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**LA THÈSE A ÉTÉ
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PSYCHOLOGICAL DIFFERENTIATION
AS RELATED TO PERSEVERATION

by Hudson A. Noel

Thesis presented to the School
of Graduate Studies of the
University of Ottawa as partial
fulfillment of the requirements
for the Degree of Master of Arts
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CURRICULUM STUDIORUM

Hudson A. Noel was born in Trinidad, West Indies, on July 5, 1929. He received his Bachelor of Arts degree from the University of Ottawa in 1975, and the degree of Master in Education in 1976, from the same University.

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INTRODUCTION

In this study, an attempt is made to investigate a possible relationship between two personality traits -- psychological differentiation, according to the theory held by Witkin et al., and perseveration, in terms of "disposition rigidity", according to Cattell's theory.

The literature reviewed for the present study has revealed certain theoretical similarities between perseveration and psychological differentiation. This implies that they may be related. For example, there is a strong implication by Cattell and Allport that perseveration might be related to psychological differentiation.

Taking into account the above observations, the lack of sufficient evidence establishing whether or not there is a significant relationship between these two personality traits, and the fact that the literature reviewed for the present study does not reveal that such relational research has been undertaken during the past ten years, the present writer feels that there is a need for further investigation into any possible relationship between perseveration and psychological differentiation.

This report is divided into four chapters. Chapter I deals with the review of the literature as a means of establishing a basis for the theories of psychological differentiation and perseveration. In Chapter II the

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methods used by the present researcher to investigate the relationship between psychological differentiation and perseveration are explained. The results of tests administered to investigate this relationship are presented in Chapter III, and in Chapter IV, a discussion of these results is given, followed by a summary and conclusion.

CHAPTER I

REVIEW OF THE LITERATURE

In this chapter a theoretical investigation is made regarding the theory of psychological differentiation, as postulated by Witkin et al., and of perseveration, as presented by Cattell. Specifically, the nature of these two personality characteristics will be explained, with special emphasis on Cattell's view of perseveration in terms of "disposition rigidity". This will be the main theoretical conception of perseveration to be adopted in the present study. A brief summary is then given, and an attempt is made to establish a theoretical link between psychological differentiation and perseveration. The chapter ends with a statement of the research problem and the general hypothesis arising therefrom.

1. Psychological Differentiation

(a) Historical Review

The concept of psychological differentiation did not originate with Witkin; nor was he the only researcher to investigate it. In fact, Witkin et al.¹ have reported that

1.H. A. Witkin, R. B. Dyke, H. E. Faterson, D. R. Goodenough, and S. A. Karp, Psychological Differentiation, New York, John Wiley, 1974, p. 9-10.

much research on the notion of differentiation had been done by investigators such as Lewin (1934) and Werner (1948), mainly in the field of biology, while von Bertalanffy (1950) and Allport (1960) made very valuable contributions to the study of differentiation from a psychological aspect.

While the work of the researchers just mentioned is not to be overlooked, Witkin et al.² have also pointed out that the first significant experimental study of psychological differentiation was done by Witkin, Lewis, Hertzman, Machover, Meisner and Wapner in 1954. These researchers found that young children change their mode of psychological differentiation as they grow older. Since then, Witkin and various other co-researchers have continued investigating the phenomenon of psychological differentiation, leading up to the current theory presented as recently as 1974 by Witkin et al.³

(b) The Concept of Differentiation

Before discussing the nature of psychological differentiation, an explication of the concept of "differentiation" seems appropriate.

2 Ibid., p. 7.

3 Ibid.

According to Witkin et al., differentiation is a "...characteristic of the structure of any system, whether psychological, biological, or social."⁴ These authors further explain that "differentiation" is used here in a developmental context and refers to the complexity of the structure of any system; that the more complex or "relatively heterogeneous" the structure of the system, the more differentiated the system, while the less complex or "relatively homogeneous" its structure, the less differentiated the system. Witkin et al., use the term "relative" to indicate the extent of complexity of the structure of a system, which in turn, would determine the degree of differentiation in that system. Furthermore, they claim that even the simplest system is differentiated to some extent.⁵

These investigators further maintain that one of the main features of any highly differentiated system is "specialization". This means that subsystems within the entire system are responsible for certain specific functions. They also claim that specialization decreases as the system becomes less differentiated, to the extent that the system may have to carry on all its functions as a whole.⁶

4 Ibid., p. 9.

5 Ibid., p. 9.

6 Ibid., p. 9.

With reference to psychological systems, Witkin and his colleagues⁷ explain that specialization refers to the degree of separation of one psychological area from another, as feeling from perceiving, or thinking from acting, and that it also refers to the specificity in functioning within an area. This implies that specific responses are likely to occur with specific stimuli, as opposed to a diffused reaction to a variety of stimuli. For example, with respect to "visual perception", some parts of the perceptual field may be experienced as being discrete rather than fused into the background. By "field" Witkin et al. mean an environment which contains anything -- objects or drawings -- that may influence the individual's perception of something specific in that environment. These concepts of "visual perception" and "field" will have important bearing on the nature of psychological differentiation to be discussed in the next section.

Witkin et al.⁸ also agree with von Bertalanffy (1950) and Allport (1960) who claim that psychological systems are "open". By "open" is meant that they are in constant contact with the environment. Witkin and his co-workers also believe that, with respect to psychological differentiation,

7 Ibid., p. 9-10.

8 Ibid., p. 9-10.

the extent of contact with the environment depends upon the degree of differentiation of the functions of the system. Hence, with a high level of differentiation, there is a definite separation of what is identified as belonging to the self, and what is external to the self in the surrounding field. This is called "segregation of the self" by Witkin et al.⁹ However, this segregation does not mean total separation of the self from the environment, as the self is always in contact with the environment.

Another important aspect of psychological differentiation pointed out by Witkin et al. is "integration". Briefly, it refers to the form of the relationships between psychological systems and the environment. Degree of differentiation is therefore affected by the complexity and effectiveness of integration. By "complexity" is meant the manifold relationships between a system and its parts, as well as among the parts, one to another. The more complex the relationships, the higher the level of differentiation. To say that a system is "effective" means that there is a harmonious functioning of the parts with one another, as well as the entire system with the environment.¹⁰

9 Ibid., p. 10.

10 Ibid., p. 10-11.

Having given some explanation of the concept of differentiation as a feature found in most systems, the nature of psychological differentiation will now be discussed.

(c) The Concept of Psychological Differentiation

Implicit in the foregoing conception of differentiation is the idea that psychological differentiation mainly involves the extent to which an individual can perceive things as being separate from a distracting environment, rather than being fused with it. This ability is derived from the individual's mode of perceiving which has its origin within the individual.

Since the ability to differentiate psychologically varies with different individuals, it seems reasonable to expect that there should be some way of ascertaining the extent of differentiation. According to Witkin et al.,¹¹ one way of determining it is by measuring the extent to which the individual can perceive the upright in space. This refers to his ability to perceive his body or an object in the environment as being truly vertical or upright in space, regardless of interference caused by environmental distractions. In this respect, psychological differentiation may be referred to as being a "propioceptive"

¹¹ Ibid., p. 1.

phenomenon. The term "vertical" is used here to mean that which is normally considered to be "erect", or "upright" with respect to the horizontal plane -- for example, a flagpole. This concept of spatial orientation is emphasized by Witkin et al., who state that:

...the way in which a person orients himself in space is an expression of a more general preferred mode of perceiving which, in turn, is linked to a broad and varied array of personal characteristics involving a great many areas of psychological functioning.¹²

The above statement also implies that a person's mode of perceiving is influenced by many different psychological areas indicated in Witkin's "differentiation hypothesis" which will be stated subsequently.

In addition to the perception of the upright in space, psychological differentiation also involves the ability to perceive objects as separate and distinct from the environment in which they are embedded. An illustration of this is seen in Thurstone's test of "Closure Flexibility", in which the subject is required to identify a given configuration concealed within a larger configuration. In this respect, psychological differentiation which deals with visual perception, may be regarded as a "perceptual" phenomenon. It is this aspect of psychological differentiation that will be mainly investigated in this study.

¹² Ibid., p. 1.

Psychological differentiation is also regarded from a developmental point of view. Witkin et al. (1974) have stated that: "As children become older they tend to be more differentiated."¹³ These authors maintain that this psychological growth results from the processes of differentiation and integration which take place in certain areas of psychological functioning.

In summary, psychological differentiation describes the manner in which an individual perceives his environment. This mode of perceiving stems from the particular nature of his inner differentiation, and may be observed in the way the individual is oriented with regard to the upright in space, as well as in his ability to separate a given item from a distracting visual field.

The theory of psychological differentiation, rests mainly on the "differentiation hypothesis", postulated by Witkin and his colleagues. This hypothesis is stated as follows:

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 the nature of the body concept and extent of

¹³ Ibid., p. 22.

development of a sense of separate identity; and extent of development of specialized, structured controls and defenses.¹⁴

Witkin et al. also add that "...Implicit in this hypothesis is the view that greater differentiation is associated with greater articulation of experience of the world."¹⁵

The above hypothesis suggests that there is a relationship among the characteristics found in various levels of differentiation; and that this divergence in differentiation is identified at different stages of development through the functioning of the psychological areas indicated in the above hypothesis. In addition, the hypothesis emphasizes the articulation of experience of the self and the environment. According to Witkin and his associates, "articulation of experience " is regarded as "cognitive clarity", which refers to the degree of clarity with which information and impressions are processed as they are received from the external world. In the words of Witkin et al., "cognitive clarity",

...reflects the extent to which information and impressions are discrete, structured and assimilated, or blurred, confused, and unassimilated.¹⁶

Here, again, the difference in extent of psychological

14 Ibid., p. 16.

15 Ibid., p. 16.

16 Ibid., p. 104.

differentiation is emphasized. While some people can perceive objects or their bodies as being separate from the environment, others tend to perceive them as being fused with it.

Such, then, is the conception of psychological differentiation held by Witkin et al.. The next section will deal with the dichotomy of field-dependence-independence, into which psychological differentiation is divided.

(d) Field-Dependence-Independence

In the preceding section it was shown that there are individual differences with respect to psychological differentiation. These differences, when represented as scores along a continuum, may be identified as two extreme groups according to the degree of differentiation. Individuals who tend to be less differentiated are said to be relatively "field-dependent", and those who tend to be more highly differentiated are regarded as being relatively "field-independent". The term "relative" implies that individuals may be oriented more in one direction than in the other, rather than falling into two distinct categories. Hence, to say that a person is "field-dependent" or "field-independent" means that he has an inclination towards one extreme or the other.

The term "field" indicates the visual environment, as is demonstrated in experiments performed by Witkin et al.

This will be described later. These investigations found, for example, that some individuals' perception of the upright in space was influenced by the nature of the surrounding area. That is, they were "dependent" upon the surrounding field in judging the uprightness of their bodies or an object in space. Those who were little affected by the surrounding field were able to make better judgement of the upright in space, independent of environmental influence in the visual field. This means that field-dependent people tend to have greater difficulty than field-independent ones, in identifying the self as separate from that which is external to the self.

According to Witkin, field-dependence-independence is also a type of "cognitive style". To support this view, Coop and Sigel have stated that:

...and many researchers have used the term cognitive style to denote individual differences in modes of cognitive functioning in children and adults. Witkin (1962) speaks of field independent (analytic) and field dependent (global) cognitive styles.¹⁷

Implicit in this statement is the idea that cognitive style is an individual's particular mode of thinking and perceiving, which affects his behaviour in a variety of situations.

¹⁷ R. H. Coop and I. E. Sigel, "Cognitive Style; Implications for Learning and Instruction," in Psychology in the Schools, Vol. 8, 1971, p. 153.

Field-dependent individuals are considered by Witkin et al.¹⁸ as being "global" in their cognitive style, since these individuals perceive the outside world as being fused with the self, forming a sort of "blurred" whole. Thus, they cannot readily separate the self from the surrounding environment. They therefore tend to be confused and unstructured in their perception. By contrast, field-independent people are considered as being "analytical"; as they are capable of perceiving the external world as being separate from the self. As a result, they tend to analyse, structure, and articulate their experiences.

To distinguish between the analytical and global way of perceiving, Witkin et al. state that:

An analytical, in contrast to a global way of perceiving, entails a tendency to experience items as discrete from their backgrounds, and reflects ability to overcome the influence of an embedded context.¹⁹

The cognitive style of field-dependent and field-independent individuals is also considered as being respectively "rigid" and "flexible", according to Allport.²⁰

18 Witkin et al., Op. Cit., p. 13.

19 Ibid., p. 57-58.

20 G. W. Allport, Pattern and Growth in Personality, New York, Holt, Rinehart and Winston, 1961, p. 267-268.

Referring to the work of Witkin and his co-workers (1954)²¹ in their study of field-dependence-independence, Allport claims that a person who is field-dependent or field-independent, "...shows a consistent tendency to be passively rigid, or actively and flexibly adaptive."²²

To further explain the notion of "rigidity" (fixedness) and "Flexibility" in terms of cognitive style Allport states that:

...some people are chronically unable to change their sets when objective conditions demand it; others, by contrast, are flexible.²³

This implies that some individuals have a "fixed" or "rigid" cognitive style, and are therefore not likely to adapt readily to a new situation; others tend to adapt easily, due to a flexible cognitive style.

To support this concept of rigidity and flexibility, Witkin et al.²⁴ have mentioned a problem-solving situation used by Dunckers (1954) in his studies of "functional fixedness". According to Witkin and his associates, "functional fixedness" refers to the difficulty experienced by some

²¹ H. A. Witkin, H. B. Lewis, M. Hertzman, K. Mach-
ober, P. E. Meissner, and W. Wapner, Personality Through
Perception, New York, Harper, 1954.

²² Allport, Op. Cit., p. 268.

²³ Ibid., p. 267.

²⁴ Witkin et al., Psychological Differentiation, Op. Cit.,
p. 74.

people in identifying the possible uses of objects, apart from their familiar functions. For example, in one problem-solving task employed by Dunckers, the subjects were required to use a pair of pliers as a shelf support, rather than as a tool. This was done with varying degrees of success, as some subjects found it difficult to change from the familiar use of the pliers (as a tool) to an unfamiliar one (supporting a shelf). It also implies that these same subjects may experience difficulty in what Witkin et al. refer to as "overcoming embedded contexts,"²⁵ as in the "Embedded Figures Test" used by these authors.

The foregoing discussion suggests that there is a similarity between Allport's view of cognitive fixedness and flexibility, and Witkin's notion of field-dependence-independence, with respect to cognitive style.

(e) Personal Characteristics of Field-dependent
and Field-independent Individuals

Because of the difference in orientation and cognitive style between field-dependent and field-independent people, it is expected that they would possess different personal characteristics. Some of these characteristics are

²⁵ Witkin et al., Psychological Differentiation, Op. Cit., p. 74.

pointed out by Witkin et al. (1954),²⁶ who report that field-dependents rely upon others in authority, are prone to aggression, and are not likely to have a keen interest in achievement. Occupationally, they tend to favour vocations that involve dealing with people. Hence, their academic interests are usually Social Studies and the humanities.

By contrast, subjects who are predominantly field-independent, are inclined to be less sociable, to be less reliant upon the opinions of people in authority, and to be less aggressive than their field-dependent counterparts. They tend to favour occupations involving independent work like scientific research, which do not require a great deal of dependence upon others. Their academic interests are usually mathematics and the sciences. In the social sphere, field-independent people sometimes show extreme forms of unsociable behaviour. This is noted by Witkin et al., who claim that:

...although field-independent people are often able to function with a fair degree of autonomy from others, some of them are strikingly isolated individuals, over controlled, cold and distant, and unaware of their social stimulus value.²⁷

According to these researchers, the personal characteristics of field-dependent-independent people, are related

26 Ibid., p. 3.

27 Ibid., p. 3.

to their experience and inner orientation. For example, these characteristics often reflect the quality of a person's environmental experience, the way in which he perceives and uses his body, or the nature of his relation to other people.²⁸

Despite their contrasting differences, there is, at least, one area in which it is difficult to identify field-dependent and field-independent people. This concerns learning ability and intelligence. Witkin and his associates have reported that in certain portions of intelligence tests, field-dependent people do not show any significant difference from field-independent people, and that the former may even do better than the latter in areas dealing with vocabulary, extent of knowledge, and comprehension ability. Witkin et al. also believe that there may not be any difference in learning ability between field-dependent and field-independent individuals.²⁹

The difference between field-dependent and field-independent people may also be considered with respect to age and sex. It has already been mentioned that Witkin et al. (1954) have reported that young children tend to change gradually from field-dependence to field independence. Regarding

²⁸ Witkin et al., Psychological Differentiation, Op Cit., p. 3.

²⁹ Ibid., p. 2.

sex differences, Lee³⁰ mentions that some researchers have found that males tend to have an analytical field-approach, while females tend to have a global one.

In general, field-dependent people tend to show personal characteristics different from field-independent ones. In the domain of intelligence and learning ability, however, both types of individuals may not show any significant difference, although there are some cases where persons belonging to one category are unexpectedly superior to those belonging to the other.

(f) Measurement of Field-Dependence-Independence

To ascertain whether an individual has a field-dependent or a field-independent orientation, Witkin et al.³¹ have used three major tests: (1) the Rod-and-Frame Test (RFT); (2) the Tilting-room-tilting-chair Test (TRTC); and (3) the Embedded Figures Test (EFT). The RFT and TRTC deal with a person's perception of the upright in space, while the EFT involves his ability to identify a given configura-

30 H. Lee, "Field-Dependence-Independence and Second Language Achievement in Grade 8," Unpublished Master's Thesis, University of Ottawa, 1974, p. 6.

31 Witkin et al., Psychological Differentiation, Op. Cit., p. 36-40.

tion, that is embedded or "hidden" in a larger and more complex configuration. Full details of these tests are given in Appendix 11 of this study. However, in order to give a preliminary insight into the nature of the tests, two of them -- the RFT and the EFT -- will be briefly explained here as they reflect the two key concepts underlying Witkin's interpretation of psychological differentiation: (1) the perceiving of the upright space and (2) separating an item from a visually distracting field.

The Rod-and-Frame test attempts to evaluate the individual's perception of the uprightness of an object in space within a limited visual field. The subject is seated on a chair in a dark room facing a luminous rod superimposed upon a luminous square frame. The frame is in a fixed tilted position, and the rod can be tilted to the right or left, independently of the frame. The examiner then manipulates the rod until the subject claims that it is in an upright position. In order to be successful in this task, the subject must be able to determine the uprightness of the rod through reference to the position of his body.

Many test trials are given and in some trials the subject is seated in an upright position, while in others, the body is tilted. In all cases, if there is a large tilt of the rod when it is claimed by the subject to be upright, this indicates that he is influenced by the surrounding

visual field -- the frame. That is, he tends to be "relatively field-dependent". On the other hand, if the rod is just slightly tilted or not tilted at all when it is reported to be vertical, it is an indication of non-dependence upon the surrounding field, and little reliance on the position of the body. This means that the subject is "relatively field-independent".

In the EFT, the subject is required to identify a simple figure within a larger complex figure. Witkin *et al.* used black-and-white figures, on which coloured patterns were superimposed to render the black-and-white outlines less discernible. The simple figure is thus regarded as being "hidden" within the more complex figure which contains many obvious sub-patterns. Individuals who experience the greatest difficulty in performing this task are said to be "relatively field-dependent"; while those who experience the least difficulty are regarded as being "relatively field-independent".

The reliability of these tests is assured by Witkin *et al.*, (1974), who claim that: "All the tests in the perceptual battery have satisfactorily high reliabilities."³² Furthermore, Witkin (1973) claims that individuals tend to be consistent in their performance on all the tests. That

³² *Ibid.*, p. 40.

is, if the same subjects are retested, those who maintain that the rod is vertical when it is tilted far towards the tilted frame, are also likely to claim that their bodies are in an upright position when tilted in the same manner as the room. These people also take a long time in identifying the simple figure in a complex pattern.³³

Witkin's claim is also supported by later investigators. Using Witkin's RFT and EFT, Dubois and Cohen (1970) have reported a correlation of 0.56 between these tests ($p < .01$, $N = 143$).³⁴ Elliot (1961) in his research showed a correlation between Witkin's RFT and EFT of 0.42 ($p < .01$, $N = 128$).³⁵

Another test which correlates significantly with those developed by Witkin et al. is Thurstone's Closure Flexibility Test, otherwise known as Thurstone's Concealed-Figures Test (Form A). This is a group test and is easily

33 H. A. Witkin, "The Rate of Cognitive Style in Academic Performance and in Teacher-Student Relations," in Research Bulletin, Princeton, New Jersey, Educational Testing Service, February 1973, p. 5.

34 T. E. Dubois and W. Cahen, "Relationship between Measures of Psychological Differentiation and Intellectual Ability," in Perceptual and Motor Skills, Vol. 31, 1970, p. 411-416.

35 R. Elliott, "Interrelationships among Measures of Field Dependence, Ability and Personality Traits," in Journal of Abnormal and Social Psychology, Vol. 63, No. 1, 1961, p. 31.

administered and scored. Since this test will be used to measure field-dependence-independence in this study, it will be described in detail in Chapter II.

Significant correlations between Witkin's Embedded Figures Test and Thurstone's Concealed-Figures Test have been reported by Elliott (1961) ($r = 0.55$, $p < .01$, $N = 128$)³⁶ and by Podell and Phillips (1957) ($r = 0.77$, $p < .01$, $N = 32$).³⁷

(g) Criticisms of Witkin's Theory

Witkin's theory, however, is not without its critics. Gardner³⁸ feels that Witkin's use of the term "differentiation" is too general, and points out that many studies have indicated that some problem-solving and verbal skills which necessitate a high degree of differentiation did not relate to the measure of psychological differentiation used by Witkin. Zigler³⁹ also reports that some of the empirical

36 R. Elliott, Op. Cit., p. 49.

37 J. E. Podell and L. Phillips, "A Developmental Analysis of Cognition as Observed in Dimensions of Rorschach and Objective Test Performance," in Journal of Personality, Vol. 27, No. 4, 1959, p. 439-463.

38 R. W. Gardner, "Book Reviews," in American Journal of Psychology, Vol 76, No. 2, 1963, p. 198.

39 E. Zigler, "A Measure in Search of a Theory," in Contemporary Psychology, Vol. 8, No. 4, September, 1963, p. 134.

relationships found between Witkin's measures of perception and other tests may be due to the common factor of "general intelligence" as defined by standard intelligence tests. Witkin, however, refutes Zigler's argument by contending that any significant relationship between measures of field dependence and intelligence test scores is "carried" mainly by those portions of intelligence tests requiring analytical ability.⁴⁰

Yet, in spite of these criticisms, Witkin's theory still remains one that has encouraged extensive research, resulting in the spreading of knowledge in the perception-personality sphere. This is probably one reason why Yamada⁴¹ defends Witkin by pointing out that most of the criticisms of his work are to be regarded as one of the problems of viable theory building. It has also been previously indicated in this study that Witkin *et al.* have found definite perceptual differences among individuals with respect to psychological differentiation, which are referred to as "field-dependence" and "field-independence".

40 Witkin *et al.*, Psychological Differentiation, Op. Cit., p. 80.

41 K. Yamada, "Extent of Psychological Differentiation as Related to Intelligence," Unpublished Doctoral Dissertation, University of Ottawa, 1968, p. 17.

(h) Summary

It has been shown that the concept of differentiation was under early investigation chiefly in the biological and social sciences. From this scientific viewpoint, differentiation is a characteristic of any system, and refers to the complexity of the structure of that system.

The psychological aspect of differentiation was subsequently investigated by various researchers, with outstanding contribution by Witkin and his colleagues. These researchers regard psychological differentiation from a perceptual point of view - the way in which a person is oriented with respect to the upright in space, and his ability to select a given item from a distracting visual field. To measure the first type of orientation, Witkin et al. devised the RFT and the TRTC, while they used the EFT to measure the second orientation. However, in recent times, Thurstone's CFT has been used in lieu of the EFT employed by Witkin et al.

Since marked individual differences are found to exist with respect to psychological differentiation, this has given rise to the dichotomy of field-dependence-independence, with a specific cognitive style and certain personal characteristics shown by each group of individuals.

The criticisms levelled against Witkin's theory of psychological differentiation do not seem to weaken its influence and popularity in the field of psychology, and much research is still being done on his theory.

In the next section the theory of perseveration will be explained, showing some common characteristics between it and psychological differentiation.

2. Perseveration

(a) Historical Review

Perseveration is a personality trait which is found in most individuals in varying degrees, although it seems to be more prevalent among abnormal people and psychiatric patients than among normal individuals.

The phenomenon of perseveration has been under investigation for a long time. Jasper⁴² claims that the term "perseveration" was first used by Neisser in 1894 while working with psychiatric patients. Neisser used the term to denote a peculiar behaviour among his patients -- the continuous involuntary repetition of an activity in the absence of the original stimulus which caused the response.

After Neisser's investigation, perseveration has been considered from many different points of view. Jasper⁴³ also reports that in 1900, Müller observed that some

⁴² H. H. Jasper, "Is Perseveration a Functional Unit Participating in all Behaviour Processes?" in Journal of Social Psychology, Vol. 2, 1931, p. 29.

⁴³ Ibid., p. 29.

individuals failed to recall a series of syllables recently learned, but that those same individuals were able to recall a series of syllables learned prior to the ones just learned. Müller called this phenomenon "perseveration".

Jasper⁴⁴ again mentions that in 1902, the psychiatrist, Otto Gross used the term "secondary function of the nervous system", to mean "perseveration" as the initial activity of a stimulated sensory-motor process, while the "secondary function" was the tendency of the process to continue spontaneously in a state of excitation for some time after the stimulation had ceased. Jasper himself did extensive research on perseveration and states that:

Perseveration may be defined as the tendency of a set of neurons, once excited, to persist in the state of excitation autonomously, showing resistance to any change in this state.⁴⁵

In addition to the foregoing research on perseveration, Cattell⁴⁶ points out that in 1912, Heymans and Wiersma did the first experimental work on perseveration and gave the term its first operational definition of "mental inertia". This conception of perseveration in terms of

44 Ibid., p. 29.

45 Ibid., p. 28.

46 R. B. Cattell, "The Riddle of Perseveration," in Journal of Personality, Vol. 14, 1946, p. 230.

"inertia", is also supported by Spearman and Wynn Jones (1951).⁴⁷

In recent times, Allport (1961) has considered perseveration as an offspring of "functional autonomy". By functional autonomy Allport means an acquired system of motivation involving tensions which are not the same as the original tensions from which the acquired system of motivation developed.⁴⁸ This means that the original motivation for a certain kind of behaviour, may be different from the motivation for the continuation of that behaviour. Allport subsequently defines perseveration as, "A mechanism set in action because of one motive, continues, at least for a time, to feed itself."⁴⁹

Underlying all these interpretations of perseveration is the basic idea that there is a strong tendency within some individuals to repeat an activity or sensation, long after the original stimulus which caused the onset of the activity or sensation has been removed. For example, a high perseverative tendency is noted in people who have a strong urge to complete a task once it has been started, or

47 C. Spearman and L. L. Wynn Jones, Human Ability: A Continuation of "The Abilities of Man," London, Macmillan, 1951, p. 162.

48 Allport, Op. Cit., p. 229.

49 Ibid., p. 231.

in those who become oblivious to the environment when engrossed in an activity like reading a book, or in people who continue to feel the sensation of a moving train after the end of a long train ride.

At this point the present writer finds it necessary to distinguish between "persistence" and "perseveration", as both terms are often confused. A very clear distinction between these two concepts is given by Sangiuliano.⁵⁰ She claims that although both concepts refer to the continuation of a response, "persistence" refers to an active, voluntary, continuous response, while "perseveration" is the involuntary repetition of a response due to an inability to shift to another response.

In addition to the original interpretations of perseveration already described, the concept has been reinterpreted in the light of many personality theories -- new and old. In this regard, Cattell claims that perseveration has been reinterpreted in terms of "...functional autonomy, retroactive inhibition, extinction of conditioned reflexes, mental set, and the Freudian concept of the death

⁵⁰ Iris Sangiuliano, "The Investigation of the Relationship Between the Perception of the Upright in Space and Several Factors in Personality Organization," Doctoral Dissertation, Fordham University, N. Y., 1952, p. 15.

instinct."⁵¹

The purpose of the present study does not warrant any detailed descriptions of these various interpretations of perseveration. Some, however, may be referred to, only in connection with Cattell's⁵² view of perseveration as "disposition rigidity" which will be the main theory of perseveration followed in this research. This conception of perseveration will be the subject of the next section.

(b) The Concept of Disposition Rigidity

In order to explain Cattell's interpretation of perseveration in terms of disposition rigidity, it seems necessary to show how he derived this idea of perseveration. Like Spearman and Wynn Jones, Cattell regards perseveration as a kind of "mental inertia." In addition, he distinguishes between two types of mental inertia -- (1) "inertia of mental processes,"⁵³ and (2) "inertia of structural disposition."⁵⁴

⁵¹ Cattell, Op. Cit., p. 229.

⁵² Ibid., p. 229-238.

⁵³ Ibid., p. 231.

⁵⁴ Ibid., p. 231-233.

According to Cattell, inertia of mental processes is observed in "alternation tests," such as making AAAA...., followed by BBBB...., and then by ABAB.... Here the activities are performed in rapid temporal succession which causes an interference in their momentum or inertia.

The other type of mental inertia which Cattell refers to as "inertia of structural disposition" or "disposition rigidity", is identified in "creative effort" tests which require the subject to change from an old accustomed way of performing a task to a new way of performing it. For example, the subject may be required to write rows of SSS...., followed by rows of inverted S's. Here, interference is caused, not by the rapid succession of each activity, but by the difficulty of making an inverted S, compared with making an S in the normal way. Thus, there is no inertia of mental processes in this task, unlike the former task of making A's and B's.

In summary, Cattell sees disposition rigidity as being closely linked with creative effort, and claims that tests used to measure both factors are usually of the same type. He also maintains that the general "p" (perseveration) factor is found in creative effort tests, mainly of a motor type, as for example, in the Inverted S Test that has just been described.

While most individuals possess the perseverative tendency to some extent, extreme forms of perseveration in normal individuals are due mainly to the biological nature of the nervous system over which the individual has no control. This situation becomes even more obvious in psychiatric patients who, due to their mental illness which affects the nervous system, cannot control their perseverative behaviour. It is precisely because of the nature of the nervous system that some individuals suffer from mental illness, which in turn precipitates extreme forms of perseveration. This brings to mind the notion of "high" and "low" perseveration which will be the topic of the next section.

(c) High and Low Perseveration

Perseveration scores may be plotted along a continuum, with some scores moving towards either extreme, giving rise to the notion of "high" and "low" perseveration. "Moderate" perseveration is therefore shown by the middle scores.

This difference in perseverative tendency among individuals arises from the very nature of perseveration. From the definitions and descriptions of perseveration previously given in this research, it may be concluded that perseveration refers to the difficulty a person experiences in switching from one activity to another that is different.

That is, some people experience difficulty in changing from one pattern of thought or action to another, once the first has already been initiated. It is this "obstinacy to change", this "mental lag", "mental inertia", or "cognitive fixedness" that characterizes perseveration. This change in thinking, or acting, is necessitated by some kind of interference with an on-going trend of the thought or action. This view is supported by Cattell who states that in most current perseveration tests "...the perseveration effect is measured by the degree of interference found in the 'Y' activity",⁵⁵ the activity that is changed. Lankes, in discussing a letter-writing test of perseveration, also maintains that:

...the strength of the perseveration would manifest itself indirectly in the amount of disturbance caused by changing the order in which the letters were to be written, the perseverator being more liable to suffer under the shock of the change than the non-perseverator.⁵⁶

The above description of perseveration emphasizes the fact that this tendency involves the amount of difficulty a person experiences in changing from a familiar activity to an unfamiliar one. It also implies that the greater the difficulty experienced, the higher the perseverative tendency. Thus, individuals who have much difficulty

55 R. B. Cattell, Personality and Social Psychology, San Diego, California, Knapp, 1968.

56 W. Lankes, "Perseveration," in British Journal of Psychology, Vol.7, 1915, p. 391.

in changing from the familiar to the unfamiliar, are regarded as "high perseverators", while those who can easily make this transition are regarded as "low perseverators". Lying between these two extremes are "moderate perseverators", while "non-perseverators" are those who are not affected at all by the necessity of having to change. Four types of perseverators can therefore be identified in the following order, as the difficulty of changing or "shifting" increases: (1) non-perseverators, (2) low perseverators, (3) moderate perseverators and (4) high perseverators.

These four categories of perseveration have been identified mainly through tests which have been successfully used for many years. A brief description of a few of these tests will be given in the next section.

(d) The Measurement of Perseveration

According to the literature reviewed, most perseveration tests are usually a pencil-and-paper type, of short duration - two to four minutes. Dozens of these tests have been devised and used throughout the years. Many of them are of a motor type, but some have been developed in the sensory and ideational fields. Motor-type perseveration tests are particularly designed to measure the amount of difficulty a person experiences in "shifting" or changing from a familiar activity to an unfamiliar one. The implication here is that

the greater the difficulty experienced in shifting, the higher the perseverative tendency. Since this notion of 'difficulty in shifting' is the key concept of perseveration adopted in the present study, and the test to be used is of a motor type, a brief description of some of these motor tests, as outlined by Jasper,⁵⁷ will now be given.

1. Reversed Order Letters

The subjects are requested to write five letters 40 times in the normal order (e.g. opqrs) and then 20 times in the reverse order (e.g. srqpo).

2. Letter Cancellation

The subjects are given practice in cancelling all the a's and t's in a series of letters. They are then required to cancel all the p's and r's in a succeeding series.

3. The "ea" Test

A passage is written as given for two minutes and then re-written with instructions to place an "a" after every "e" occurring in the passage.

4. The Inverted S Test

The subjects are instructed to write rows of normal S's and then to write rows of this letter in an inverted manner as it would be seen in a mirror.

In all the above tests the change of activity follows in rapid succession, and each test lasts for a short, specific

57 Jasper, Op. Cit., p. 31-32.

duration of time. The perseverative effect is measured by the difficulty in changing from one activity, and different investigators calculate the perseveration score in slightly different ways. Pinard,⁵⁸ for instance, uses the formula $X-Y$, where X denotes the number correct in the first activity, and Y the number correct in the second activity. On the other hand, Cattell⁵⁹ employs the ratio X/Y , where X indicates the number correct in the second activity, and Y , the number correct in the first activity.

A full description of some more perseveration tests - including the Inverted S Test to be used in this study - is given in Appendix 12.

Since high and low perseveration will be the main types of perseveration to be considered in this study, it seems worthwhile to include a brief description of the personal characteristics of high and low perseverators. This will be the subject of the next section.

(e) Characteristics of High and Low Perseverators

The literature reviewed for this study reveals that there are certain qualities that are predominant among very

58 J. W. Pinard, "Tests of Perseveration: I - Their Relationship to Character", in British Journal of Psychology, Vol.23, Part I, 1932, p. 12.

59 Cattell, Personality and Social Psychology, Op. Cit., p. 12.

high and low perseverators, respectively. Following is a list of some of the characteristics of extreme perseverators, as identified by Cattell,⁶⁰ who is considering perseveration here in terms of the two forms of mental inertia previously described.

Extreme Low Perseverators

- (a) Active, irresponsible, obstinate, prone to action when dissatisfied.
- (b) Tense, anxious, excitable, restless, assertive.
- (c) Nagging, critical, fussy over details, thorough.
- (d) Enterprising, hard-working, self-reliant.
- (e) Individualistic, selfish, insensitive to others.
- (f) Seldom dreams.
- (g) Sometimes holds better job than intelligence might suggest.

Extreme High Perseverators

- (a) Resigned, unpredictable, easily discouraged when dissatisfied.
- (b) Moody and deeply emotional.
- (c) Negligent of details, slovenly, careless, forgetful.
- (d) Passive, pessimistic, careless of ambition.
- (e) Gregarious, considerate towards others.
- (f) Dreams a lot.
- (g) Usually does not achieve status which intelligence suggests is likely.

The above characteristics may not hold true in all cases and are meant to be a general guide in distinguishing between the characteristics of extremely high and low per-

⁶⁰ Cattell, "The Riddle of Perseveration," Op. Cit., p. 242-243.

servators. There is also some overlap in the personal characteristics of both types of individuals.

From the above list it will be observed that, in many cases, high and low perseverators possess opposite qualities - for example, in characteristics (a), (c), (e), (f), and (g). These opposing tendencies also seem to be in keeping with the natural orientation of each type of individual. For instance, high perseverators seem to have difficulty in changing their mental set and are therefore easily affected by situations demanding change. It is therefore not surprising to find that many of these people are "easily discouraged when dissatisfied." That is, they tend to give up easily when obstacles impede their progress. On the other hand, low perseverators are so oriented that they are more prone to adapt to changing situations. In other words, they tend to be so obstinately persistent that they are likely to surmount any mental barrier necessitated by change. Hence, these people are characteristically "obstinate" and "prone to action when dissatisfied." That is, as opposed to high perseverators, they do not give up easily and are likely to make every effort to overcome difficulties which hamper progress. In like manner, other characteristics from the list may be identified which would generally be commensurate with the natural orientation of high and low perseverators.

Regarding cognitive styles, high perseverators tend to possess a "rigid" cognitive style, while low perseverators tend to have a "flexible" style. This is probably why Cattell regards perseveration as disposition rigidity. Some people tend to have so "rigid" a cognitive disposition, that they experience great difficulty in changing their mental orientation to suit situations which demand such change.

Since it has been established that field-dependent individuals have a rigid cognitive style, while field-independent ones possess a flexible cognitive style, this implies that there may be some relationship between psychological differentiation and disposition rigidity.

3. Summary

In the preceding sections, the theory of psychological differentiation was presented according to Witkin and his co-workers. It describes an individual's characteristic mode of perceiving his environment. In other words, it is a type of cognitive style unique to each individual.

According to Witkin and his associates, the extent of psychological differentiation is based mainly on two factors:-

- (1) the individual's perception of the upright in space, and
- (2) his ability to select a given item from among several other visually confusing items.

Psychological differentiation is dichotimized into "field-dependence" and "field-independence". This is indicated by test scores which may be arranged along a continuum.

With respect to personal characteristics, field-dependent people tend to rely upon others and are often very sociable. As a result, they seem to favour subjects like social studies and the humanities, and follow vocations in the Social Services. These people usually have low self-esteem and poor self-image. Their cognitive style is regarded as being "rigid", and they are also considered as being "global" in their cognitive orientation.

Field-independent individuals tend to be independent, self-reliant, and are not very sociable. Academically, they are interested in mathematics and the sciences, and have a liking for vocations such as engineering and scientific research. These individuals also have high self-esteem and good self-image. Their cognitive style is "flexible", and they are considered as being "analytical".

Perseveration has been viewed in many different ways by different authors. However, in spite of this, their conceptions seem to underscore the basic nature of perseveration -- the difficulty experienced by some individuals in "shifting" from a familiar to an unfamiliar way of performing a task. Cattell's conception of perseveration in terms of

"disposition rigidity", deals specifically with this type of individual orientation and is adopted as the major theory in this study.

Like psychological differentiation, the perseverative tendency may be dichotomized into "high" and "low" perseveration, which may be easily identified from test scores arranged along a continuum. High perseverators are those who experience much difficulty in "shifting" while low perseverators are those who experience very little difficulty in shifting.

With respect to cognitive orientation, high perseverators are regarded as being "rigid" and low perseverators as being "flexible", as is the case with field-dependent and field-independent people, respectively. Similarly, while the personal qualities of high and low perseverators are usually different, both groups may sometimes have similar personal characteristics, or even an unexpected reversal of these characteristics.

From this review of the literature, it seems that there are some theoretical similarities between psychological differentiation and perseveration, in terms of disposition rigidity. The purpose of the next section will be to establish a theoretical linkage between the two theories, as a further attempt to justify the undertaking of the present research.

Theoretical Rationale and Basic Hypothesis

The objective of this section is to establish a theoretical link between perseveration and psychological differentiation, to give a rationale for undertaking the present research, and to state the basic hypothesis.

From the literature reviewed, there are some striking similarities between the two personality traits. More specifically, a theoretical resemblance exists between field-dependent people and high perseverators, and between field-independent people and low perseverators. One area of similarity concerns a person's particular way of dealing with certain environmental situations, regardless of any change in mental process that these situations may necessitate. For example, both field-dependent people and high perseverators have difficulty in overcoming any interference in their perceptual or mental functioning. Both types of individuals also appear to have a "rigid" cognitive style. This means that they are so oriented that their "mental set" is not easily altered to suit the demands necessitated by new environmental situations. For instance, in the Dunckers experiment previously mentioned, field-dependent individuals could not readily transfer the use of a pair of pliers from a tool to a shelf support. Similarly, high perseverators experience much difficulty in rapidly switching from making normal S's

to making inverted ones.

This difficulty in adapting to new situations is caused by some interference or "obstacle" in the environment. In psychological differentiation tests, like the RFT, visual interference is caused by the tilt of the frame and the dark room. In perseveration tests like the Inverted S Test, an interference to a well-established motor skill arises when inverted S's are to be made, due to an acquired mental habit which dominates this particular motor activity. The notion of interference may therefore be considered as another point of similarity between psychological differentiation and perseveration.

With respect to personal characteristics and interests, perseverators and field-dependent-independent people show some similarities. For example, low perseverators and field-independent individuals tend to be unsociable, to place little reliance upon people in authority, to prefer working independently, and to show much interest in mathematics and the sciences.


The attempt by some authors to link psychological differentiation with perseveration, although under different terminologies, makes one wonder whether these two traits may not be related. For example, it has previously been stated that Allport feels that "cognitive fixedness and flexibility" and "field-dependence-independence" are probably the same personality trait. But Allport's notion of cognitive fixed-

ness and flexibility is quite similar to field-dependence-independence.

In the preceding discussion, an attempt has been made to establish a theoretical rationale for pursuing the present investigation of a possible relationship between psychological differentiation and perseveration, in terms of disposition rigidity. The research hypothesis arising from this problem will now be stated as follows:

Field-dependent individuals will show a significantly higher perseverative tendency than field-independent ones.

The preparations made for testing of this hypothesis, and the manner in which it was tested, will be the purpose of Chapter II.



CHAPTER II

EXPERIMENTAL DESIGN

This chapter deals with the procedures that were followed in conducting the experimentation to test the basic hypothesis stated in Chapter I. The sample and measuring instruments are discussed in the first and second sections respectively, while in the third and fourth sections, the method by which the data were collected and analysed is described.

1. The Sample

The sample consisted of 210 Grade Six, Seven and Eight boys and girls, ranging from 12 to 14 years of age. The limitations imposed by the school system in which the experimentation was conducted influenced the choice and size of the sample greatly. Only two schools were willing to allow testing of students, and the largest and most suitable sample could only be obtained from among the grades mentioned. The sample did not include students who were mentally retarded or emotionally disturbed, but was comprised of "normal" students such as would be found in any regular class. With this choice of 210 students, it was hoped that the test results would be normally distributed and so enhance the possibility of obtaining enough scores in the extreme

groups in accordance with the procedure of statistical analysis adopted in this study. Furthermore, it was felt that this number would be large enough for the purpose of this research, particularly with respect to the method by which the experimentation was to be conducted.

The students were chosen at random from two Roman Catholic schools in Hamilton, Ontario, Canada. Both schools happened to be in the same geographic area, where the socio-economic level of the students may be viewed as middle-class -- another indication of similarity between the two groups of students. Considering thus, and the similarity in age and academic standing, the sample tested may be regarded as being fairly homogeneous.

School children were regarded as reasonable subjects for this research because the CFT and IST employed here are so designed that they could be performed easily by children of either sex, and of the age group mentioned above. There is evidence also, that these tests have been successfully administered to children by other researchers. For example, Lee¹ used Thurstone's CFT to test boys and girls between thirteen and fourteen years of age, in his study of the relationship between psychological differentiation and second-

¹ Lee, Op. Cit., p. 29.

language achievement, while the IST was used by Pinard² to measure the perseverative tendency of children of both sexes, ranging from eight to fifteen years of age.

2. The Measuring Instruments

In the present study psychological differentiation was measured by Thurstone's test of "Closure Flexibility" (Concealed Figures - Form A), already referred to in this study as Thurstone's CFT. This is a pencil-and-paper test developed by Thurstone and Jeffrey.³ It was originally designed to measure a mental ability which Thurstone calls the "second closure factor". It refers to the ability to identify a given configuration (diagram, drawing, or figure) that is "concealed" or "hidden" in a larger and more complex configuration. It is a ten-minute test consisting of eight pages with twenty-eight configurations to a page. This gives a total of 196 items. (See Appendix 5). The subject's raw score is obtained by subtracting the number of items inaccurately identified from the number correctly identified. This is done to cancel out the effects of guessing which some

2 Pinard, Op. Cit., p. 6.

3 L. L. Thurstone and T. E. Jeffrey, "Closure Flexibility (Concealed Figures, Form A), Test Administration Manual, University of Chicago, Illinois, Industrial Relations Centre, 1965, p. 151-188.

students may be tempted to do.

Thurstone's CFT was considered a suitable measure of psychological differentiation in this research because it has been successfully implemented by various researchers^{4,5,6} to measure psychological differentiation. Furthermore, Witkin et al.⁷ have considered the CFT as a suitable substitute for their own Embedded Figures Test (EFT). They have also quoted some high correlations between their EFT and Thurstone's CFT, as a result of studies done by other researchers like Phillips et al. (1957), ($r = 0.77, p < .01$), and Goodman (1960), ($r = 0.69, p < .01$).

Thurstone's CFT is also easily administered and scored and does not rely upon the subject's previous knowledge or intelligence. Moreover, it provides a simple group method of testing the extent of psychological differentiation in terms of visual perception.

4 R. I. Long, "Field Articulation as a Factor of Verbal Learning and Recall," in Perception and Motor Skills, Vol. 15, 1962, p. 151-158.

5 A. Bowles, "Extent of Psychological Differentiation as Related to Achievement in Science and Attitude towards Science," Unpublished Master's Thesis, University of Ottawa, 1973, p. 32.

6 Lee, Op. Cit.

7 Witkin et al., Psychological Differentiation, Op. Cit., p. 49.

To measure perseveration in terms of disposition rigidity, Pinard's version of the Inverted S Test (IST) was the only test used. A single test was chosen, not only to economize on the time stringently allotted by the School Board for the present experimentation, but also because, as Pinard⁸ has shown, there is an almost consistent correlation between it and his other perseveration tests.

The choice of the IST was also determined by the fact that Cattell considered it as a fairly accurate test of "creative effort" which necessitates a sudden change from a familiar activity to an unfamiliar one. This change or "shifting" is an inherent quality in the concept of disposition rigidity, as described by Cattell. Furthermore, the present researcher feels that greater effort in shifting would be required in making an inverted S, than, for example, in making a triangle with the apex down. It was therefore expected that the IST would measure the perseverative effect more directly.

The IST lasted four minutes, and Pinard's procedure was adopted but Cattell's method of scoring was followed. According to Cattell's method, the perseveration score was calculated by dividing the number of S's correctly made in the first two minutes, by the number correctly made in the second two minutes. In the present

⁸ Pinard, Op. Cit., p. 12.

research it was decided to multiply this ratio by 10, for the convenience of statistical analysis. For example, suppose a subject were to make 54 S's in the first two minutes and 30 in the second two minutes, then his raw score would be:

$$\begin{aligned} \text{Raw Score} &= \frac{\text{No. of S's in first two min.}}{\text{No. of S's in second two min.}} \times 10 \\ &= \frac{54}{30} \times 10 \\ &= 18 \end{aligned}$$

This method of scoring enables the present researcher to assume that a high raw score would indicate high perseveration, while a low score would mean low perseveration. Furthermore, since subjects are expected to make fewer S's in the second two minutes than in the first two minutes, and the ratio is multiplied by 10, no subject is expected to have a raw score that is less than 10. This means that the closer a subject's raw score is to 10, the lower his perseverative tendency, while the more his raw score increases beyond 10, the higher his perseverative tendency.

The IST was done on squared paper prepared in advance. (See Appendix 10). The sheets were arranged to accommodate the maximum number of S's a subject could normally make within a given period of time. For instance, a subject is not likely to make more than 60 S's in 30 seconds; hence 60 squares were

allotted for this activity. Patterns of S's were placed at the left of each sheet to remind the subjects of the type of activity to be done next, although they also received verbal instructions from the examiner.

Squared paper was used for two main reasons. First, it permitted the size of the S's to be fairly uniform. It is obvious, for example, that more small S's could be drawn within a given time, than bigger ones within the same time. Second, the squares facilitated neat and purposeful activity on the part of the subjects, and easy and accurate checking by the examiner.

The IST was administered first, followed, after a short respite of about ten minutes, by the CFT. This interim was used by the experimenter to prepare the subjects for the CFT. This order of testing was chosen because the IST was of a motor type and was not expected to cause mental fatigue which might interfere with the performance on the CFT. The IST was also considered easier to perform than the CFT, and thus it was hoped that this would serve as an incentive to the students to undertake the CFT which demanded some concentration.

Although the actual testing time for both tests was 14 minutes -- 10 minutes for the CFT and 4 minutes for the IST -- about 45 minutes were spent with each group. This included time for assembling the groups, for orientation to

the testing, for explanation, instruction, demonstrations, practice trials, and for the distribution and collection of pencils, paper, erasers, etc.

From the literature reviewed, no specific statement by Pinard was found regarding the reliability and validity of this test. However, according to a statement from Cattell, there is a strong indication that the Inverted S Test may be among the most valid and reliable perseveration tests. Cattell claims that:

From the results of research which were available at the time the present work was begun (principally those of Lankes (1915), Wynn Jones (1929), Bernstein (1924), Pinard (1932) and Stephenson (1932), we concluded that the most reliable and valid tests would be found in the triangles test, the cancellation test, and the reversed letters test.⁹

The literature reveals that these three tests, as well as Pinard's Inverted S Test, are administered under the same format (See Appendix 12). It seems reasonable to assume, therefore, that the Inverted S Test would be a valid and reliable measure of perseveration. Furthermore, Cattell¹⁰ specifically mentions that this test may be used to measure disposition rigidity - the aspect of perseveration to be considered in this study.

9 Cattell, Personality and Social Psychology, Op. Cit., p. 4.

10 Cattell, "The Riddle of Perseveration", Op. Cit., p. 231-233.

The fact that many researchers have used the Inverted S Test to measure perseveration, should lend additional support to its implementation in the present investigation. For example, Jasper ¹¹ himself used this test as a measure of perseveration, and reports that other researchers like Wynn Jones, Bernstein and Hargreaves, have also employed it for the same purpose.

In view of the preceding remarks, the present investigator feels confident that, for the present study, the Inverted S Test is a valid and reliable measure of perseveration in terms of disposition rigidity.

Having explained how psychological differentiation and disposition rigidity were measured, the methods and procedures involved in the collection of data for this study will now be discussed.

3. Collection of Data

In October, 1976, official permission was granted by the Roman Catholic Separate School Board in Hamilton, Ontario, Canada, to conduct the experimentation for this research in two of its elementary schools. The two principals concerned were contacted and were explained the nature and purpose of the testing. They subsequently passed on this information to parents, teachers and students.

¹¹Jasper, Op. Cit., p. 31.

EXPERIMENTAL DESIGN

With the cooperation of all concerned, the tests were conducted at School "A" on Thursday, October 21, 1977, with a total of 113 Grade 6, 7 and 8 students of both sexes, and at School "B" on Friday, October 22, 1977, with a total of 97 boys and girls of same grades as in school "A". Altogether, there were 68, 81 and 61 students in Grades 6, 7 and 8, respectively. This gave a total sample of 210 subjects, with 103 males and 107 females.

Before the actual testing, the examiner explained to the students the nature and purpose of the tests. This was done to eliminate any emotional anxiety which might arise. The students were also assured that the results of the tests would be kept confidential. Full instructions and practice trials were given before the performance of each test. The students seemed to be at ease, and worked eagerly and willingly.

The data collected were then prepared for computer analysis. The methods by which they were analysed will be explained in the next section.

4. Analysis of Data

It would be recalled that the main purpose of this study is to investigate any possible relationship between psychological differentiation and perseveration. To this end, it was hypothesized that field-dependent individuals

would show significantly higher perseveration scores than field-independent ones. This hypothesis was tested in the null form by using a one-tailed t-test. In preparation for this, it was necessary to identify field-dependent and field-independent subjects. This was done by selecting the upper and lower 20% of the entire 210 scores. This percentage was chosen as it was felt that it would yield the maximum of extreme scores that would be of statistical significance in this study. Furthermore, although it is statistically accepted that the upper and lower 16% of scores indicate the extreme groups in a normal distribution, other researchers have used a higher percentage to identify these groups. Cooper (1972)¹² used 30% in his study of Cattell's personality factors, and Bowles (1973)¹³ chose this same percentage in testing field-dependence-independence. Thus, the choice of 20% seems justified in the present investigation.

Accordingly, the upper 20% of the scores on the CFT (regarded as field-independent scores) was selected and matched in a one-to-one correspondence with the scores on the IST. (See Appendix 2). Similarly, the lower 20% of the CFT scores (field-dependent scores) were matched with those on the IST. (See Appendix 3). It was these IST scores

¹² T. M. Cooper, "Cattell's Personality Factors as Prediction of High School Performance," Unpublished Doctoral Dissertation, University of Ottawa, 1972, p. 87.

¹³ Bowles, Op. Cit., p. 32.

that were directly used in testing the research hypothesis, by means of a one-tailed t-test.

It seems feasible to use the one-tailed t-test in this analysis because it was expected, according to the type of prediction made in the research hypothesis, that the mean of the IST scores of field-dependent subjects would be significantly higher than the mean of the IST scores of field-independent subjects. In other words, this suggests "directionality" and hence the one-tailed t-test could be applied.

To support this argument, Fox is quoted as stating that:

...when the research hypothesis specifies the nature of the change or the difference that is expected a one-tailed t-test will be sufficient to test the hypothesis.

The above statement seems to describe exactly the kind of prediction hypothesized in this study, and furnishes further justification for using the one-tailed t-test here.

In this Chapter, some experimented procedures and the testing of the research hypothesis were explained. The results obtained from these processes will be presented in the Chapter that follows.

CHAPTER III

PRESENTATION OF RESULTS

This Chapter begins with a presentation of the results obtained from testing the research hypothesis, and concludes with a summary, followed by a reiteration of the hypothesis.

1. Results of Testing the Research Hypothesis

Of the total 210 CFT and IST raw scores, it was noted that those for the CFT ranged from 10 - 103, while those for the IST ranged from 10 - 24. After selecting the upper and lower 20% of the 210 CFT scores, 42 field-independent and the same number of field-dependent scores were identified. Because these scores were matched in a one-to-one correspondence with those on the IST, there were two sets of IST scores, each containing 42. It was with these IST scores that the basic hypothesis was tested.

According to this hypothesis, it was expected that field-dependent subjects would tend to show a higher perseverative tendency than field-independent ones. This implies that the IST scores for field-dependent subjects would be significantly higher than the IST scores for field-independent subjects. In other words, there should be a significant difference between the means of each of the two groups of 42 IST scores. By computation, the means of the IST scores for field-dependent and field-independent

subjects were 15.7 (\bar{X}_1) and 14.6 (\bar{X}_2), respectively. To ascertain whether there was a significant difference between the means, the one-tailed t-test was applied at the .05 level of confidence. It was noted that the given value of t was 1.67, while the calculated value (t_1) was 1.70 (See Table I). Since $t_1 > t$, this indicates that the difference between the means is significant.

2. Reiteration of Research Hypothesis

It would be recalled that the research hypothesis stated that:

Field-dependent individuals will show a significantly higher perseverative tendency than field-independent ones.

Implicit in this hypothesis is the prediction that the perseveration raw scores for field-dependent subjects would be significantly higher than those for field-independent ones. The results that have just been presented show this to be the case, as the IST raw scores for field-dependent subjects were significantly higher than those for field-independent ones. Thus, the null hypothesis -- which assumes that there would be no significant difference between these scores -- was rejected, and hence, the research hypothesis was confirmed.

Table I

One-tailed t-test for the IST Scores
of Field-Dependent and
Field-Independent Subjects

	n	\bar{X}	SD	NDF	t	t_1
IST (FD)	42	15.7	2.9			
				82	1.70	1.67
IST (FID)	42	14.6	3.4			

t = calculated value of t

t_1 = critical value of t, $p < .05$

CHAPTER IV

DISCUSSION OF RESULTS

In this chapter the results presented in the previous chapter will be discussed, mainly with a view to explain how these results are commensurate with the two theories employed in the present study, and support the basic hypothesis. In addition, some educational implications based on the linkage between the theories and the results will be suggested.

The chapter begins with a discussion, showing how the results are in keeping with the theories of psychological differentiation and perseveration, as adopted in this study. The suitability of the sample and the method of collecting the data are then discussed, followed by a closer scrutiny of the method of testing the research hypothesis. The chapter ends with some inferential comments regarding the practical educational implications based on the results of the present investigation. A summary and the author's concluding remarks bring this study to a close.

1. Theories Supported by Results

The two theories tested were psychological differentiation and perseveration in the form of 'disposition rigidity'. The aspect of psychological differentiation on which this research was based is that of visual perception,

According to the theory held by Witkin et al. This theory holds that some individuals have more difficulty than others, in identifying a given item from among other items in a distracting visual field. This gives rise to the dichotomy of field-dependence-independence which Witkin et al. measured by their EFT. In the present study Thurstone's CFT was used for the same purpose, and according to the results obtained, this test did show individual differences in ability to select items from a distracting visual field, leading to the identification of field-dependent-independent individuals. In this respect, the results seem to support the theory of psychological differentiation in the light of visual perception.

The second theory on which the results were based was Cattell's theory of disposition rigidity as a form of perseveration. According to Cattell, disposition rigidity refers to the fixedness of a person's mental set. In this regard, some individuals tend to be 'rigid' and find it difficult to change their mental orientation, while others tend to be 'flexible' and can change easily. This gives rise to two types of individuals - high perseverators (the rigid type) and low perseverators (the flexible type).

As has been mentioned before, Cattell feels that disposition rigidity shows itself strongly in tests like the Inverted S Test which requires the subject to change rapidly

from a familiar activity to an unfamiliar one. When this test was employed in the present study, the results obtained did indeed indicate wide individual differences in disposition rigidity, so that high and low perseverators were identified. Thus, the results obtained from administering the Inverted S Test, seem to be commensurate with Cattell's theory of disposition rigidity.

These two theories were linked in the present study, due to some theoretical similarities between them, mainly with respect to the cognitive styles and personal characteristics of individuals. This has led to the investigation of a possible relationship between psychological differentiation and perseveration. To this end, the research hypothesis which predicted that field-dependent individuals will show a significantly higher perseverative tendency than field-independent ones was confirmed by the results.

2. The Sample and Method of Collecting the Data

One aspect of the sample which contributes to the authenticity of this research is the fact that the sample consisted of a fairly homogeneous group of normal school children, who were tested under satisfactory testing conditions. The results presented are therefore a true indication of their test performances.

By selecting the upper and lower 20% of the original 210 scores, 42 scores were found at each extreme. Thus, only

the scores of 84 subjects were directly involved in testing the research hypothesis. This sample is considered large enough to be of statistical significance in the present research.

Perhaps a larger sample could have been obtained by testing a population greater than 210 until a very large number of field-dependent-independent subjects was obtained and then subsequently testing these same subjects for perseveration. However, this did not seem very practical because of the difficulty previously explained, of obtaining a very large sample of school children for the present investigation.

Another method of choosing field-dependent-independent subjects from the total 210 subjects would have been to use the Normalized Standard Score Distribution for the CFT, given in the Test Manual.¹ According to this distribution, field-independent subjects would have a Standard Score ≥ 61 , which is equivalent to a Raw Score ≥ 95 , while field-dependent subjects would have a Standard Score ≤ 39 , equivalent to a Raw Score ≤ 29 . This means that from the 210 scores, there would be 49 field-dependent subjects and only 2 field-independent ones. But it would be recalled that the method used in the present research to identify field-

¹ Thurstone and Jeffrey, Op. Cit., p. 5.

DISCUSSION OF RESULTS

dependent and field-independent subjects yielded 42 subjects in each category. Using the Standard Scores was therefore considered unsuitable for this research because of the method by which the data was collected. Furthermore, it is questionable whether the Standard Scores just mentioned should have been used in the present analysis because of the difference in the size and type of sample. While Thurstone's CFT was administered to 210 school children in this study, the Standard Scores were derived from the results of administering this same test to 1,105 male industrial personnel (See Appendix 7). The strict application of the Standard Scores to these results was therefore considered to be a risky statistical approach for the present analysis.

In view of the foregoing, the present researcher feels justified in choosing the sample and using the method of collecting the data, as indicated in this investigation.

The next section will deal with an appraisal of the measuring instruments, with a view to supporting their adequacy.

3. The Measuring Instruments

In the present research, psychological differentiation was tested by using Thurstone's CFT. As has been mentioned in Chapter II, this test is regarded as a valid and reliable instrument for measuring psychological differentia-

tion and has been used for this purpose by many investigators. In the present research, the test was administered according to the procedure specified in the Test Manual, and testing conditions were ideal. The test was also meticulously marked and computed and then thoroughly rechecked. The results obtained are therefore regarded as a true indication of the subjects' performances on that particular occasion. Thus, it seems reasonable to conclude that, for the purpose of this research, Thurstone's CFT is a satisfactory measure of psychological differentiation.

Perhaps the tests used by Witkin et al. for measuring psychological differentiation would have been ideal for this research, but the present investigator foresaw many problems in procuring and administering these tests and had no other alternative but to use Thurstone's CFT.

Perseveration in the form of "disposition rigidity", was measured by Pinard's Inverted S Test. The test was administered once, after one test trial. Only one trial could have been given, due to the limited time allotted by the schools for experimentation. However, this factor did not seem to influence the subjects' performances in the actual test, for it was observed that the results on this test were comparable with those on the trial test.

As has previously been mentioned, Pinard's method of administering the Inverted S Test was strictly followed;

but for reasons already given, Cattell's method of scoring was adopted. This yielded a ratio which was multiplied by 10 for statistical convenience. This method produced raw scores (ranging from 10 to 24) which subsequently proved to be in keeping with the basic hypothesis. The additional fact that the Inverted S Test is a valid and reliable measure of disposition rigidity, as has been documented in Chapter II, allows the present investigator to place much reliance on the results obtained.

A probable cause for concern regarding the present results lies in the reliability of the testing. Both the CFT and IST were administered once, the former with no practice trials, and the latter with only one practice trial. Concerning a single administration of any psychological test Vernon (1972) warns that a single test, or even a battery, is ". . . only partially representative, and may show different correlations with cognitive or personal characteristics from any other test or battery."² In the light of this statement, the present results should be taken only as presented, and not for making broad factual generalizations.

² P.E. Vernon, "The Distinctiveness of Independence" in Journal of Personality, Vol.40, 1972, p. 368.

4. Testing the Research Hypothesis

In this section the testing of the research hypothesis will be re-examined. It would be recalled that it was hypothesized that field-dependent subjects will show a significantly higher perseverative tendency than field-independent ones. Hence, according to the methods used in collecting and analysing the data on the CFT and IST, it was predicted that the IST raw scores of field-dependent subjects would be significantly higher than the IST raw scores of field-independent subjects. In view of this type of prediction, it was considered appropriate to test the research hypothesis by using the one-tailed t-test. This would indicate any significant difference between the means on the IST of field-dependent and field-independent subjects.

When the one-tailed t-test was applied to the 42 IST scores of field-dependent subjects and the same number of IST scores of field-independent subjects, the mean of the field-dependent subjects was 15.7 and that of the field-independent ones was 14.6. The one-tailed t-test indicated a significant difference between the means at the .05 level of confidence, since the calculated value of t was 1.70, while the critical value t_1 was 1.67. (See Table I).

The difference between the means also occurred in the direction predicted -- that, ~~the~~ mean (15.7) of the IST

scores for field-dependent subjects would be greater than the mean (14.6) of the IST scores for field-independent subjects. This is yet another justification for using the one-tailed t-test in testing the research hypothesis. Hence, it is felt that the most suitable methods were used in analyzing the data. This resulted in a confirmation of the research hypothesis, thus bringing the present investigation to a successful conclusion.

5. Educational Implications

The present results have indicated that there is a possible relationship between field-dependence and high perseverance, and between field-independence and low perseverance. From this, certain inferences may be made with a knowledge of only one type of orientation. For instance, if a child is field-dependent, it may be inferred that he will tend to be a high perseverator.

An awareness of a student's orientation regarding either psychological differentiation or perseverance can assist teachers in channelling the student's academic potential in the appropriate direction. For example, field independent people usually excel in mathematics and science. Therefore, if a field-independent student shows an interest in these subject areas, the teacher may encourage him or her to

pursue studies in these subjects which would be compatible with his natural inclination. On the other hand, a field-dependent student who is weak in mathematics and science, but claims an avid interest in them, could be advised by the teacher to try social studies instead, which would be more in line with the student's field-dependent orientation. In general, a knowledge of children's natural tendencies with respect to field-dependence-independence and perseveration may be used as a basis for vocational guidance and in choosing academic programmes at school. In this regard, Cattell points out that:

. . . low perseverators choose more frequently, as college and school subjects, mathematics, science, and, especially, constructive handicrafts, while high perseverators choose languages, history, the humanities, and religion.³

The personal characteristics and cognitive styles of field-dependent and field-independent people, as well as high and low perseverators, also have some positive implications in classroom instruction. For instance, extreme low perseverators are characteristically tense, anxious and excitable, and have a flexible cognitive style. By bearing this in mind, the teacher would realize that children showing these qualities

³ Cattell, "The Riddle of Perseveration", Op. Cit., p. 246.

may probably be low perseverators who are simply following their natural tendencies. Consequently, the teacher will know how to deal with these children, and can employ methods of instruction to suit their needs.

Psychological differentiation and perseveration also have some bearing on a person's conduct. In this regard, Pinard,⁴ as a result of perseveration tests conducted, concludes that: "About 75 per cent of the most 'difficult' and 'unreliable' subjects proved to be extreme perseverators or extreme non-perseverators." With this in mind, a teacher would refrain from being too harsh on children who pose disciplinary problems, and would be more patient and understanding in dealing with them.

4 Pinard, Op. Cit., p. 19.

SUMMARY AND CONCLUSIONS

The purpose of this study was to investigate a possible relationship between psychological differentiation (in terms of visual perception), and perseveration (in terms of disposition rigidity). To this end, it was hypothesized that field-dependent individuals would show a significantly higher perseverative tendency than field-independent individuals.

In the present investigation a sample of 210 subjects was originally used for testing the extent of psychological differentiation by means of Thurstone's CFT, and for testing perseveration by means of Pinard's IST. Of the 210 subjects, only 84 were used to test the research hypothesis. These were divided equally into field-dependent and field-independent subjects.

The research hypothesis was tested by means of a one-tailed t-test, which indicated that field-dependent subjects had significantly higher perseveration scores than field-independent subjects.

However, this study does not allow one to make indisputable generalizations regarding the relationship between psychological differentiation and perseveration, according to the findings presented here. The present researcher feels that there is room for further investigation in this

area before any definite conclusions could be drawn. For instance, one wonders what the outcome would have been if the sample, measuring instruments and method of collecting and analysing the data were different.

Another point to be noted is the fact that, in this investigation, it was not claimed that psychological differentiation and perseveration were identical personality factors. The only claim that was made was that there seems to be a "similarity" between these two factors, giving rise to a certain type of relationship between field-dependence-independence and high and low perseveration.

In conclusion, the present writer considers this investigation to have been a fruitful academic exercise, and hopes that it has contributed to a better understanding of the concepts of psychological differentiation and perseveration. More specifically, it is hoped that educators, teachers, counsellors, social workers, and people in similar professions, will glean helpful insights into human behaviour from the information presented in this study.

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theory of psychological differentiation as a developmental aspect of human behaviour. This text presents the results of empirical inquiry by Witkin et al. with special emphasis on individual difference in cognitive style and adoptive behaviour.

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APPENDIX 1

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RAW SCORES ON CFT AND IST (GROUP A)

<u>S</u>	<u>CFT</u>	<u>IST</u>	<u>S</u>	<u>CFT</u>	<u>LST</u>
1	48	16	45	38	17
2	55	11	46	36	15
3	41	10	47	70	18
4	41	18	48	55	16
5	13	13	49	54	15
6	62	20	50	103	16
7	32	16	51	45	13
8	44	16	52	32	12
9	35	12	53	82	23
10	52	19	54	44	13
11	44	13	55	68	17
12	35	19	56	40	16
13	74	18	57	57	13
14	49	15	58	69	16
15	18	18	59	54	11
16	36	19	60	27	20
17	80	20	61	32	12
18	10	12	62	10	15
19	23	19	63	54	17
20	21	14	64	21	20
21	11	15	65	40	16
22	38	19	66	43	16
23	33	10	67	34	12
24	25	10	68	61	16
25	70	10	69	22	16
26	76	13	70	53	12
27	32	16	71	13	17
28	58	13	72	46	16
29	25	12	73	16	14
30	64	10	74	10	13
31	51	12	75	20	13
32	31	14	76	16	19
33	30	10	77	71	13
34	56	15	78	35	15
35	76	12	79	65	16
36	49	13	80	27	16
37	25	15	81	47	20
38	39	22	82	34	17
39	62	22	83	16	16
40	67	11	84	53	14
41	75	10	85	42	15
42	33	14	86	42	12
43	61	13	87	40	14
44	84	22	88	84	13

RAW SCORES ON CFT AND IST (GROUP A)

<u>S</u>	<u>CFT</u>	<u>IST</u>	<u>S</u>	<u>CFT</u>	<u>LST</u>
89	74	13	133	36	17
90	42	11	134	45	14
91	23	16	135	20	18
92	44	15	136	76	17
93	70	18	137	77	13
94	30	16	138	40	16
95	46	21	139	34	12
96	58	19	140	57	14
97	51	20	141	26	15
98	96	22	142	62	13
99	70	13	143	77	12
100	38	18	144	56	10
101	46	19	145	26	17
102	36	16	146	40	16
103	48	24	147	36	13
104	29	14	148	57	11
105	10	14	149	62	17
106	30	17	150	38	17
107	68	18	151	57	12
108	40	16	152	82	14
109	44	18	153	80	14
110	27	12	154	26	17
111	22	15	155	88	17
112	36	13	156	25	16
113	15	13	157	38	16
114	41	14	158	45	17
115	19	13	159	29	12
116	63	10	160	42	10
117	77	16	161	26	16
118	30	11	162	75	16
119	57	11	163	53	13
120	74	11	164	39	14
121	12	22	165	44	17
122	28	14	166	37	17
123	70	17	167	33	12
124	18	14	168	59	14
125	80	10	169	31	13
126	37	10	170	66	13
127	62	12	171	35	15
128	49	10	172	38	12
129	13	11	173	12	11
130	62	13	174	20	17
131	27	20	175	22	14
132	73	17	176	36	13

RAW SCORES ON CFT AND IST (GROUP A)

<u>S</u>	<u>CFT</u>	<u>IST</u>	<u>S</u>	<u>CFT</u>	<u>LST</u>
177	64	12	194	28	12
178	28	15	195	75	20
179	28	15	196	85	11
180	57	14	197	59	18
181	76	14	198	40	18
182	29	18	199	34	16
183	40	19	200	35	16
184	55	15	201	51	16
185	35	13	202	84	13
186	44	13	203	62	16
187	20	19	204	43	22
188	44	13	205	52	14
189	64	15	206	57	14
190	50	17	207	21	16
191	60	15	208	56	15
192	50	17	209	41	16
193	58	12	210	15	15

N = 210

Means

CFT

IST

S.D.

45.4

15.0

19.9

3.0

APPENDIX 2

DISTRIBUTION OF RAW SCORES OF FIELD-INDEPENDENT SUBJECTS
 (UPPER 20% OF CFT)
 WITH CORRESPONDING RAW SCORES ON THE IST
 (GROUP B)

<u>S</u>	<u>CFT</u>	<u>IST</u>	<u>S</u>	<u>CFT</u>	<u>IST</u>
13	74	18	99	70	13
17	80	20	107	68	18
25	72	10	116	63	10
26	76	13	117	77	10
30	64	16	120	74	11
35	76	12	123	70	17
40	67	11	125	80	10
41	75	10	132	73	17
44	84	22	136	76	17
47	70	18	137	77	13
50	103	16	143	77	12
53	82	13	152	82	14
55	68	17	153	80	14
58	69	16	155	88	17
77	71	13	170	66	13
79	65	16	177	64	12
88	84	13	181	76	14
89	74	13	189	64	15
91	73	16	195	75	20
93	70	18	196	85	11
98	96	22	202	84	13

n = 42

Means
S.D.

<u>CFT</u>	<u>IST</u>
75.3	14.6
8.5	2.9

APPENDIX 3

DISTRIBUTION OF RAW SCORES OF FIELD-DEPENDENT SUBJECTS
(LOWER 20% OF CFT)
WITH CORRESPONDING RAW SCORES ON THE IST
(GROUP C)

<u>S</u>	<u>CFT</u>	<u>IST</u>	<u>S</u>	<u>CFT</u>	<u>IST</u>
5	13	13	110	27	12
15	18	18	111	22	15
18	10	12	113	15	13
19	23	19	115	19	13
20	21	14	121	12	22
21	11	15	124	18	14
24	25	10	129	13	21
29	25	12	131	27	20
37	25	15	135	20	18
60	27	20	141	26	15
62	10	15	145	26	17
64	21	20	154	26	17
69	22	16	156	25	16
71	13	17	161	26	16
73	16	14	162	25	16
74	10	13	172	12	11
75	20	13	174	20	17
76	16	19	175	22	14
80	27	16	187	20	19
83	16	16	207	21	16
105	10	14	210	20	17

n = 42

	<u>CFT</u>	<u>IST</u>
Means	19.4	15.7
S.D.	5.7	3.4

APPENDIX 4

DISTRIBUTION OF RAW SCORES ON THE IST OF FIELD-DEPENDENT
AND FIELD-INDEPENDENT SUBJECTS (GROUPS B AND C)

<u>S</u>	<u>IST (FD)</u>	<u>S</u>	<u>IST (FID)</u>
5	13	13	18
15	18	17	20
18	12	25	10
19	19	26	13
20	14	30	16
21	15	35	12
24	10	40	11
29	12	41	10
37	15	44	22
60	20	47	18
62	15	50	15
64	20	53	13
69	16	55	17
71	17	58	16
73	14	77	13
74	13	79	16
75	13	88	13
76	19	89	13
80	16	91	16
83	16	93	18
105	14	98	22
110	12	99	13
111	15	107	18
113	13	116	10
115	13	117	10
121	22	120	11
124	14	123	17
129	21	125	10
131	20	132	17
135	18	136	17
141	15	137	13
145	17	143	12
154	17	152	14
156	16	153	14

DISTRIBUTION OF RAW SCORES ON THE IST OF FIELD-DEPENDENT
AND FIELD-INDEPENDENT SUBJECTS (GROUPS B AND C)

<u>S</u>	<u>IST(FD)</u>	<u>S</u>	<u>IST(FID)</u>
161	16	155	17
162	16	170	13
172	11	177	12
174	17	181	14
175	14	189	15
187	19	195	20
207	16	196	11
210	17	202	13

n = 42

Mean = 15.7

S.D. = 3.4

n = 42

Mean = 14.6

S.D. = 2.9

APPENDIX 5

ADMINISTRATION OF THURSTONE'S
CLOSURE FLEXIBILITY TEST
(Concealed Figures, Form A)

Orientation: (Pencils, erasers handed out)

This is not an intelligence test, and is not aimed at finding out how "bright" or how "dull" you are, or whether you are of "good" or "bad" conduct. The test is also not a competition with other students. It is simply a test to see how well you can pick out a given drawing from among many other different drawings. The test lasts ten minutes and you should not open your booklets until you are told to do so.

Instructions: (Booklets handed out, face down)

Your booklet should have eight pages. Please check. (Examiner waits). Now, please turn to the first page and write your name, age, sex, etc., in the space provided at the top right-hand corner of the page. (Examiner supervises). All right. Now, kindly follow while I read the instructions on this page. (Examiner reads and explains instructions carefully). Now, you may try the example on this page. (Examiner checks results and explains further, if necessary). If you have any questions, please ask them now, as no questions will be allowed during the test. (Examiner pauses for questions). Fine. Now we are almost ready to begin, but please do not open your booklets until I say "go". Kindly remember the following:

- (1) You are to try to find the drawing on the left from among each one of the four drawings on the right.
- (2) You must work as fast as you can and try not to guess.
- (3) Please do not leave blank spaces. Put a check mark or a "0" as you see fit.
- (4) If you make a mistake you may erase and write it over clearly.
- (5) If your pencil breaks during the test, use the other one on your desk, (or raise your hand if both are broken).

Any questions? (Examiner pauses). Very well. We are ready to begin and when I say "stop", you must stop

ADMINISTRATION OF THURSTONE'S
CLOSURE FLEXIBILITY TEST
(Concealed Figures, Form A)

immediately. You will have ten minutes. Now, get ready ...
"go".

The examiner supervises vigilantly during the test and the booklets are collected at the end of ten minutes.

Scoring:

A subject's raw score was calculated by subtracting the number wrong from the number right of all items attempted.

Example:

$$\begin{aligned}RS &= R - W \\ &= 87 - 20 \\ &= 67\end{aligned}$$

APPENDIX 6

THURSTONE'S CLOSURE FLEXIBILITY TEST
(CONCEALED FIGURES, FORM A)

7

PREVIOUSLY COPYRIGHTED MATERIAL

IN APPENDIX 6, LEAVES 84, 85, 86, 87, 88, 89, 90, 91.

NOT MICROFILMED.

MAY BE OBTAINED FROM:

Industrial Relations Center
The University of Chicago
1225 East 60th Street
Chicago, Illinois
60637

APPENDIX 7

NORMALIZED STANDARD SCORES
FOR THURSTONE'S CFT*

<u>RAW SCORE</u>	<u>STANDARD SCORE</u>	<u>RAW SCORE</u>	<u>STANDARD SCORE</u>
159-155	81	64-60	50
154-150	79	59-55	48
149-145	78	54-50	47
144-140	76	49-45	45
139-135	74	44-40	44
134-130	73	39-35	42
129-125	71	34-30	40
124-120	69	29-25	39
119-115	68	24-20	37
114-110	66	19-15	36
109-105	65	14-10	34
104-100	63	9- 5	32
99- 95	61	4- 0	31
94- 90	60	-1 - -5	29
89- 85	58	-6 - -10	27
84- 80	57	-11 - -15	26
79- 75	55	-16 - -20	24
74- 70	53	-21 - -25	23
69- 65	52		

Mean = 61.46

S.D. = 30.92

* Test Manual, p. 17 (Scores given for 1,105 Male Industrial Personnel).

APPENDIX 8

STANDARD SCORE RANGE* DISTRIBUTION, RE: APPENDIX 7

	<u>Standard Score Range</u>
Very Low	20 - 29
Low	30 - 39
Average	40 - 60
High	61 - 70
Very High	71 - 80

* Test Manual, p. 5.

APPENDIX 9

ADMINISTRATION OF PINARD'S INVERTED S TEST

Orientation:

This is a short, simple test, which will last for four minutes. In this test you will be required to make S's in the normal way and inverted (backward) S's. The purpose of the test is to find out how easily you can change from a familiar way of doing something to an unfamiliar way of doing the same thing. It should be fun. Before doing the real test you will be given a practice trial. Please listen to the instructions.

Instructions:

First, I will ask you to make normal S's as fast as you can for 30 seconds, like this...SSSSS. (Examiner demonstrates on blackboard). Then, beginning in a new line, I will ask you to make inverted S's as fast as you can, for another 30 seconds like this.2222. (Examiner demonstrates again). Third, you will be required to draw normal S's, as in the first case, again, for 30 seconds. Fourth, you will make inverted S's, for another 30 seconds, as in the second case. Finally, you will have to draw normal and inverted S's as quickly as possible for two minutes, like this.S2S2S2. (Examiner demonstrates). So there would be five activities in all, something like this (Examiner puts the following synopsis on blackboard):

1. SSS..... 30secs.
2. 22222. 30 secs.
3. SSS..... 30 secs.
4. 22222. 30 secs.
5. S2S2S 2 mins.

At the end of each activity I will say, "Change, normal S's; Change, inverted S's," etc.. You must change immediately to the activity specified (if even you are in the middle of another activity). You may also glance at the patterns in the left margin to remind you what kind of S's to make. Any questions? (Examiner pauses). I will now hand the sheets out. Please do not write until I say so. (Sheets handed out, face down). Now, turn your paper over and observe the patterns to the left, but do not write. Be sure to put one S in each square, and try to make all the S's the same size. Now we are ready for a practice trial. Get ready....go." (Examiner instructs) . . .

ADMINISTRATION OF PINARD'S INVERTED S TEST

Normal S's ...Go (30 Secs.)
 Inverted S's...Change (30 Secs.)
 Normal S's ...Change (30 Secs.)
 Inverted S's...Change (30 Secs.)
 Normal and
 Inverted S's...Change (2 Mins.)

Stop. (At end of 2 mins). All right. Let's see how you did. (Examiner checks papers, makes clarifications, if necessary, and invites questions. The practice sheets are then collected). Now we are ready for the real test. Please do not write until I tell you to do so. If your pencil breaks during the test, use another. If you make a mistake do not erase. Just quickly strike it off like this (\$) and continue. Try to work as fast as you can and do not stop until I say, "Stop!" Good luck! (Sheets are handed out, face down). Please turn over your paper and write your name, school, age, sex, etc., in the space provided. (Examiner supervises). After this has been done the test is administered as previously explained.

Scoring:

A subject's raw score is calculated by dividing the number of S's correctly made in the first two minutes (activities 1 - 4) by those correctly made in the second two minutes (activity 5), and then multiplying by 10.

Example:

$$\begin{aligned}
 RS &= \frac{A (1-4)}{A (5)} \times 10 \\
 &= \frac{54}{30} \times 10 \\
 &= 18
 \end{aligned}$$

APPENDIX 11

WITKIN'S MEASURES OF FIELD-DEPENDENCE-INDEPENDENCE

To determine whether an individual has a field-dependent or a field-independent orientation, Witkin et al. have used three major tests -- The Rod-and-frame test (RFT), the Tilting-room-tilting-chair test (TRTC), and the Embedded-figures test (EFT).

1. The RFT

The Rod-and-frame test attempts to evaluate the individual's perception of the uprightness of an object in space within a limited visual field. The subject is seated on a chair in a dark room facing a luminous rod superimposed upon a luminous square frame. The frame is in a tilted position, and the rod can be tilted to the right or left, independently of the frame. The examiner then manipulates the rod until the subject claims that it is in an upright position. In order to be successful in this task, the subject must be able to "extract" the rod from the tilted frame through reference to the position of his body. In some trials the subject is tested, seated in an upright position, while in other trials the body is tilted. In all cases, if there is a large tilt of the rod when it is claimed by the subject to be upright, this indicates that the subject is adhering to the surrounding visual field -- the frame. That is, the subject tends to be field-dependent. On the other hand, if the rod is just slightly tilted when it is reported to be vertical, it is an indication of dependence upon the surrounding field, and little reliance on the position of the body. This means that the subject is relatively field-independent.

2. The TRTC

While the RFT determines the individual's perception of uprightness of an item within a field, the TRTC tests are designed to evaluate his perception of the position of his body, as well as of the entire surrounding field with respect to the true vertical.

Because the TRTC tests evaluate the subject's perception from two aspects, they are divided into two tests -- the Body-adjustment test (BAT) and the Room-adjustment test (RAT). The apparatus for these tests is the same, but the

procedures differ slightly. It consists of a box-like room, seventy by seventy-one by sixty-nine inches. It stands on ball-bearing pivots to facilitate tilting to any extent, to the right or left. Inside the room is a pivoted chair which can also be tilted at any angle to the right or left, independently of the room.

The BAT involves the position of the body. The subject is seated in the tilted room and he is required to bring his body to a position that he perceives as being upright. If the subject tilts his body far in the direction of the tilted room to ascertain uprightness, he is relying greatly upon the surrounding field--the tilted room. On the other hand, if the subject is able to bring himself close to the true vertical, he is not much influenced by the surrounding field, but rather, he relies upon the sensation of his body.

The RAT is used to determine how the subject establishes the position of the surrounding field. The room is tilted and he is required to bring it to a true vertical position. If the subject claims that the room is upright while in the initial tilted position, his judgement is affected by the surrounding field -- the room. If, on the other hand, he is able to bring the room to a true upright position, he is relying upon the sensations of his body, rather than upon the surrounding field.

3. The EFT

Like the RFT and TRTC, the EFT requires the subject to perceptually detach himself from a surrounding visual field. However, unlike the other two tests, the EFT does not involve the upright in space.

In the EFT the subject is required to identify a simple figure within a larger complex figure. Witkin et al. used black-and-white figures, on which coloured patterns were superimposed to render the black-and-white outlines more complex. The simple figure is thus regarded as being "hidden" within the more complex figure which contains many obvious subpatterns.

APPENDIX 12

DESCRIPTION OF PINARD'S PERSEVERATION TESTS

Following is a description of four perseveration tests used by Pinard. In these tests Pinard used 194 children of both sexes between the ages of 8 and 15 years. The average inter-correlation among the four tests was 0.34.

1. The Inverted S Test

This test consists of five activities, lasting a total of four minutes. The subjects are instructed to write normal S's as fast as possible for 30 seconds. Then, without a break, they are required to change to writing inverted S's, for another 30 seconds. The first and second activities are repeated immediately, without pauses, for 30 seconds each, followed immediately by the final activity of writing one normal S, followed by one inverted S, for two minutes.

2. The Triangle Test

This test is similar to the Inverted S test that has just been described, except that the subjects are required to draw triangles instead of S's. Thus the procedure may be summarized as follows:

- (1) Triangles, (apex up)... 30 secs.
- (2) Triangles, (apex down)... 30 secs.
- (3) Repeat (1)... 30 secs.
- (4) Repeat (2)... 30 secs.
- (5) Triangles, (apex up, apex down)... 2 mins.

3. Alphabet and Number Test

This test consists of three activities, lasting a total of four minutes. In the first activity the subjects are instructed to write in small letters...a b c d e f g a b c d e f g etc., for one minute, followed by the numbers 1 2 3 4 5 6 7 1 2 3 4 5 6 7 etc., in the second activity for another minute. Finally, they are requested to write letters alternated with numbers, thus, a 1 b 2 c 3 d 4 e 5 f 6 g 7 a 1 b 2 c 3 d 4 e 5 f 6 g 7 etc. for two minutes.

4. The Mirror Image Test

This test consists of two activities and lasts four minutes. The subjects are requested to write in block letters, the series...BCDEFBCDEF etc., as fast as possible for two minutes. Then they are required to write these same letters in series, in an inverted form as they would appear in a mirror. This activity also lasts two minutes.

In the second activity of this test, the literature examined did not reveal whether Pinard allowed his subjects to look in a mirror at the time of testing, whether he demonstrated the inverted letters, or whether he simply relied upon their imagination.

In all the above tests, the activities followed one another in rapid succession. The method of calculating the raw score adopted by Pinard in each test was to subtract the number correct in the last two minutes from the number correct in the first two minutes.

APPENDIX 13

ABSTRACT OF

Psychological Differentiation as Related
to Perseveration¹

The present research was inspired by two theories - the theory of psychological differentiation formulated by Witkin et al., and the theory of perseveration in the form of disposition rigidity, propounded by Cattell.

Through his readings in Educational Psychology, the present writer encountered these two theories on separate occasions, and noted some striking theoretical similarities between them. In particular, there seemed to be some resemblance between psychological differentiation with respect to 'visual perception', and disposition rigidity in terms of 'mental inertia'. This prompted further research into these aspects of the two theories, and since the literature reviewed failed to reveal any previous attempt to investigate a possible relationship between the two theories as specified above, the present researcher decided to embark upon such a task. Furthermore, the theory of perseveration is an old one, and has been presented from slightly different points of view,

¹ Hudson A. Noel, master's thesis presented to the School of Graduate Studies of the University of Ottawa, Ontario, 1978, viii-100 p.

APPENDIX 13

some of which are surrounded by uncertainty. This, together with the conviction that a personality trait called 'perseveration' does indeed exist, served as an added impetus to undertake present investigation, in an effort to crystallize the psychological phenomenon of perseveration.

This research was done in the province of Ontario, Canada, under the supervision of the University of Ottawa. It was begun in October 1976 and was completed in August 1978.