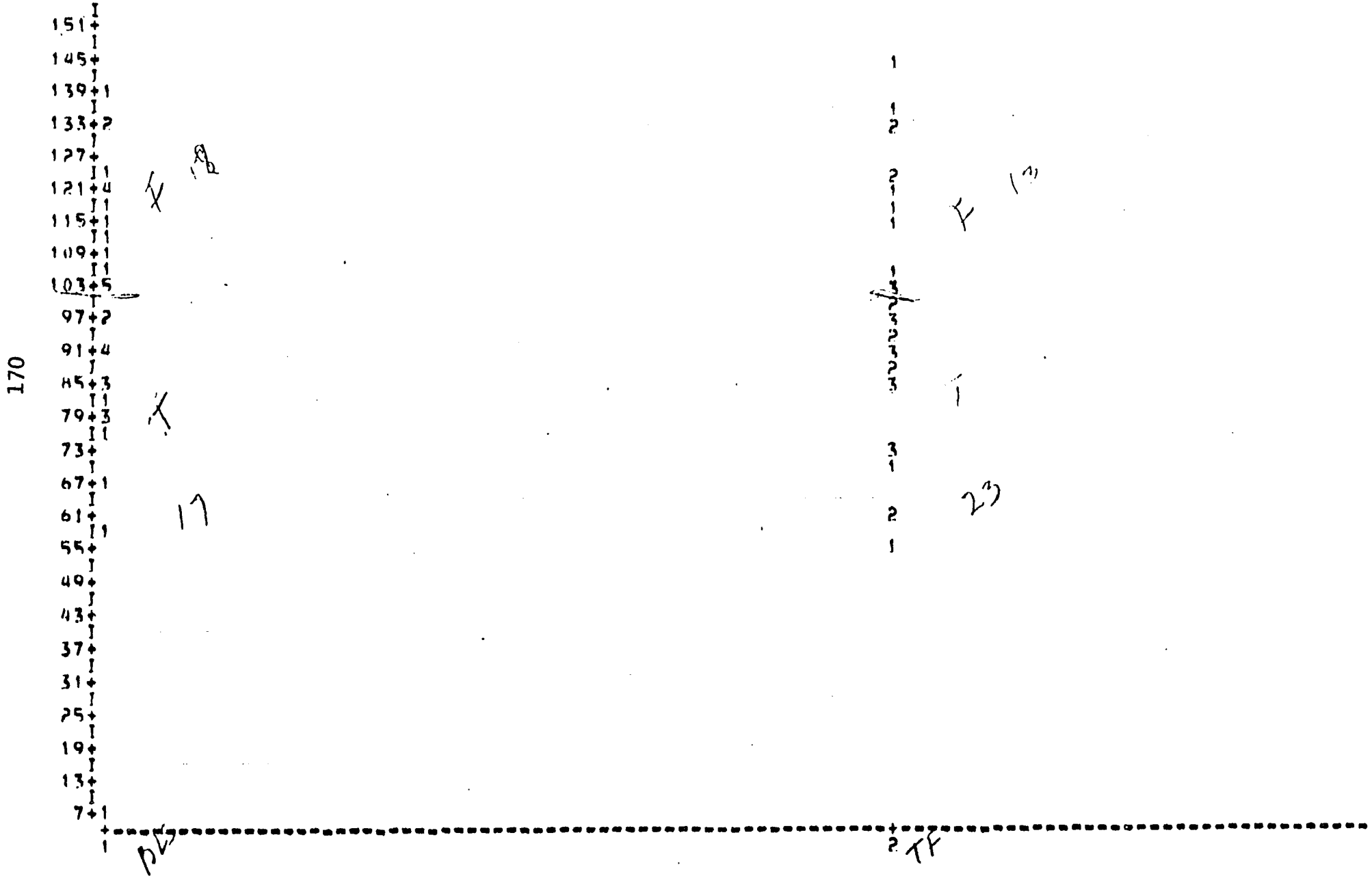

TABLE 6 SCATTERPLOT

Y= VAR # 17 VAR. NAME=JP CONT MEAN= 94.14 ST. DEV= 28.35 N= 7
X= VAR # 5 VAR. NAME=E FORMAT MEAN= 1.500 ST. DEV= 0.5000 N= 7
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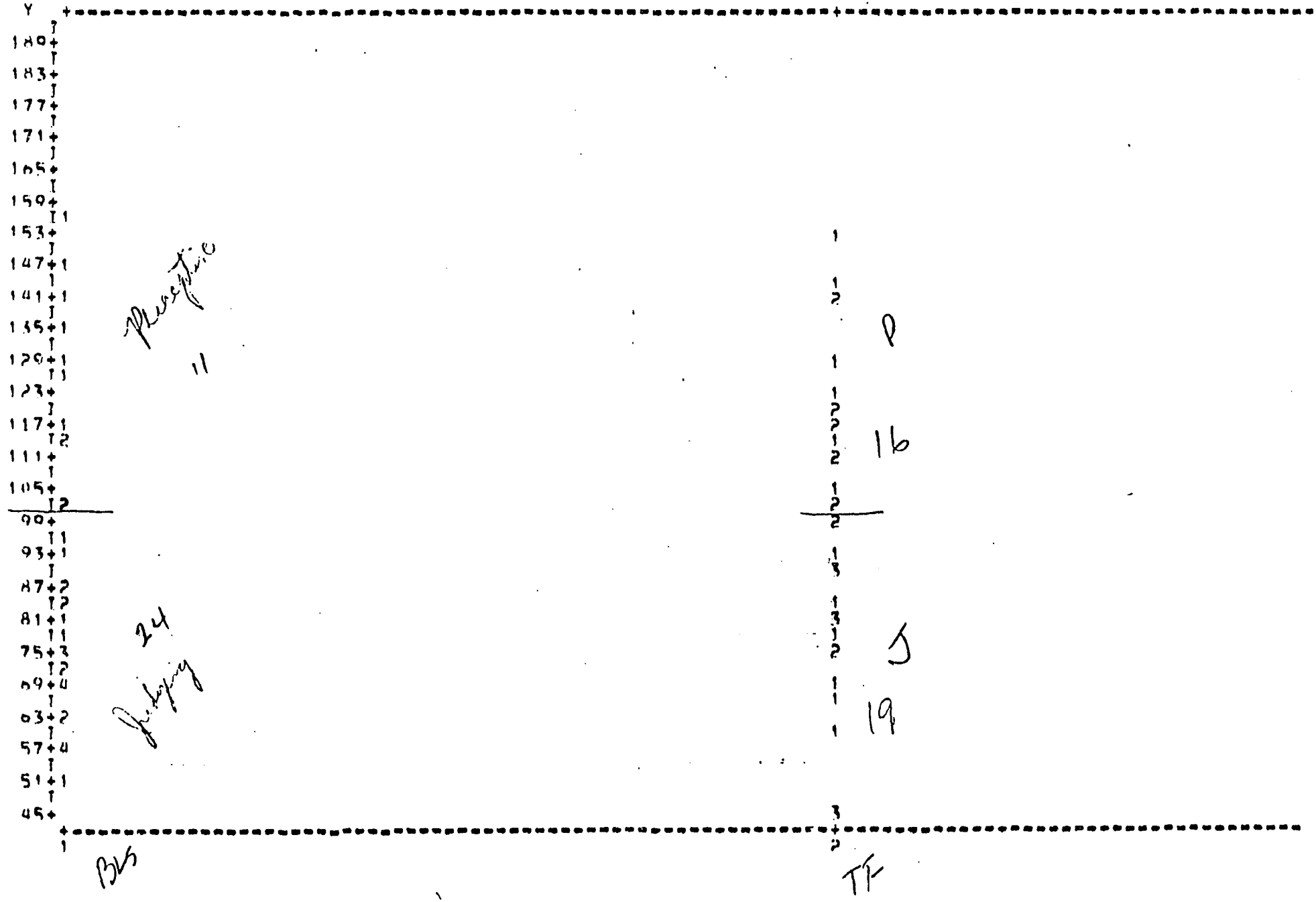

RAW DATA

RAW DATA

Subj No	Format	Sex	Age	GEFT Cat	GEFT Cont	LOC Cat	LOC Cont	MBTI EI Cat	MBTI EI Cont	MBTI SN Cat	MBTI SN Cont	MBTI TF Cat	MBTI TF Cont	MBTI JP Cat	MBTI JP Cont
1	Trad	F	23	F/I	17	N	10	E	81	N	121	F	119	P	117
2	Trad	F	23	F/D	02	I	08	I	111	N	117	F	135	P	101
3	Trad	F	23	N	09	N	09	E	63	S	91	F	103	J	91
4	Trad	F	41	F/I	17	I	06	I	103	N	103	F	105	J	69
5	Trad	M	28	N	14	N	12	E	78	N	119	T	95	P	145
6	Trad	M	25	F/I	18	N	09	E	77	S	95	F	101	P	129
7	Trad	F	24	F/D	06	E	17	I	127	N	123	F	135	J	91
8	Trad	F	24	N	10	N	10	E	95	N	115	T	63	J	85
9	Trad	M	23	N	14	N	11	E	69	N	121	T	63	J	67
10	Trad	M	26	F/I	17	N	12	E	79	N	113	T	99	J	83
11	Trad	F	43	N	12	I	06	E	71	S	63	F	145	P	121
12	Trad	F	28	F/D	04	N	12	E	53	S	47	T	89	J	61
13	Trad	F	37	F/D	03	N	11	I	101	S	57	F	121	J	45
14	Trad	F	31	F/I	16	N	9	E	79	N	121	T	57	J	93
15	Trad	M	24	N	13	EXT	16	I	111	S	77	T	85	P	121

RAW DATA

Subj No	Format	Sex	Age	GEFT Cat	GEFT Cont	LOC Cat	LOC Cont	MBTI EI Cat	MBTI EI Cont	MBTI SN Cat	MBTI SN Cont	MBTI TF Cat	MBTI TF Cont	MBTI JP Cat	MBTI JP Cont
16	Trad	M	28	F/D	08	N	11	E	99	S	75	T	75	P	103
17	Trad	M	23	F/I	18	N	9	I	131	N	147	T	87	P	105
18	Trad	M	25	N	12	N	13	I	117	N	123	F	125	P	153
19	Trad	M	33	N	14	INT	1	I	137	N	117	F	107	P	101
20	Trad	F	30	F/D	02	INT	3	E	85	N	113	F	125	J	81
21	Trad	F	25	F/I	18	N	12	I	103	S	63	T	93	J	47
22	Trad	M	23	N	12	EXT	16	I	103	N	115	F	117	P	125
23	Trad	F	23	F/D	3	N	14	E	67	S	83	T	95	J	79
24	Trad	M	23	F/I	17	I	6	E	63	S	55	T	87	P	111
25	Trad	F	23	F/I	17	N	11	I	127	N	147	T	89	P	119
26	Trad	F	24	F/I	18	I	3	I	109	N	111	F	105	P	115
27	Trad	F	23	N	11	I	7	I	113	N	125	F	137	J	77
28	Trad	F	23	F/D	05	I	7	I	149	N	125	F	101	J	77
29	Trad	F	42	F/I	15	I	3	E	87	N	140	T	97	J	81
30	Trad	M	27	F/I	18	N	15	E	65	N	113	T	71	P	103

RAW DATA

Subj No	Format	Sex	Age	GEFT Cat	GEFT Cont	LOC Cat	LOC Cont	MBTI EI Cat	MBTI EI Cont	MBTI SN Cat	MBTI SN Cont	MBTI TF Cat	MBTI TF Cont	MBTI JP Cat	MBTI JP Cont
31	Trad	F	23	F/I	16	N	13	I	127	N	141	T	93	J	143
32	Trad	F	29	N	14	N	12	E	81	N	139	T	75	P	113
33	Trad	F	25	F/I	18	N	15	E	59	S	87	T	97	J	47
34	Trad	M	23	F/I	18	N	12	I	107	N	121	T	91	J	91
35	Trad	M	23	N	11	N	15	I	131	S	83	T	75	P	143
36	Nontrad	M	59	F/I	16	E	16	I	117	N	119	F	107	J	75
37	Nontrad	F	44	F/D	6	N	13	E	93	N	111	F	109	J	97
38	Nontrad	F	35	F/D	4	N	11	I	117	S	67	T	67	J	95
39	Nontrad	M	26	F/D	8	E	16	I	139	N	141	T	81	P	115
40	Nontrad	F	60	F/I	18	N	11	I	121	N	145	F	133	J	69
41	Nontrad	F	34	F/I	15	I	8	I	127	N	133	T	87	J	89
42	Nontrad	M	38	F/I	17	I	5	E	75	S	83	F	125	J	69
43	Nontrad	F	23	F/I	18	I	8	I	115	N	109	T	99	J	85
44	Nontrad	M	45	N	10	I	2	I	139	S	95	T	81	J	75
45	Nontrad	F	37	N	12	I	7	I	151	S	71	F	121	J	79

RAW DATA

Subj No	Format	Sex	Age	GEFT Cat	GEFT Cont	LOC Cat	LOC Cont	MBTI EI Cat	MBTI EI Cont	MBTI SN Cat	MBTI SN Cont	MBTI TF Cat	MBTI TF Cont	MBTI JP Cat	MBTI JP Cont
46	Nontrad	F	31	F/I	18	I	1	I	109	S	79	F	105	J	77
47	Nontrad	F	37	F/I	15	I	6	I	115	N	117	T	77	J	59
48	Nontrad	M	40	F/D	2	I	7	I	109	S	99	F	135	J	85
49	Nontrad	M	33	F/I	18	I	6	I	119	N	141	T	97	P	127
50	Nontrad	F	35	F/I	18	I	2	E	81	N	147	F	113	P	137
51	Nontrad	F	53	N	14	I	8	I	135	S	85	T	87	J	83
52	Nontrad	M	27	N	12	I	5	E	79	N	123	T	91	P	117
53	Nontrad	F	43	F/D	8	I	4	E	91	S	79	T	91	J	69
54	Nontrad	F	52	F/I	18	I	2	I	133	S	93	T	83	P	103
55	Nontrad	M	55	F/D	8	I	4	E	71	N	119	T	97	J	57
56	Nontrad	F	47	F/D	5	I	6	E	53	N	135	T	85	P	149
57	Nontrad	M	49	F/I	17	I	5	I	103	S	61	T	79	J	53
58	Nontrad	F	43	F/I	15	E	15	E	69	N	111	F	103	J	87
59	Nontrad	M	24	F/I	16	N	11	E	99	N	103	F	103	P	115
60	Nontrad	F	33	N	14	N	14	I	127	S	83	T	91	P	141

RAW DATA

Subj No	Format	Sex	Age	GEFT Cat	GEFT Cont	LOC Cat	LOC Cont	MBTI EI Cat	MBTI EI Cont	MBTI SN Cat	MBTI SN Cont	MBTI TF Cat	MBTI TF Cont	MBTI JP Cat	MBTI JP Cont
61	Nontrad	M	40	F/I	16	N	10	I	151	N	145	F	141	P	151
62	Nontrad	M	62	F/I	16	E	16	I	153	S	41	T	59	J	73
63	Nontrad	F	31	F/D	6	N	13	E	77	S	89	F	123	J	57
64	Nontrad	F	34	F/I	16	N	12	E	73	S	71	F	119	J	73
65	Nontrad	F	46	F/D	0	N	12	E	99	N	141	F	103	J	65
66	Nontrad	F	56	N	9	I	7	E	91	N	129	F	121	P	103
67	Nontrad	F	43	F/I	18	N	12	E	79	N	143	F	117	P	157
68	Nontrad	M	38	F/D	6	I	7	I	101	S	93	F	103	J	65
69	Nontrad	F	50	F/D	3	I	3	I	119	S	61	F	121	J	59
70	Nontrad	M	43	F/D	9	I	8	E	71	S	69	F	139	P	129