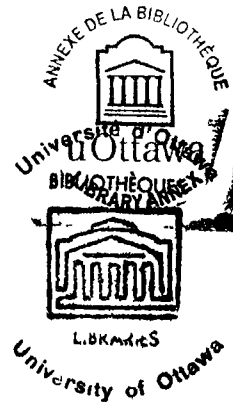


THE RELATIONSHIP BETWEEN PSYCHOLOGICAL
DIFFERENTIATION AND ACHIEVEMENT IN
ADULT BASIC EDUCATION

by: Rose Ann Reid

Thesis submitted to the School of Graduate Studies
of the University of Ottawa, as partial fulfillment
of the requirements for the degree of M.A. (Ed.)



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CURRICULUM STUDIORUM

Rose Ann Reid was born January 29, 1945 in St. Catherines, Ontario. She received the degree of Bachelor of Science in Psychology from Acadia University, Wolfville, Nova Scotia in 1963.

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INTRODUCTION

This research represents an attempt to study the relationship between certain perceptual/personality factors and achievement in adult basic education (ABE). One prominent investigator in the area of perception, personality and cognition has been Herman A. Witkin.

Witkin and his associates have been able to demonstrate consistent individual differences in perceptual functioning. That is, there appears to be a continuum in individual ability to perceptually separate a part from its surrounding visual field. Persons who can perform such tasks efficiently are "field independent" while those at the other end of the continuum are "field dependent". Degree of field dependency is considered to reflect the individual's extent of "psychological differentiation". This perceptual trait seems to be associated with performance in other areas of psychological functioning such as personality and cognition.

Further research has indicated that when individuals are matched for degree of differentiation, they tend to evaluate each others' personalities and cognitive abilities more positively than do those involved in a mismatch.

The present study, based on Witkin's theory of psychological differentiation, will attempt to elucidate the effects of matches and mismatches in field dependency on student achievement in adult basic education. It is hoped that the following question will be answered:

Is there a difference in marks assigned to students by their teachers which is related to the interaction of the level of field dependence - independence of these individuals?

Towards this end, the study is presented in the following order. Chapter One deals with Witkin's research and his statement of the psychological differentiation theory. Chapter Two presents research relevant to this theory and also outlines the hypotheses. The methodology of the experiment is to be found in Chapter Three. The succeeding chapter presents the data. The results of the study are discussed in Chapter Five. The final chapter contains a summary and the conclusions of the study as well as suggestions for further research.

CHAPTER I

THEORETICAL RATIONALE

Witkin's psychological differentiation hypothesis provides the theoretical rationale for this study. Chapter One will outline the development and nature of his theory.

Witkin's original experiments ^{1,2,3,4} dealt with locus of control in spatial orientation of the upright. He and his associates wanted to determine the relative dominance of postural/gravitational factors and visual clues in perception of the upright. They were able to conclude that:

1 S.E. Asch and H.A. Witkin, "Studies in Space Orientation: I. Perception of the Upright with Displaced Visual Fields", Journal of Experimental Psychology, Vol. 38, No. 3, June 1948, p. 325-337.

2 -----, "Studies in Space Orientation: II. Perception of the Upright with Displaced Visual Fields and with Body Tilted", Journal of Experimental Psychology, Vol. 38, No. 4, August 1948, p. 455-477.

3 H.A. Witkin and S.E. Asch, "Studies in Space Orientation: III. Perception of the Upright in the Absence of a Visual Field", Journal of Experimental Psychology, Vol. 38, No. 5, October 1948, p. 603-614.

4 -----, "Studies in Space Orientation: IV. Further Experiments in Perception of the Upright with Displaced Visual Fields", Journal of Experimental Psychology, Vol. 38, No.6, December 1948, p. 762-782.

Under everyday circumstances, when a 'strong' visual field is present, the perceived upright is determined with relation both to the axes of the visual field and to the impressions received from the body, although visual factors tend to play a dominant role.⁵

Of more importance, however, was the evidence of individual differences in mode of perception. Some persons were relatively dependent on the visual field while others tended to rely on bodily sensations. In addition, the individual's mode of perception tended to remain constant over a variety of orientation situations and there was some indication that it was related to other aspects of psychological functioning.

Witkin and his associates embarked on a further series of experiments designed to research both the consistency and the basis of individual differences in perception.^{6,7} In his studies, Witkin used a variety of instruments - nine spatial orientation tests and seven non-orientation tests - to explore ability to overcome an embedding context. Among them were the Rod and Frame Test (RFT),⁸

5 H.A. Witkin et al., Personality Through Perception, New York, Harper, 1954, p. 8.

6 Ibid, xxvi - 571 p.

7 H.A. Witkin et al., Psychological Differentiation, New York, Wiley, 1962, xii - 418 p.

8 Ibid, p. 36 - 37.

the Tilting Room - Tilting Chair Test (TRTC)⁹ and the Embedded Figures Test (EFT).¹⁰

The apparatus for the RFT consists of a luminous square frame and a rod, both pivoted at the centre of the frame but independently movable, and a chair which can be tilted from side to side. The testing is done in the dark so that the subject can see only the rod and frame. There are three series of tests, with eight trials in each. In the first set, the subject and the frame are tilted to the same side at an angle of 28° . During the second series, the subject and the frame are tilted to opposite sides. Finally, the subject is left upright and the frame alternately tilted 28° left and 28° right. In each series, the rod is systematically set either in the same direction as the frame or to the opposite side. The subject's task is to instruct the examiner to adjust the rod to the subject's perceived vertical. His raw score on each series is the mean of the absolute deviations from the true upright. These can then be translated into standard scores based on age-sex norms; from this,

9 Ibid, p 37-39.

10 H.A. Witkin, "Individual Differences in Ease of Perception of Embedded Figures", Journal of Personality, Vol. 9, No. 1, September 1950, P. 1-15.

an RFT index, the mean of the standard scores for each series, can be computed. There are other methods of scoring the RFT, but Witkin does recommend using the absolute error.¹¹

A smaller portable model of the RFT has recently been developed.¹²

The apparatus for the TRTC test consists of a chair in a small "room", each of which can be tilted independently of the other. There are two parts to this test: the Room Adjustment Test, (RAT), and the Body Adjustment Test, (BAT). The RAT involves eight trials. During the first four, the room and chair are tilted to opposite sides; in the remaining four, both room and chair are pivoted in the same direction. In each case, the subject instructs the examiner to tilt the room until the subject perceives it as upright. The BAT is comprised of six trials, three of which are conducted with the chair and room in opposite directions and three with the room and chair tilted the same way. The subject is required to adjust the tilt of his chair until he perceives himself as upright. RAT and BAT indexes are computed in the same manner as the RFT index.

11 -----, 1962, Op. Cit. p.37.

12 P.K. Oltman, "A Portable Rod and Frame Apparatus", Perceptual and Motor Skills, Vol. 26, 1968, p. 503 - 506.

The RFT and TRTC tests seemed to measure the ability of an individual to resist the influences of environmental factors, such as visual cues, and to utilize gravitational cues in determining the upright. Witkin observed individual differences in ability to perform such tests. Some subjects seemed strongly affected by the surrounding field while others were able to perceptually separate themselves from it. Further, subjects who performed well on the RFT also tended to score well on the TRTC.

In order to continue studying perception of a part within a field, Witkin adapted the Embedded Figures Test (EFT) from the Gottschaldt Test of 1926. This enabled him to research a perceptual situation which did not involve the upright. The subject is shown a simple figure and then required to locate it when it is "embedded" in a more complex, coloured design. The subject's score is the mean amount of time taken to find the hidden figures. Again, Witkin found a "striking range of difference" in the ease with which subjects overcame the embedding context. As well, performance on the EFT was found to be correlated with scores on the RFT and BAT, especially for males. Individuals, who were able to perceive a part, such as rods, designs, their own bodies, as discrete from its field were designated "field independent" while those who could not do this efficiently were called "field dependent".

It was established that there was a continuum along the field dependence--field independence dimension with most individuals performing in the intermediate range. Mode of field approach was found to be relatively stable. Results such as this gave support to Witkin's notion that individual differences in perception were related to ability to overcome an embedding context.

While investigating individual differences in perception, Witkin and his associates came to the conclusion that mode of perception was related to certain personality patterns. Using interviewing techniques as well as Rorschach, Figure-Drawing, and Thematic Apperception Tests, they found, in general, that field dependent persons were less active in dealing with their environments, less aware of their inner lives, more fearful and less able to control aggressive and sexual impulses, and evaluated themselves more negatively than did their field independent counterparts. Field dependents subjects also tended to be more submissive to authority and to require more external support than did more analytic subjects.¹³ Further, it was found that young children tended to be more field dependent than did older children,¹⁴ indicating a relationship between field dependency

13 H.A. Witkin, 1962, Op. Cit., Chapters 10 - 13.

14 Ibid. Chapter 7.

and age. Males consistently performed better than females on the perceptual tasks.¹⁵

Further research of consistency in perception and personality led Witkin to formulate the psychological differentiation hypothesis. He states:

Specifically the differentiation hypothesis proposes an association among the characteristics of greater or more limited differentiation, identified in the comparison of early and later functioning in each of several psychological areas: degree of articulation of experience of the world, degree of articulation of experience of the self, reflected particularly in nature of the body concept and extent of specialized, structured controls and defenses. Implicit in this hypothesis is the view that greater inner differentiation is associated with greater articulation of experience of the world.¹⁶

In other words, Witkin hypothesizes that ontogenesis or psychological development is reflected in self-nonsel self differentiation. He expects young children to function in a relatively global fashion, that is, to view themselves as fused with their world. As they grow older, they learn to differentiate, to separate self from environment. This process of differentiation is supposed to be more extensive in certain individuals. That is, some people tend to

15 Ibid, Chapter 8.

16 Ibid, p. 16.

experience themselves and the world in an articulated, analytical manner. At the other end of the continuum are global individuals who have not achieved a discreteness of self. Witkin expects these tendencies to be reflected in other areas such as cognition, personality, controls, and defenses. The degree to which this analytical trait exists can be measured by the RFT, EFT, etc. A field independent performance indicates a differentiated, analytic mode of psychological functioning. It should be noted that in the literature pertaining to this trait, psychological differentiation is also referred to as cognitive style -- global or analytic, field articulation and mode of perceptual or field approach.

There is much research to support the differentiation hypothesis. It will be recalled that longitudinal and cross-sectional studies have revealed that young children are relatively field dependent and tend to become more field independent as they grow older.¹⁷ Individuals tend to retain their relative group positions concerning field dependency as they mature, thus indicating stability of field approach.¹⁸

17 Ibid, p. 374.

18 Ibid, p. 375.

Indeed, according to Witkin, test-retest correlations for adults on the RFT and EFT after a one to three year period were between .66 and .97¹⁹. Mode of field approach was stable even after major events such as marriage, divorce, surgery, psychotherapy and drug therapy.

Degree of psychological differentiation has been shown to have personality and cognitive correlates. In general, it can be said that people who do not resist the visual environment when performing perceptual tasks in the laboratory tend to be subject to environmental pressures elsewhere. Witkin notes the following traits to be characteristic of field independent individuals: they have well-articulated concepts of their bodies;²⁰ are better able to structure their experiences;²¹ are more aware of their own separate identities;²² are regarded by others as more socially independent; need other people less; are guided by an internal rather than an external frame of reference and are less aware of others' subtle social cues.²³ There is also some evidence that FD individuals may be superior in

19 Ibid, p. 370.

20 Ibid, Chapter 7.

21 Ibid, Chapter 6.

22 Ibid, Chapter 8.

23 Ibid, p. 156.

certain verbal skills, such as expressiveness.²⁴ Witkin sums this up by stating that, concerning field independent individuals:

...in general their attitudes, feelings, and needs are developed and discrete and do not easily become fused with the matrix of attitudes, feelings, and needs of others.²⁵

Witkin also reports that field independent subjects are superior at certain types of problem-solving, namely those requiring the individual to disembed a particular item from its context and restructure it. Many mathematical problems require this sort of solution. Haggard,²⁶ researching personality and academic achievement in gifted children, found that high achievers in spelling and grammar, subjects depending in large part on rote learning and verbal skills, tended to be passive, dependent upon others for direction, and reliant upon conformity and social techniques in order to gain acceptance. Although these children were not tested on any of the instruments which measure psychological differentiation, Witkins appears to accept the above personality characteristics as indicative of field dependence.²⁷

24 Witkin, 1962, Op. Cit., p. 188 - 203.

25 Ibid, p. 156.

26 Haggard, E.A., "Socialization, Personality and Academic Achievement in Gifted Children", School Review, Vol. 65, Winter, 1957, p. 388 - 414.

27 Witkin, 1962, Op. Cit., p. 200.

Similarly, high achievers in reading and arithmetic seemed more independent, assertive and self-reliant, which suggests field independence.

To summarize, Witkin and his associates articulated the psychological differentiation hypothesis. It postulates that psychological development is reflected in the ability to separate one's self from one's environment. This ability improves from childhood to adulthood and can be measured using tests such as the Rod and Frame Test or the Embedded Figures Test. Individuals who perform such tasks efficiently are known as field independent while those who cannot are field dependent. Field independent individuals tend to exhibit this trait in various ways. In comparison with field dependent persons, they are more independent of their surroundings. Field dependent individuals are more likely to fuse with their surroundings and be more affected by it. In addition, there was some indication that field independence is associated with success in solving analytic types of problems.

On the basis of the foregoing discussion, it is reasonable to state two theoretical expectations. They are:

- (1) there are cognitive correlates of field dependency which may predispose individuals towards success in certain academic areas;
- (2) there are personality correlates of field dependency which could influence interaction between individuals.

These theoretical expectations will be expanded in Chapter Two.

CHAPTER II

A REVIEW OF RELATED STUDIES

In Chapter Two, research pertaining to field dependency as it relates to variables such as personality, academic achievement, and teaching will be presented and discussed. The intention is to expand the theoretical background of the study and aid in the statement of pertinent, researchable hypotheses.

1. Field Dependency and Personality

Research subsequent to Witkin's formulation of the psychological differentiation hypothesis tends to confirm his belief that there are personality factors associated with field dependency. However, it is worth remembering his caution that although he considers his hypothesis to be supportable, the predicted relations are not expected to be of a very high order.¹

In general, people who do not resist the visual environment when performing perceptual tasks in the laboratory tend to be subject to environmental pressures elsewhere.

¹ H.A. Witkin et al., Psychological Differentiation, New York, Wiley, 1962, p.17.

For example, Rosner² and Crutchfield³ both found indications that field dependent individuals are more likely to conform to majority opinions than are field independent types. Rosner administered the EFT to conformers and non-conformers in an Asch-type group pressure situation. No significant time differences were found between the two groups. However, the conformers failed to locate the hidden figure significantly more often than did the non-conformers. Thus, it is possible that field dependent persons are more likely to conform to group pressure than are field independent persons.

Crutchfield, in another group pressure situation, found that businessmen who conformed to majority decisions concerning items such as perception, logic, attitude and opinion were those who tended to have personality traits indicative of field dependence. Similarly, individuals who were low in conformity were described in terms similar to those used to describe people who are field independent. Ambiguous judgements were most affected by group influence while matters of individual preference were least subject to it. It is to be noted that these men were not tested on any

2 Stanley Rosner, "Consistency in Response to Group Pressures", Journal of Abnormal and Social Psychology, Vol. 55, 1957, p. 145-146.

3 Richard S. Crutchfield, "Conformity and Character", American Psychologist, Vol. 10, 1955, p. 191-198.

of Witkin's perceptual measures. Rather, they were rated by personality scales and testing personnel who had not been apprised of the men's performances during the pressure situation. Witkin⁴ reports a further experiment by Crutchfield in which scores on the Gottschaldt embedded figures test were significantly related to degree of conformity. In this instance, RFT scores were not significantly correlated with conformity.

In a later publication, Witkin refers to several other studies which indicate that:

...in forming their attitudes on an issue, field dependent persons are especially prone to be guided by the positions attributed to an authority figure or peer group.⁵

For example, Linton⁶ found field dependence measured by the EFT and TRTC, to be significantly and positively related to conformity with an authority figure. Judgements concerning attitude and autokinetic movement were especially susceptible.

4 Witkin, 1962, Op. Cit., p. 151.

5 Herman A. Witkin, The Role of Cognitive Style in Academic Performance and in Teacher-Student Relations, Princeton, New Jersey, Educational Testing Service, February 1973, p. 8.

6 Harriet B. Linton, "Dependence on External Influence: Correlates in Perception, Attitudes and Judgement", Journal of Abnormal and Social Psychology, Vol. 5, 1955, p. 502 - 507.

She suggested that while field dependence and conforming behaviour appear to have a common element, the latter is probably the result of several variables rather than a single trait. Witkin⁷ reports an experiment by Sanguiliano in which he found field dependent individuals to be more suggestible than field independent persons. That is, they were more responsive to suggestions concerning olfactory, weight and visual perceptions.

Field dependent subjects have been shown to have a less consistent self-view, it tending to fluctuate with the environment.⁸ In other words, their identities are somewhat fused with their surroundings; when the environment is altered, so are their perceptions of themselves. Witkin reports an experiment carried out by Stark, Parker and Iverson, concerning performance of tasks under ego-enhancing/ego-threatening situations. From this research, Witkin concluded that

subjects with a global field approach tend to be influenced by the examiner's attitude toward them, while subjects with an analytical approach were relatively immune to such influence.⁹

7 Witkin, 1962, Op. Cit., p. 152.

8 Stanley A. Rudin and Ross Stagner, "Figure-Ground Phenomena in the Perception of Physical and Social Stimuli", Journal of Psychology, Vol. 45, 1958, p. 213 - 225.

9 Witkin, 1962, Op. Cit., p. 155.

This has been confirmed in a similar experiment by Konstadt and Forman.¹⁰ Both reports seem to demonstrate that field dependent individuals tend to fuse and change with the environment.

Various tendencies suggest that field dependent persons are more socially sensitive than are their field independent counterparts. For instance, it has been demonstrated that global persons prefer physical proximity to others, especially when uncomfortable.¹¹ Global children spend more time than analytic children do looking at others' faces^{12,13} and are better at remembering faces.¹⁴ According to Witkin, this is due to the fact that

10 Norma Konstadt and Elaine Forman, "Field Dependence and External Directedness", Journal of Personality and Social Psychology, Vol. 1, 1965, p. 490 - 493.

11 M.T. Justice, Field Dependence, Intimacy of Topic and Interpersonal Distance, unpublished Doctoral thesis presented to the University of Florida, 1969, in H.A. Witkin, 1973, Op. Cit., p. 38.

12 Konstadt and Forman, 1965, Op.Cit., p. 490 - 493.

13 Diane N. Ruble and Charles Nakamura, "Task Orientation versus Social Orientation in Young Children and their Attention to Relevant Social Cues," Child Development, Vol. 43, 1972, p. 471 - 480.

14 Samuel Messick and Fred Damarin, "Cognitive Styles and Memory for Face", Journal of Abnormal and Social Psychology, Vol. 69, No. 3, 1964, p. 313 - 318.

...field dependent persons, being in need of support and guidance from others, are particularly attentive to the facial characteristics and expressions which provide ready clues to other people's moods and attitudes.¹⁵

Globals are superior in the recall of socially-cued words.¹⁶ Witkin reports research by Thomas which found that field dependent children are more responsive to aggression in television programmes.¹⁷ They may also be superior in certain verbal skills such as expressiveness.¹⁸ These and similar findings have led Witkin to state that, in general:

...field dependent persons are particularly sensitive and attuned to the social environment. The result, overall, is a picture of highly developed social skills.¹⁹

Sex has been found to be related to field dependency; males tend to be more analytic than females.^{20, 21.}

15 Ibid, p. 313.

16 Morris Eagle et al., "Field Dependence and Memory for Social vs. Neutral and Relevant vs. Irrelevant Incidental Stimuli", Perceptual and Motor Skills, Vol. 29, 1969, p. 903-910.

17 Witkin, 1973, Op.Cit., p. 9.

18 Witkin, 1962, Op.Cit., p. 188 - 203.

19 Witkin, 1973, Op.Cit., p. 9.

20 Ibid, p. 6.

21 James Bieri et al., "Sex Differences in Perceptual Behaviour", Journal of Personality, Vol. 26, 1958, p.1-12.

There has been some controversy concerning the nature of the relationship between field independence and intelligence. Zigler,^{22,23} for example, contends that:

the empirical relationships between field dependence measures and many of the scores employed by Witkin are due to the common relationship between all these scores and general intelligence as defined by standard intelligence tests.²⁴

Witkin et al., maintain that perceptual field independence is related only to those items in intelligence tests which emphasize the ability to overcome embeddedness.²⁵ The standard examples requiring this sort of analysis are the block and design, picture completion and object assembly subtests of the Wechsler Intelligence Scale for Children, (WISC).

The argument concerning field dependence and intelligence is not resolved;²⁶ however, it is usually accepted that intelligence tests weighted on analytic ability will give field independent subjects an advantage.

22 Edward Zigler, "A Measure in Search of a Theory?" Contemporary Psychology, Vol. 8, 1963, p. 133 - 135.

23 Edward Zigler, "Zigler Stands Firm", Contemporary Psychology, Vol. 8, 1963, p. 459 - 461.

24 Edward Zigler, Op. Cit., p. 135.

25 Witkin et al., "Witkin et al. on Zigler on Witkin et al." Contemporary Psychology, Vol. 8, 1963, p. 363 - 365.

26 Kerry T. Yamada, Extent of Psychological Differentiation as Related to Intelligence, Doctoral thesis presented to the Faculty of Graduate Studies, University of Ottawa, Ontario, 1967, p. 95 - 96.

2. Field Dependency and Academic Achievement

There is considerable evidence linking field dependency and academic achievement. Witkin states:

Field dependence-independence has... been related to performance in different subject matter areas in school and in vocation chosen. It is especially impressive that a linkage between cognitive style and academic choice and achievement is already clearly evident as early in a student's academic career as the elementary and high school levels.²⁷

In general, field independent students are more likely to select and perform well in analytic subjects and vocations than are field dependent individuals.

As noted earlier, Haggard's study on gifted children indicates that high achievers in reading and arithmetic tended to be described as field independent while those showing signs of a global cognitive style tended to do well in spelling and grammar.

Witkin reports that Iscoe and Carden (1961) found, with boys, a significant correlation between reading ability and EFT scores ($r = .69$, $N = 16$). Scores for girls were in the same direction, but not statistically significant.²⁸

27 Witkin, 1973, Op. Cit., p. 14.

28 Witkin, 1962, Op. Cit., p. 200.

Stuart also found a correlation between field independence (EFT) and reading.²⁹ The correlations between scores on the EFT and Reading Grade Level Test were: $r = .59$ (boys) and $r = .45$ (girls), both significant at the $p < .01$ level. He suggested that scores on both tests were linked with intelligence.

Research by Bruininks with disadvantaged boys resulted in similar findings, but the correlation between scores on the children's version of the EFT and a test of reading achievement was lower ($r = .367$, $p < .05$).³⁰ Similarly, Severson found that behaviourally adjusted good readers, aged 10 - 15, obtained significantly higher scores on the EFT than did adjusted poor readers.³¹

29 Irving R. Stuart, "Perceptual Style and Reading Ability: Implications for an Instructional Approach", Perceptual and Motor Skills, Vol. 24, 1967, p. 135 - 138.

30 Robert H. Bruininks, "Auditory and Visual Perceptual Skills Related to the Reading Performance of Disadvantaged Boys", Perceptual and Motor Skills, Vol. 29, 1969, p. 179 - 186.

31 Roger Alfred Severson, "Some Nonreading Correlates of Reading Retardation", in Dissertations Abstracts Vol. 23, 1963, p. 2798.

A similar trend is evident in mathematics and science achievement. The field independent student tends to outperform the field dependent student. For example, Bowles found that ninth grade boys who were field independent, measured by Thurstone's Test of Closure Flexibility, had both higher classroom achievement in science and a better attitude toward science than did the field dependent boys.³² Similarly, Frehner reports that, at the sixth grade level, success in mathematics, measured by the mathematics subtests of the Metropolitan Achievement Tests, is significantly correlated ($p < .05$) with scores on the EFT. In addition, there was a general trend indicating that when effects of IQ, measured by the Otis-Lennon Mental Abilities Test, were partialled out, field independence is compatible with all areas of academic achievement, while field dependence is not.³³

Acker, researched four personality variables - achievement need, affiliation need, time perspective and field articulation, the latter measured by the Hidden Figures Test, CF 1 - which she theorized might be effective in measuring

32 Anna Bowles, Extent of Psychological Differentiation as Related to Achievement in Science and Attitude towards Science, Master's thesis presented to the Faculty of Graduate Studies, University of Ottawa, Ontario, 1973, 50 p.

33 Verl L. Frehner, "Cognitive Style as a Determinant of Educational Achievement among Sixth Grade Elementary School Students", in Dissertation Abstracts, Vol. 334, 1973, p. 3379.

both the cumulative grade point average (GPA) of high school seniors as well as performance on standardized academic achievement tests. This battery of tests did have predictive value; the multiple R's for G.P.A. ranged between .35 and .69 while the R's for the achievement tests varied from .37 to .66. Levels of significance were between .05 and .001. Of special interest was the finding that if the predictors were analyzed separately, superior academic performance was best predicted by the trait of field independence. In addition, field independence was more highly correlated with achievement need than affiliation need.³⁴

At the adult level, Bieri et al., report a significant correlation between scores on the EFT and those on the mathematics subtests of the Scholastic Aptitude Test. For males (N = 50), $r = .40$, $p < .01$ and for females (N = 62), $r = .45$, $p < .01$.³⁵ Stein confirmed that achievement in college science is related to field independence.³⁶ Holtzman

34 Mary Bryant Acker, The Relation of Achievement Need, Time Perspective, and Field Articulation to Academic Performance, unpublished Doctoral dissertation presented to the University of California, Berkeley, 1967, vi - 109p.

35 James Bieri et al., 1958, Op. Cit.

36 Franklin Stein, "Consistency of Cognitive, Interest, and Personality Variables with Academic Mastery: A Study of Field Dependence - Independence, Verbal Comprehension, Self-Perception, and Vocational Interest in Relation to Academic Performance among Male Juniors attending an Urban University", in Dissertation Abstracts, Vol. 29 A, 1968, p.1429.

et al. tested outstanding male students in art, architecture and engineering - all of which require a high degree of analytic ability - on the shortened version of the EFT. All three groups completed the test in considerably less time than does the general population.³⁷ Rosett found similar results with a group of 77 male engineering students.³⁸ Research by Barrett and Thornton confirms male engineers as significantly more field independent than either non-engineering male students or Witkin's standardization sample.³⁹ DeRussy and Futch report that liberal arts students are more global than those majoring in mathematics, physics and chemistry.⁴⁰ Unfortunately, their sample included only 8 males and 8 females.

Results such as these tend to confirm that persons who have chosen and are successful in analytical academic or vocational areas are apt to be field independent.

37 W.H. Holtzman et al., "Artists, Architects and Engineers: Three Contrasting Modes of Visual Experience and their Psychological Correlates", Journal of Personality, Vol. 39, 1971, p. 432 - 449.

38 Henry L. Rosett, "Personality and Cognitive Characteristics of Engineering Students: Implications for the Occupational Psychiatrist", American Journal of Psychiatry, Vol. 122, 1966, p. 1147-1152.

39 Gerald V. Barrett and Carl L. Thornton, "Cognitive Style Differences between Engineers and College Students", Perceptual and Motor Skills, Vol. 25, 1967, p. 789 - 793.

40 E.A. DeRussy and E. Futch, "Field Dependence - Independence as Related to College Curricula", Perceptual and Motor Skills, Vol. 33, 1971, p. 1235 - 1237.

3. Field Dependency and Teaching

As well as influencing personality and achievement, cognitive style seems to have an effect on various areas of teaching.

Teachers of analytic subjects such as science and mathematics are more likely to be field independent than are teachers of the humanities.⁴¹ Witkin has speculated on the possibility that individuals teaching an analytic subject at an advanced level may be more field independent than those teaching the same subject at a lower level.⁴²

Cognitive style may influence teaching strategy; Witkin⁴³ reports a study by Wu in which global teachers preferred discovery or discussion techniques while analytic teachers were more likely to lecture. It is also possible that the amount of knowledge acquired by students via the various teaching methods is somewhat related to degree of psychological differentiation. For example, Grieve and Davis found that while "neither cognitive style nor method of instruction had an overall effect on the acquisition of knowledge, ... extreme global males receiving the expository

41 Joseph J. DiStefano, Interpersonal Perceptions of Field Independent and Field Dependent Teachers and Students, unpublished Doctoral dissertation presented to Cornell University, Ithaca, New York, 1969, p. 39.

42 Witkin, 1973, Op. Cit., p. 27.

43 Witkin, Ibid, p. 27.

instruction experienced significant difficulty in acquiring knowledge... of Japan's geography."⁴⁴ As well, cognitive style as measured by the Hidden Figures Test (HFT) was found to be related to scores on a test of higher learning, namely, the application of acquired knowledge to new situations. That is, analytic subjects had less difficulty in applying their knowledge of geography than did global subjects. Again, extremely global male subjects who had received expository teaching had significant difficulty. The author states that "...the more global a male is, the more he is likely to benefit from discovery instruction which is designed to develop knowledge" ⁴⁵

Witkin reports a programme developed by Spitler in which he outlined two different approaches to teaching mathematics to field dependent and field independent students. The programme was designed to take advantage of the particular abilities and disabilities of these two types of students.⁴⁶

44 Torrance Don Grieve and J. Kent Davis, "The Relationship of Cognitive Style and Method of Instruction to Performance in Ninth Grade Geography", Journal of Educational Research, Vol. 65, 1971, p. 141.

45 Ibid, p. 141.

46 Witkin, 1973, Op. Cit., p. 31.

Thus, there is the possibility that, in some circumstances, field dependent teachers may use teaching methods that are particularly effective with field dependent students; the converse also applies. It is not suggested that this is a universal phenomenon; Witkin reports a study by Rennels in which both global and analytic students receiving training in spatial relations achieved superior results with an analytic approach compared with a global approach.⁴⁷ Results such as these give rise to speculation that the outcomes of instruction designed to exploit the peculiarities of cognitive style may be affected by the nature of the subject matter.

DiStefano found matches and mismatches in cognitive style between teachers and students to have implications for that interaction. Using the Hidden Figures Test (CF-1), his basic finding was:

people with similar perceptual styles tend to describe each other in highly positive terms, while people whose perceptual styles are different have a strong tendency to describe each other in negative terms.⁴⁸

47 Ibid. p. 29.

48 Joseph J. DiStefano, "Perceptual Biases in Subordinate-Superior Evaluation", Working Paper Series No: 43R, Research and Publications Division, School of Business Administration, University of Western Ontario, London, Ontario, March 1973, p. 4.

In his doctoral thesis, DiStefano had ten teachers (five from each end of the field dependence-independence continuum) describe eleven students selected at random. The students also described the teachers in question. Thus there were 220 sets of descriptions. Instruments used were 21 bipolar scales adapted from Osgood's Semantic Differential technique and 25 single adjective scales from the Peabody List. The CF - 1 was used to test field independence. It is to be noted that in justifying use of this instrument DiStefano quotes figures that actually refer to Witkin's EFT. They are not the same tests but are frequently interchanged. However, according to Arbuthnot,⁴⁹ the CF-1 is not an adequate substitute. In any case, the results showed that students and teachers tended to rate each other more positively on attributes such as fairness, rationality, intelligence, success, pleasantness, when matched for cognitive style than when mis-matched. Thus description of an individual was dependent upon the cognitive style of the observer and the one observed. Differences in evaluative descriptions between

49 Jack Arbuthnot, "Cautionary Note on Measurement of Field Independence", Perceptual and Motor Skills, Vol. 35, 1972, p. 479 - 488.

matched and unmatched pairs were accentuated if there were very large differences in psychological differentiation within the pair or if one of the pairs was extremely field independent.

It is unfortunate that the DiStefano sample was so small. However, two follow-up studies involving eleven sales managers, seventy-one salesmen and eight managers, seventy salesman respectively, revealed the same trends.⁵⁰ Thus cognitive style influences: (1) the way in which one perceives others; (2) the way in which one is perceived by others.

An interesting post hoc finding of DiStefano's 1969 doctoral research was that:

independent teachers gave their independent students significantly higher grades than their dependent students. Dependent teachers did not differentiate (or were unable to do so) between their grading of independent and dependent students. These results need to be interpreted cautiously, however, since the independent teachers were predominantly involved with science and mathematics courses where the higher analytic skill of the field independent students was directly related to the task on which they were evaluated and graded.⁵¹

50 Joseph J. DiStefano, March 1973, Op.Cit.

51 Ibid, p. 11.

It would be enlightening to research this post-hoc finding under the following conditions: (1) restrict the subject matter to one specific area in which there are both field dependent and field independent teachers; (2) employ Witkin's instrument to measure degree of psychological differentiation; (3) choose an educational facility in which there is a good deal of student-teacher interaction. Under these conditions, the effects of matched or mismatched levels of psychological differentiation could conceivably be observed. Not only could the researcher investigate the differences in marks received by analytic and global students from teachers with whom they are matched on psychological differentiation, but also analyze the differences in marks resulting from mismatches. It is conceivable that field dependent teachers might be inclined to mark field independent students relatively less harshly than field independent teachers would mark field dependent students. This is based on the contention that field dependent teachers are more likely to be influenced by their surroundings and thus have a greater awareness of the students' personal circumstances than field independent teachers. It is suggested that the field dependent teacher would be less likely to separate this awareness from his marking techniques than would the field independent teacher.

4 Summary

This review of the literature has dealt with three areas related to field dependency, namely, personality, academic achievement, and teaching.

Studies pertaining to field dependency and personality indicate that there are certain traits associated with global/analytic cognitive styles. In general, field independent individuals show a greater tendency than field dependent persons to resist the influences of their environments.

Research concerning the influence of field dependency on academic achievement seems to indicate that a field independent style is compatible with all areas of study while field dependent individuals are disadvantaged in analytic subjects such as mathematics and science.

Cognitive style was also found to pervade the area of teaching. Analytic teachers are more likely to lecture whereas global teachers tend to prefer discussion or discovery techniques. There was some indication that students could acquire different amounts and types of knowledge through these methods, depending upon degree of psychological differentiation.

Finally, the cognitive styles of teacher and student seem to interact, with a match producing positive descriptions of each other, and a mismatch being associated with mutually negative evaluations. It is possible that marks assigned to

students by their teachers could reflect this interaction of cognitive style.

5. Hypotheses

As a result of the information generated by the review of the relevant literature, it is possible to restate the expectations of this research in terms of the following hypotheses:

I. Field independent students taught mathematics by field independent teachers receive a higher mean mark than field independent students being taught by field dependent teachers.

II. Field dependent students taught mathematics by field dependent teachers receive a higher mean mark than field dependent students being taught by field independent teachers.

III. The difference in mean mathematics marks between field independent and field dependent students assigned by field independent teachers is greater than the difference in mean marks between field independent and field dependent students assigned by field dependent teachers.

In summary, these hypotheses will be stated in symbolic terms. In the following contingency table, μ represents the mean mathematics mark for cell ij .

TABLE 1

Contingency Table for μ_{ij}
Students

		F1	FD
Teachers	F1	μ_{II}	μ_{ID}
	FD	μ_{DI}	μ_{DD}

In terms of these symbols, the hypothesized relations may be stated as follows:

$$\text{I} \quad \mu_{II} > \mu_{DI}$$

$$\text{II} \quad \mu_{DD} > \mu_{ID}$$

$$\text{III} \quad \mu_{II} - \mu_{ID} > \mu_{DI} - \mu_{DD}$$

It is also anticipated, and established by previous research, that, regardless of teacher, the field independent students should outperform the field dependent students in mathematics.

6. Adult Basic Education

The foregoing discussion has focused on Witkin's theory of psychological differentiation. The area of Adult Basic Education (ABE) is one in which there is much student-teacher interaction and therefore could be an adequate arena in which to test the hypotheses. In addition, little is known concerning the reasons for success and failure among ABE students; conceivably, the concept of psychological differentiation could provide a partial explanation. Thus

for both theoretical and pragmatic reasons, the hypotheses will be tested in an ABE setting.

ABE has been defined as:

...instruction in communicative, computational and social skills for those adults whose inability to effectively use these impairs their getting or retaining employment commensurate with their real ability, in order to lessen or eliminate such inability, raise their level of education and enable them to become more productive and responsible citizens.⁵²

That is, ABE is usually considered to be the upgrading of academic and social skills in educable adults so that they become employable or eligible for training in a specific skill.

Most research which has been done in this area pertains to course discontinuation or "dropping out". Some of these studies are relevant because of the relationship between discontinuation and poor achievement.⁵³ One of these studies reported that the results of research concerning dropping-out

52 Putman, John F., and W.D. Chrismere, compilers, Standard Terminology for Instruction in Local and State School Systems: An Analysis of Instructional Content, Resources and Processes, Office of Education, U.S. Department of Health, Education and Welfare, Washington D.C., 1967, quoted by Robert M. Smith et al., "editors", Handbook of Adult Education, The MacMillan Company, London, 1970, p. 407.

53 Fitzsimmons, Stephen J. et al., "School Failures: Now and Tomorrow", Developmental Psychology, Vol. 1, No. 2, 1969, p. 135.

of adult education courses have been contradictory and inconclusive.⁵⁴ There were indications that low income and a low level of prior education were related to a higher incidence of dropping out. It should be noted that the populations of these studies were not completely analogous to the population of the present research. In addition, the research concerning level of prior education did not include significance tests.

Brooke recently surveyed dropping-out in a population highly similar to the one involved in this study. He investigated variables such as age, prior education, personality and situational factors, and course adjustment. Significant differences (at the 0.05 level) were found in the following areas:

1. Continuers (C) had repeated fewer grades during prior formal schooling than had discontinuers (D);

- 2 C had had better rapport with teachers in Grades 6 and above than had D;

- 3 C had had more friends during formal schooling than had D;

54 Verner, Coolie and G.S. Davis, "Completion and Drop-Outs": A Review of the Literature", Adult Education, Vol. 14, No. 3, 1964, p. 157-176.

4. C had had better relations with his family of origin than had D;

5. C had better relations with his present family than D;

6. C reported a more positive reaction concerning teacher co-operation and colleague adjustment during the course than did D.⁵⁵

Unfortunately, there were no adequate instruments available to measure the above tendencies; it was necessary for Brooke to construct his own and therefore there are no validity or reliability reports available.

Regardless, the import of Brooke's study was that drop-outs had more problems in interpersonal relationships both during the course and prior to it. He suggests that "...a crucial group of variables that distinguish D from C are those that pertain to the ability to relate satisfactorily to others".⁵⁶ It is too much to expect that all patterns of unsatisfactory relationships are due to mis-matched field dependency. However, as has been previously discussed, individuals matched for extent of psychological differentiation

55 Brooke, W. Michael, An Investigation of Certain Factors Contributing to Dropping-Out in an Ontario Adult Basic Education Program, unpublished Doctoral thesis presented to the Faculty of Education, University of Toronto, Ontario, 1973, vii - 242 p.

56 Ibid, p. 152.

do tend to relate to each other more positively than do those involved in a mismatch. Thus, there is a possibility that if this factor of satisfactory interpersonal relationships is operational in the discontinuation of students in ABE courses, it may also exist in achievement patterns and could reveal itself in field dependency - independency interactions.

CHAPTER III

DESIGN OF THE EXPERIMENT

Chapter Three will present the experimental design used to test the research hypotheses. It will focus on the research instruments, the population sample, and the experimental procedure employed.

1. Research Instruments

Oltman's Portable Rod and Frame Test (PRFT),¹ was selected to assess degree of psychological differentiation. Teacher-assigned marks were the measure of the dependent variable, student achievement.

(a) Portable Rod and Frame Test. Oltman developed this test to overcome the restrictive properties of Witkin's RFT. The former test is more economical, easier to transport, and does not require a darkened room.

The apparatus consists of a base and an enclosure. At one end of the base (24" x 36") is a moveable disc, 22 inches in diameter. The other end is essentially a chin rest. The interior side of the moveable disc is covered with white

1. P.K. Oltman, "A Portable Rod and Frame Apparatus", Perceptual and Motor Skills, Vol. 26, 1968, p. 503 - 506.

acrylic plastic and has a 3/8" x 11" black strip, the "rod", centred on it. A protractor, enabling the deviation from the upright to be measured to the nearest half degree, is mounted on the other side.

The removeable enclosure, made of translucent white acrylic plastic, resembles a rectangular (12" x 24") box with open ends. These ends are circular frames (22" diameter) whose 12 inch square centres have been removed. The enclosure is placed on rollers in the base so that it can be rotated smoothly in either direction. The rod and enclosure can thus be tilted independently of each other. The complete apparatus is placed on a level table.

The subject is seated on a chair with his feet together on the floor and his hands folded in his lap. When his head is properly placed in the chin-rest, his vision is restricted to the interior of the enclosure and the acrylic-covered disc with the rod. Only the third series of the original RFT is used.

The subject's task is to inform the experimenter when he perceives the rod as being vertical. Complete instructions, as given by Oltman, are in Appendix 3. However, there were two variations from the usual procedure: (1) since there was no curtain on this particular model of the PRFT, subjects were asked to close their eyes between trials; (2) verbal instructions had to be modified according to individual student

fluency in English. To overcome the fact that some students were not fluent in English, all subjects were allowed to inspect the machinery and received explicit instructions concerning the concept of verticality. Prior to administration of the test, it was ascertained - by pre-test, if necessary - that the subjects understood that the absolute, rather than the relative vertical was desired.

The final PRFT score was the average of absolute deviations over the eight trials. A sample score sheet is in Appendix 3.

Correlations between scores on the RFT and the PRFT are high. Oltman reports r 's of .89 for females ($N = 83$) and .90 for males ($N = 80$). Spearman - Brown split-half reliabilities were .95 on the PRFT and .96 on the RFT. Correlations between the EFT and both tests were also similar (RFT: $r = .56$; PRFT: $r = .60$)². The PRFT is thus an adequate substitute for the RFT. It does yield smaller mean errors from the vertical than does the RFT.

2 Ibid. p. 503 - 506.

The reliability of the original RFT is adequate. After a one-year interval, Witkin found test-retest correlations to be .88 for males (N = 32) and .75 for females (N = 30).³ Bauman,⁴ using the same subjects, reported similar results after three years (males: $r = .84$; females: $r = .66$) as did Adevai and McGough,⁵ retesting after 4 years (males only: $r = .86$; $p < .001$).

Even higher reliability coefficients have been established with the PRFT. McCarrey, Dayhaw and Chagnon have reported an r of .85 with thirty adult subjects after a two-week interval.⁶ Shugart et al., at the junior high level, found a correlation of .98 after fifteen months⁷ and Lyle, using student nurses, relates an r of .97 after one month.⁸ Thus, the reliability of the PRFT is suitable for the purposes of this research.

3 Witkin et al., Psychological Differentiation, New York, Wiley, 1962, p. 370.

4 Ibid, p. 370.

5 Greta Adevai and W. Edward McGough, "Retest Reliability of Rod and Frame Scores During Early Adulthood", Perceptual and Motor Skills, Vol. 26, 1968, p. 1306.

6 Michael W. McCarrey et al., "Attitude Shift, Approval Need and Extent of Psychological Differentiation", Journal of Social Psychology, Vol. 84, 1971, p. 141 - 149.

7 Betty J. Shugart et al., "Relationship between Vertical Space Perception and a Dynamic Non-Locomotor Balance Task", Perceptual and Motor Skills, Vol. 34, 1972, p. 43 - 44.

8 Robert C. Lyle, personal communication.

The validity of the PRFT is more difficult to substantiate. The concept of psychological differentiation grew out of the test rather than the reverse. As previously noted, there are significant correlations between scores on the RFT and traits which are presumed to reflect extent of psychological differentiation.⁹ Researchers in the field accept the RFT and PRFT as having adequate validity for measurement of field dependence - independence. In fact, Witkin himself advocates the use of the RFT, time permitting.¹⁰ Otherwise, he uses the EFT and figure-drawing techniques. Arbuthnot, studying the various measures of field dependency, advises using two instruments chosen from the RFT, Witkin's EFT or Jackson's shortened EFT. If only one is to be used, he suggests that it be the RFT, since certain characteristics of the other two tend to heighten test anxiety.¹¹

In summary then, Oltman's Portable Rod and Frame Test appears to provide an adequate measure of field dependency.

(b) Teacher-assigned marks: Teacher-assigned marks were used to measure student performance in mathematics. The

9 Witkin et al., 1962, Op. Cit., p. 115 - 176.

10 Witkin, "Psychological Differentiation and Forms of Pathology", Journal of Abnormal Psychology, Vol. 70, 1965, p. 324.

11 Jack Arbuthnot, "Cautionary Note on Measurement of Field Independence", Perceptual and Motor Skills, Vol. 35, 1972, p. 479 - 488.

prime purpose of this study was to investigate student-teacher interaction as reflected in teachers' evaluations of the students. It seems logical that this effect would be more readily apparent in teacher assigned marks than in those scores resulting from standardized achievement tests. In addition to this, the results of a standardized test would likely reflect the diverse educational backgrounds of adult basic education students more than it would the student-teacher relationship. Teachers' marks are not always noted for their reliability; however, as stated by Cooper, "marks are ...real measures of performance in school. Standardized achievement tests, although they may have high internal reliability, do not always measure performance in school".¹² In practical terms, teacher-assigned marks are the criteria on which students pass or fail.

As will be explained later, the sample was drawn from the academic upgrading divisions of two Ontario Colleges of Applied Arts and Technology, namely Algonquin and George Brown Colleges.

¹² Martin Cooper, Cattell's Personality Factors as Predictor's of High School Performance, Doctoral thesis presented to the Faculty of Education, University of Ottawa, Ontario, 1972, p. 81.

2. The Research Sample

The various Ontario Colleges of Applied Arts and Technology have established academic upgrading divisions in an effort to provide academic credentials to individuals whose previous educational attainment had been less than an Ontario Grade 12 certificate. Generally these are pragmatic programmes focusing on mathematics, science, communications skills, and often, a social science elective. Although it is possible for students to pay their own minimal fees, most of them are funded by the Federal Department of Manpower and Immigration or some other government agency.

It had been hoped that a large sample of academic upgrading teachers and students would be available for the research. Due to practical difficulties which proved impossible to surmount, only two samples, both small in numbers, could be located. These were at Algonquin College and George Brown College.

To be accepted as part of the sample, it was necessary for the student to have attended the upgrading program long enough to have completed at least one grade level in mathematics and to have received a final score from a teacher who was also available for testing.

(a) Algonquin College: Algonquin College is situated in a middle-sized city peopled largely by government and allied workers. Fifty-two students and 14 teachers comprised the sample. This was, in fact, the total population fitting the research criteria at the time of the study. For reasons noted in Chapter Two, only male students were used. It was necessary to test both male and female teachers in order to obtain adequate numbers. The students varied in age between seventeen and forty-nine; the majority were in their late teens or early twenties. Prior educational attainment ranged from practically nil to Grade 10.

Students fit in one of the following educational categories:

- | | |
|---------|---|
| Level 0 | Grades 0 - 4 inclusive; |
| Level 1 | Grades 5 - 8 inclusive, subdivided into grades 5 - 6 and 7 - 8; |
| Level 2 | Grades 9 - 10, each separately identifiable; |
| Level 3 | Grades 11 - 12, each separately identifiable. |

Students in Grades 1 - 8 inclusive write standard tests before passing on to the next level; however, actual assignment of the final mark is left to the discretion of the teachers. In Grades 9 - 12, the classroom teachers set their own tests and assign their own marks.

The administrative marking scheme at Algonquin College is as follows:

- A Excellent: Consistently outstanding performance;
- B Superior: Accomplishment decidedly above the required level;
- C Satisfactory: Achievement sufficient to enable the student to progress with confidence in that subject;
- D Marginal: A minimum acceptable level of achievement;
- F Unsatisfactory: Insufficient achievement;
- IN Incomplete: Failure to complete subject requirements while progress is otherwise satisfactory.

There are no numerical marks associated with these letter grades.

(b) George Brown College: As opposed to the population at Algonquin, George Brown College draws its students from the downtown area of a large industrial city. In terms of age, variety of ethnic background and financial support, the George Brown students were similar to those at Algonquin. However, due to practical problems and different academic procedures at this institution, only students from grades nine and ten fit the criteria established for the purposes of the research. This resulted in a total of thirty-four subjects: 31 students and 3 teachers. Thus the sample was numerically inadequate and no use was made of the data from George Brown College.

3. Collection of Data

Names of prospective subjects were drawn from class lists. Due to the limited number available for testing, all possible subjects were asked to participate. With very few exceptions, they agreed to do so.

The PRFT was administered privately during school hours. Marks of the students and names of the teachers who had assigned them were retrieved from administrative records. These PRFT and achievement scores are shown, by teacher, in Appendices 1 and 2.

Collection of data took place during May, June and July.

4. Establishment of Performance Groups

It was decided that there would be three criterion groups, reflecting degree of psychological differentiation. Thus, there would be a field independent group, an average group and a field dependent group. The extreme groups would each represent approximately 25% of the total sample, with the average group comprising about 50%. This was done in an effort to assure that the extreme groups were relatively independent.

5. Quantification of Marks

The college administration issues only descriptive terms, such as consistently outstanding performance, in defining a letter grade. It was essential to translate these into numerical marks in order to analyze them. In the absence of

other details, it was necessary to assume equal intervals between letter grades. Thus A was assigned a score of 5; B of 4; C of 3; D of 2; F of 1.

This chapter has dealt with the research instruments, the population sample and the experimental procedures employed to test the hypotheses. The results of the experimentation will be presented in Chapter Four.

CHAPTER IV

PRESENTATION OF DATA

Chapter Four consists of a description of the data which resulted from the methods described in the preceding chapter.

1. Presentation of Data

The PRFT scores are presented in Appendix 1.

Table II shows the mean, median and standard deviation scores on the PRFT for the student, teacher, and total samples.

TABLE II
Mean, Median and Standard Deviations
of PRFT Scores

Sample	N	Mean	Median	Standard Deviation
Teachers	14	3.49	2.38	3.98
Students	52	2.46	1.69	2.39
Total	66	2.67	1.72	2.84

The dependent variable scores (mathematics achievement) assigned to students by their respective teachers are detailed in Appendix 2. Examination of those scores reveals a distribution normal enough to allow the use of analysis of variance in the statistical treatment.

As stated in Chapter III, the sample was split into approximate quarters in order to form the criterion groups. There were eighteen individuals (3 teachers, 15 students) with a mean error over 8 trials of 1.19 or less; this appeared to be a logical group to define as field independent. At the other end of the continuum, the eighteen subjects (7 teachers, 11 students) who had mean error scores over 8 trials of 2.94 or greater were designated as the field dependent group. The remaining thirty subjects (4 teachers, 26 students) were defined as "average" in PRFT performance.

The dependent variable scores (mathematics achievement) were translated into numerical values as follows: A = 5; B = 4; C = 3; D = 2; F = 1. These scores were then placed into the appropriate cells in the following 3 x 3 table.

TABLE III

Dependent Variable Scores

		Students		
		Field Independent (FI)	Average (Av.)	Field Dependent (FD)
Teachers	FI	5, 2	5, 5, 4, 4, 3, 3	3, 3, 3, 1
	Av.	5, 4	5, 5, 4, 4, 3, 3, 3, 2, 2, 1	3, 3
	FD	5, 4, 4, 4, 4, 4, 4, 4, 3, 3, 2	5, 4, 4, 4, 3, 3, 3, 3, 3, 2	4, 4, 3, 3, 2

The frequencies, mean scores and standard deviation of the raw data presented in Table III can be summarized as follows:

TABLE IV

Frequency, Mean and Standard Deviation
for each Cell

		Students		
		FI	Av.	FD
FI		N = 2	N = 6	N = 4
		M = 3.50	M = 4.00	M = 2.50
		S.D. = 1.50	S.D. = 0.82	S.D. = 0.87
Teachers	Av.	N = 2	N = 10	N = 2
		M = 4.50	M = 3.20	M = 3.00
		S.D. = 0.50	S.D. = 1.25	S.D. = 0.00
FD		N = 11	N = 10	N = 5
		M = 3.73	M = 3.30	M = 3.20
		S.D. = 0.75	S.D. = 0.80	S.D. = 0.75

As can be seen from cell six which has zero dispersion, there was no homogeneity of variance. Homogeneity of variance is an assumption which must be met prior to the performance of analysis of variance. Thus, this statistical treatment could not be carried out. Other statistical analyses, such as the Kruskal - Wallis test, were considered but could not be attempted due to the low cell frequency. Therefore, a descriptive analysis of the data was undertaken.

2. Descriptive Analysis of the Data

It will be noticed that the mean error for the total sample on the PRFT was 2.67. As anticipated, this is a smaller error than might be expected using the standard RFT.¹ It is also possibly a function of the explicit directions given the subjects and is similar to the results obtained by Weitz² (mean error = 1.60) using a similar technique.

The teachers obtained a higher mean score (3.49) than did the students (2.55). That is the teachers appear to be more field dependent than their students.

1 P.K. Oltman, "A Portable Rod and Frame Apparatus", Perceptual and Motor Skills, Vol. 26, 1968, p. 503 - 506.

2 Jacqueline Weitz, Cultural Change and Field Dependence in Two Native Canadian Linguistic Families, Doctoral dissertation presented to the Faculty of Education, University of Ottawa, Ontario, 1971, x - 166 p.

Table V details the mean dependent variable scores of field independent versus field dependent students.

TABLE V
Mean Dependent Variable Scores

Sample	N	Mean	Standard Deviation
FI Students	15	3.80	.91
FD Students	11	2.91	.79

That is, FI students attained higher mathematics scores than did FD students. The difference was .89. This does not imply significant differences between the means. Nonetheless, it is in accord with the existing research concerning the relationship between psychological differentiation and achievement in analytical subjects.

Table VI outlines the relationship between the psychological differentiation of the mathematics teachers and the marks assigned by them to their students.

TABLE VI
Mean Mathematics Scores
Assigned by FI and FD Teachers

Sample	N	Mean Score	Standard Deviation
FI Teachers	3	3.42	1.19
FD Teachers	7	3.50	0.80

The difference between these mean scores was 0.08, demonstrating that there was very little difference between FI and FD teachers in the overall marks they assigned to their students.

The main objective of this study was to investigate the results of the interaction of psychological differentiation between students and teachers. The mathematics achievement scores of the FI and FD students, when paired with their teacher counterparts are as follows:

TABLE VII

Achievement Scores Resulting from Various FI-FD
Combinations among Students and Teachers

		Teachers	
		FI	FD
Students	FI	3.50	3.72
	FD	2.50	3.20

Both FI and FD teachers assigned higher marks to FI students than to FD students. Field dependent teachers assigned slightly higher mean marks to FI students than did FI teachers. This mean difference was .22. Hypothesis I which states that the FI student - FI teacher combination corresponds to a higher mean achievement score than does the FI student - FD teacher combination, is not supported.

On the other hand, FD students received a considerably higher average mark from FD teachers than they did from FI teachers. Thus, hypothesis II, that the FD student - FD teacher combination is associated with higher student achievement than is the FD student - FI teacher combination, is supported by the data. Again, caution is advised in accepting and interpreting these results.

It is to be noted that although Table VI indicates no support for the notion that FI and FD teachers might give different overall scores to their students, Table VII suggests that, perhaps when dealing with extremely field dependent or independent students, there could be different results. With these extreme groups, FD teachers seem to give higher overall marks than do FI teachers. Thus, in reference to hypothesis II, it is difficult to ascertain whether the difference in marks was due to the match in psychological differentiation between student and teacher or whether FD teachers tend to give higher marks.

Hypothesis III suggested that the difference in the mean marks given to FI and FD students by FI teachers would be greater than the difference in mean marks between FI and FD students assigned by FD teachers. The direction of the expected relationship was as follows:

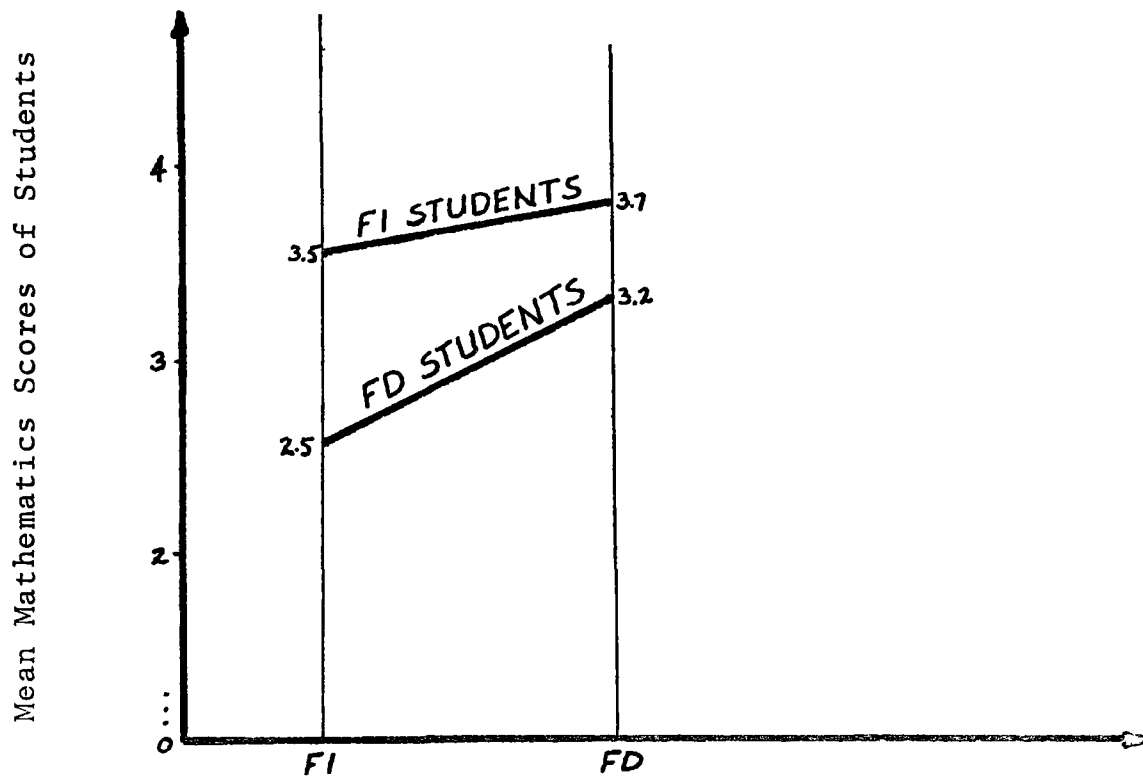
$$\mu_{II} - \mu_{ID} > \mu_{DI} - \mu_{DD}$$

If the raw mean scores are substituted in the above, the following is the result:

$$\begin{aligned}\mu_{II} - \mu_{ID} &= 3.50 - 2.50 \\ &= 1.00 \\ \mu_{DI} - \mu_{DD} &= 3.72 - 3.20 \\ &= .52\end{aligned}$$

Thus, there was a grade point difference in the mean marks assigned to FI and FD students by FI teachers and a difference of one-half mean grade point when rendered by FD teachers. In both cases, the field independent students received higher mean scores.

These results are shown graphically as follows:



Psychological Differentiation of Teachers

The above graph demonstrates ordinal interaction. Thus hypothesis III is supported by the data

Chapter IV has consisted of the presentation of data. The following chapter will discuss the results of the experiment.

CHAPTER V

DISCUSSION OF RESULTS

Chapter Five consists of a discussion of the results of the study. These results will be compared to those of related studies which were reviewed in Chapters One and Two.

It appears that mathematics teachers in the Adult Basic Education programme are more field dependent than the student population. It is possible that the small number of teachers involved might have resulted in a distortion of the mean error; on the other hand, the teachers may, in fact, tend to be inherently more field dependent. That finding is partially explained by the fact that many of the teachers were not mathematics specialists but had been seconded from other subject areas, some of them non-analytic. In addition, several teachers were former elementary school personnel who might, according to Witkin, be more likely to be FD than would high school mathematics teachers.¹ The suggestion that the teachers are more field dependent than their students is strengthened by the medians shown in Table II.

1. Herman A. Witkin, The Role of Cognitive Style in Academic Performance and in Student-Teachers Relations, Princeton, New Jersey, Educational Testing Service, February 1973, p. 27.

Field independent students received higher mathematics scores than did FD students. This finding is in accord with research already reviewed indicating that FI students tend to outperform FD students in analytical areas. (Haggard, 1957; Bowles, 1973; Frehner, 1973; Bieri, 1958; Holtzman et al., 1971; Rosett, 1966; Barrett and Thornton, 1967).

FI and FD teachers did not appear to assign different average marks. However, if only the field independent and field dependent groups of students are taken into consideration, then field dependent teachers seem to be more lenient in marking. This is consistent with Witkin's contention that field dependent individuals are more sensitive to and more likely to be influenced by the environment than are field independent persons. (Witkin, 1962, 1973). In this case, it is suggested that the FD teacher is influenced by his awareness of the difficulties facing ABE students and cannot separate this awareness from his marking techniques. Apparently this tendency is stronger than any effects of the FI student and FI teacher match. Field independent teachers, being less influenced by their environments, are more likely to mark solely on the basis of student performance. This is of particular disadvantage to FD mathematics students. The existence of these tendencies in FD and FI teachers explain the rejection of hypothesis I that:

$$\mu_{II} > \mu_{DI}$$

and the failure to reject hypothesis II that:

$$\mu_{DD} > \mu_{ID}$$

Concerning the match and mismatch of level of psychological differentiation between teachers and students, the graph in the previous chapter indicates interactive effects. As noted earlier, FI students receive a higher mean mark than FD students regardless of the psychological differentiation of the teachers. As well, both types of students receive higher mean marks from FD than from FI teachers. However, the increase in mean mark from FD teachers is more pronounced when there is a match with FD students. This offers support for DiStefano's contention (1973) that persons with similar perceptual styles tend to describe each other in positive terms while those with differing perceptual styles tend to describe each other in negative terms. This contention, in fact, led to the formulation of the hypotheses of the present study.

It is suggested that this study be repeated with an adequate sample. Should statistical analysis confirm the present findings, there are certain implications for educational practice. For instance, teachers should be aware of the effects their personalities can have on others and vice versa. Under certain conditions, such as very poor

achievement, it might be advisable to match students and teachers for extent of psychological differentiation. However, this would not be universally practical, both in terms of administrative problems, and the fact that students must learn to adapt to all types of personalities, not just those with whom they are matched. A firm recommendation on this count awaits knowledge of the effects of field dependency on academic learning as well as interpersonal relationships.

Perhaps the most important realization is that teachers' evaluations of students are partly determined by their own and the student's extent of psychological differentiation. This should be taken into account when teachers assess and relate to students and vice versa. This problem is partially avoided by a programmed approach to education; however, it is conceivable that even with programmed learning, field dependent and field independent students could benefit by different types of presentation.

This chapter has consisted of a discussion of the results of the experiment as well as its implications for educational practice.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Chapter VI comprises a summary of this research, its limitations and its conclusions. This is followed by suggestions for further related research.

The present study is an outgrowth of Witkin's psychological differentiation theory which postulates psychological correlates of the ability to distinguish the upright in the absence of a normal visual field. DiStefano (1969, 1973) has found that individuals matched for level of psychological differentiation tend to evaluate each other more positively than do those involved in a mismatch. It is reasonable to propose that the effects of such a match or mismatch between student and teacher could be reflected in student marks.

After careful consideration of the elements involved, the following hypotheses were stated:

I. Field independent students taught mathematics by field independent teachers receive a higher mean mark than field independent students being taught by field dependent teachers.

II. Field dependent students taught mathematics by field dependent teachers receive a higher mean mark than field dependent students being taught by field independent teachers.

III. The difference in mean mathematics marks between field independent and field dependent students assigned by field independent teachers is greater than the difference in mean mathematics marks between field independent and field dependent students assigned by field dependent teachers.

It was also anticipated that, regardless of teacher, FI students would outperform FD students in mathematics.

The hypotheses were investigated at the academic upgrading division of an Ontario College of Applied Arts and Technology. Fifty-two students and 14 teachers were involved. All were tested on the PRFT; dependent variable scores, student mathematics marks, were retrieved from administrative files.

Data resulting from the testing were not amenable to regular statistical treatments and a descriptive analysis was therefore undertaken. The results were as follows:

I. Hypothesis I was not supported by the data. FI students receive a higher mean mark from FD teachers than they do from FI teachers.

II. Hypothesis II was supported by the data. FD students receive a higher mean mark from FD teachers than they do from FI teachers.

III. Hypothesis III was supported by the data. The difference in mean mathematics marks between FI and FD students is greater when assigned by FI teachers than when assigned by FD teachers.

As expected, FI students outperform FD students in mathematics, regardless of the teacher's level of psychological differentiation.

Previous research has established that FD individuals are more aware of their interpersonal environments and less able to separate themselves from this than are FI persons. Thus, FD teachers, being more aware of the difficulties faced by their students, might take this into account when assigning marks. This is a possible explanation for the fact, that in hypotheses I and II, FD teachers assigned higher marks than did FI teachers.

Interactive effects of matched and mismatched cognitive styles, as indicated by the failure to reject hypothesis III, offers support for DiStefano's contention that persons matched for cognitive style tend to evaluate one another more positively than do those involved in a mismatch. In terms of student marks, the FD student - FI teacher mismatch would be the most inopportune.

The study is limited by its small sample size and the resultant lack of statistical analyses.

The findings of this study give rise to several suggestions for further research. It would be interesting to repeat it with an adequate sample and to include other subject areas. This would provide further information concerning matches and mismatches in field dependency in relation to different academic areas.

It would also be enlightening to substitute standardized achievement tests in place of teacher-assigned marks as the dependent variable. This would allow the experimenter to deal with "pure" achievement rather than the teacher's perception of it and might elucidate other academic effects of matching degree of psychological differentiation. It would permit further investigation of differential effects of mathematics teaching by FI and FD individuals. For example, one type of teacher might tend to emphasize different aspects of mathematics.

It will be difficult to duplicate this experiment in a College of Applied Arts and Technology Academic Upgrading Division since most of them are discarding the traditional teaching and marking methods. Instead, a unit system or individually programmed instruction and its pass/fail (and repeat) results are being instituted. Thus, teacher-assigned scores will not be available. However, given the close student-teacher working relationship in an ABE situation, the personality interactions of field dependency will still occur and should be investigated, both in terms of mutual personal evaluation and learning outcomes. The experiment could also be repeated in other academic settings where there is sufficient student-teacher interaction, for example, in a high school setting or with small college classes.

Finally, from a practical point of view, further research should be conducted into the reasons for success and failure in Adult Basic Education. Post-industrial living may require the focus in ABE classes to shift from vocational and academic training towards behavioural and personal adaptation to increased leisure time. Personality interaction between students and teachers will assume even more importance under these circumstances and thus should be a focus of research. It is feasible that Witkin's psychological differentiation theory could be a useful tool in explaining certain important behaviours occurring under these conditions.

This chapter has summarized the present study, presented its conclusions and offered suggestions for further research.

ANNOTATED BIBLIOGRAPHY

Brooke, W. Michael, An Investigation of Certain Factors Contributing to Dropping-Out in an Ontario Adult Basic Education Program, unpublished Doctoral thesis presented to the Faculty of Education, University of Toronto, Ontario, 1973, vii - 242 p.

One of the few studies exploring continuation/discontinuation in a Canadian ABE course.

DiStefano, Joseph J., Interpersonal Perceptions of Field Independent and Field Dependent Teachers and Students, unpublished Doctoral thesis presented to Cornell University, Ithaca, New York, 1969.

This report concerns the interpersonal effects of the matching and mismatching of level of psychological differentiation between high school students and their teachers. Two follow-up studies concerning the same problem but in different superior-subordinate situations have been published by the Research and Publications Division, School of Business Administration, University of Western Ontario, London, Ontario (Working Paper Series #24 (1970) and #43R (1973)).

Witkin, Herman A. et al., Psychological Differentiation, New York, Wiley, 1962, xii - 418 p.

This text contains the statement of the psychological differentiation hypothesis as well as the research supporting it.

Witkin, Herman A., The Role of Cognitive Style in Academic Performance and in Teacher-Student Relations, Princeton, New Jersey, Educational Testing Service, February 1973, ii - 58 p. This paper outlines the important research and theoretical developments in the field subsequent to the 1962 basic text.

APPENDIX I

DISTRIBUTION OF PRFT MEAN ERROR SCORES

(*indicates teacher)

<u>Subject</u>	<u>PRFT Mean Error</u>
* 1	0.38
2	0.44
3	0.56
4	0.69
5	0.81
6	0.86
7	0.94
8	1.00
9	1.00
10	1.00
11	1.06
12	1.06
13	1.06
14	1.13
15	1.13
*16	1.13
17	1.19
*18	1.19
*19	1.25
20	1.25
21	1.25
*22	1.31
23	1.31
24	1.31
*25	1.38
26	1.38
27	1.38
28	1.50
29	1.56
30	1.56
31	1.69
32	1.69

APPENDIX I

<u>Subject</u>	<u>PRFT Mean Error</u>
33	1.69
34	1.75
35	1.81
*36	1.81
37	1.94
38	1.94
39	2.00
40	2.25
41	2.44
42	2.44
43	2.50
44	2.75
45	2.75
46	2.81
47	2.88
48	2.88
*49	2.94
50	3.31
*51	3.31
52	3.69
53	3.75
54	3.81
*55	3.81
56	3.81
57	3.94
*58	4.19
*59	3.38
60	4.56
*61	4.81
62	5.63
63	6.00
64	9.38
65	15.19
*66	16.94

APPENDIX 2

DISTRIBUTION OF ACHIEVEMENT SCORES

(PRFT score in brackets)

<u>Teacher</u>	<u>Student</u>	<u>Achievement Score</u>	
		<u>Actual Mark</u>	<u>Converted Score</u>
1 (0.38)	30 (1.56)	A	5
	31 (1.69)	B	4
	65 (15.19)	C	3
	46 (2.81)	B	4
16 (1.13)	43 (2.50)	A	5
	45 (2.75)	C	3
	52 (3.69)	C`	3
	56 (3.81)	C	3
18 (1.19)	9 (1.00)	A	5
	14 (1.13)	D	2
	27 (1.38)	C	3
	57 (3.94)	F	1
19 (1.25)	12 (1.06)	B	4
	29 (1.56)	D	2
	32 (1.69)	B	4
	33 (1.69)	C	3
	38 (1.94)	C	3
	39 (2.00)	D	2
22 (1.31)	37 (1.94)	C	3
	44 (2.75)	A	5
	63 (6.00)	C	3
	64 (9.38)	C	3
25 (1.38)	6 (0.88)	D	2
	11 (1.06)	A	5
	20 (1.25)	B	4
	26 (1.38)	A	5
36 (1.81)	23 (1.31)	F	1
49 (2.94)	3 (0.56)	C	3
	15 (1.13)	A	5
	50 (3.31)	B	4

APPENDIX 2

<u>Teacher</u>	<u>Student</u>	<u>Achievement Score</u>	
		<u>Actual Mark</u>	<u>Converted Score</u>
51 (3.31)	21 (1.25)	C	3
55 (3.81)	35 (1.81)	B	4
	48 (2.88)	D	2
58 (4.19)	13 (1.06)	B	4
	47 (2.88)	A	5
	54 (3.81)	C	3
59 (4.38)	2 (0.44)	B	4
	3 (0.56)	B	4
	4 (0.69)	C	3
	10 (1.00)	B	4
	24 (1.31)	B	4
	28 (1.50)	C	3
	34 (1.75)	C	3
	62 (5.63)	D	2
61	8 (1.00)	B	4
	40 (2.25)	C	3
	41 (2.44)	C	3
	60 (4.56)	C	3
66	7 (0.94)	B	4
	17 (1.19)	B	4
	42 (2.44)	B	4
	53 (3.75)	B	4

APPENDIX 3

PRFT PROCEDURE AND SCORESHEET

(a) Procedure for Portable RFT - Adults

Philip K. Oltman
Psychology Laboratory, Department of Psychiatry
State University of New York Downstate Medical Center
450 Clarkson Avenue
Brooklyn, New York 11203

Note: Apparatus must be on sturdy table and be level.

Before seating S in front of apparatus:

"In this test we want to find out how well you can determine the upright - the vertical - under various conditions."

"In this box (PRFT) you will see a square frame and within this frame you will see a rod."

"It is possible for me to tilt the frame to the left or the right. I can also tilt the rod to the left or right. I can tilt the frame alone or the rod alone; or I can tilt them both at the same time, either to the same side or to opposite sides."

"When I lower the curtain at the beginning of each trial, I want you to tell me whether the rod and frame are straight up and down - i.e. vertical - or whether they are tilted. In other words, tell me whether the rod and frame are straight with the walls of this room or whether they are tilted."

"Are there any questions?"

Seat S in front of apparatus and adjust headrest. S's hands must be in his lap, not touching table. Tell S to keep his head in the rest at all times. Feet together.

Trial 1: Adjust the frame to 28L and the rod to 28L. Lower curtain. Say to S: "What is the position of the rod and the frame?" (Record S's response.)

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If S says the rod is not vertical, say to him:

"I will now turn the rod slowly until you think it is straight with the walls of this room. As I said, I will turn it slowly, and after each turn, tell me whether it has been turned enough or whether you want it turned some more. Just say 'more' or 'enough' after each turn. Please make your decisions quickly and don't be too finicky. Which way shall I move the rod to make it vertical - clockwise or counter-clockwise?"

Now move the rod about 30° at a time opposite to the direction in which the S says it is tilted, until he reports "enough." Ask the S after he reports the rod vertical: "Is the rod now vertical - that is, is it straight with the walls of this room? In other words, is it straight up the way the flagpole outside is?"

If the subject should now say that he wants the rod moved some more in either direction, do so. Raise the curtain and record the position of the rod.

If on this first trial, the S reports the rod to be straight at the outset, ask him the question: "Is the rod now vertical, that is, is it straight with the walls of this room?"

In such instances, give the S the instructions concerning the straightening of the rod, as above, on the next trial. If on the next trial, the S again states that the rod is straight at the outset, give him these instructions on the first trial on which he says that the rod is tilted.

Trial 2: Leave the frame at 28L and adjust the rod to 28R. Lower the curtain and say to the S:

"Would you tell me now and at the beginning of all subsequent trials whether the rod and frame are straight with the walls of this room, or tilted; and if the rod is tilted, whether the rod should be moved clockwise or counter-clockwise to be made straight?"

If the S asks you to turn the rod, do so until he says "enough."

Ask him again: "Is the rod now vertical - that is, is it straight with the walls of this room?"

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Do not ask this question on subsequent trials. Raise curtain. Record adjustment. Proceed the next trials.

Trial 3: Frame 28R Rod 28R

Trial 4: Frame 28R Rod 28L

Trial 5: Frame 28L Rod 28L

Trial 6: Frame 28L Rod 28R

Trial 7: Frame 28R Rod 28R

Trial 8: Frame 28R Rod 28L

Before S enters the room, be sure frame is straight and curtain up.

If at any time after the rod has been adjusted on a given trial the S should say that he wants it moved some more in either direction, do so.

If the S should take more than 5 seconds on any trial before saying "more" or "enough," tell him: "Please make your decisions quickly."

If the S should repeatedly say "more" or "enough" before the turn of the rod is completed, say to him: "Please wait until I have completed the turn."

Check from time to time to determine whether the S's head is in the proper position in the headrest. Attaching the elastic cord around the back of S's head is recommended.

APPENDIX 3

PRFT PROCEDURE AND SCORESHEET

(b) PRFT Scoresheet

Name.....

Subject Number.....

Results of the Portable Rod and Frame Test

Trial	Description	Degrees from vertical
1	F28L R28L	_____
2	F28L R28R	_____
3	F28R R28R	_____
4	F28R R28L	_____
5	F28L R28L	_____
6	F28L R28R	_____
7	F28R R28R	_____
8	F28R R28L	_____
	Total	_____
	Mean	_____

APPENDIX 4

ABSTRACT OF

The Relationship between Psychological Differentiation and Achievement in Adult Basic Education¹

This study is an extension of Witkin's theory of psychological differentiation into the area of achievement in adult basic education (ABE). Research subsequent to Witkin's 1962 statement of the psychological differentiation hypothesis suggests that individuals matched for extent of field dependency tend to rate each others' personalities and cognitive abilities more positively than those who are mismatched. The present study attempted to investigate mathematics achievement as a function of the matching and mismatching of ABE students' and teachers' levels of psychological differentiation.

Fifty-two students and 14 teachers at an Ontario College of Applied Arts and Technology were tested on the Portable Rod and Frame Test, and on the basis of this, were designated as field independent (FI), average, or field dependent (FD). Student achievement scores in mathematics were retrieved from administrative files.

1. Rose Ann Reid, Master's thesis presented to the Faculty of Education, University of Ottawa, Ontario, January 1975, (vii - 78p.)

APPENDIX 4

Sampling problems eliminated the possibility of usual statistical treatments. A descriptive analysis revealed the following:

(1) Field independent students receive a higher mean mathematics mark from field dependent teachers than they do from field independent teachers.

(2) Field dependent students receive a higher mean mathematics mark from field dependent teachers than they do from field independent teachers.

(3) The difference in mean mathematics marks between field independent and field dependent students is greater when assigned by field independent teachers than when assigned by field dependent teachers. In terms of student marks, the field dependent student - field independent teacher mismatch is the most inopportune.

As expected, field independent students attained a higher mean mathematics mark than did the field dependent students, regardless of teacher characteristics.

These findings were discussed. Suggestions for further research included an expanded treatment of this study involving a wider subject range and using standardized achievement tests, in order to elucidate interpersonal and academic effects of matches and mismatches in psychological differentiation. It was also suggested that research be continued into the reasons for success and failure in adult basic education.