FIELD DEPENDENCE AMONG THE EDUCABLE MENTALLY RETARDED

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CHAPTER I

Introduction

A frequent complaint about the mentally retarded student is that he is unable to attend to and to concentrate on elements of his environment. White (1964) describes the process of attending as when "something has been made the center or object or topic in regard to which we are actively busy or occupied whether perceptually or intellectually or even practically." Some writers on attention (Mackintosh, 1965; Santostefano & Slayton, 1967) include differential response to stimuli as a major component of the concept. This viewpoint encompasses perceptual proficiency as related to the analysis of stimuli and the discrimination of adjacent forms (Easterbrook & Costello, 1970). Witkin (1965) terms deficiency in this aspect of attention as "field dependence" which entails an inability to keep item from context in many perceptual situations. The hypothesis which guided the work of Witkin and his associates toward this finding was:

> The differentiation hypothesis proposes an association among characteristics of greater or more limited differentiation, identified in the comparison of early and later functioning in each of several psychological areas: degree of articulation of experience of the world; degree of articulation of experience of the self, reflected

> particularly in nature of the body concept and extent of development of a sense of separate identity; and extent of development of specialized, structured controls and defenses. (Witkin, Dyk, Faterson, Goodenough, & Karp, 1974, p. 16)

They suggest that field dependence is a cognitive and perceptual differentiation style which underlies the organism's development toward greater psychological complexity. Psychological differentiation is a lasting aspect of the personality which is manifested in perception through the field dependence continuum. The degree of perceptual differentiation is the product of a complex interaction between intellectual and personality characteristics (Witkin, Faterson, Goodenough, & Birnbaum, 1966).

It long has been apparent to educators and workers in the field of mental retardation that a total intellectual measurement is not adequate in describing an individual's cognitive abilities and functioning. The determination of the importance of the field dependence variable among the mentally retarded would assist in understanding the processes of learning and behavior as evidenced with this population. The combination of intellectual processes and field dependence suggests that the knowledge of perceptual style is necessary for a complete understanding of mental retardation. "The construct of cognitive style can contribute to the understanding of individual differences in the processing of information" (Coop & Sigel, 1971, p. 152).

The total picture would have ramifications in all aspects of the lives of the mentally retarded, particularly in the realm of educational goals and methodology. The understanding of the relationship between their intellectual style and their field dependence style broadens the scope of describing, comparing, and teaching the mentally retarded individual, particularly the mildly retarded individual. The analysis of the perceptual patterns in mental retardates can provide enlightenment into normal as well as deviant development; the use of its measurement could be unlimited in the field of education.

In the search for indicators of intellectual and behavioral functioning, patterns of subtest scores on standardized individual intelligence tests have been studied. However, in order to determine cognitive functioning rather than intellectual or behavioral functions alone, the patterning must include not only performance on subtests of standardized individual intelligence tests but perceptual performance on field dependence tests as well (Witkin et al., 1966).

Goodenough and Karp (1961) investigated cognitive functioning through a series of factor analysis studies. The battery of tests used in the studies included perceptual tests and intelligence tests, among them the subtests of the Wechsler Intelligence Scale for Children (WISC). They found three major factors which apparently account for most of the

intercorrelations among the tests. One factor, the most closely related to this study, encompasses both perceptual and intellectual tasks. Loading on this factor included tests of field dependence and the Block Design, Picture Completion, and Object Assembly subtests of the WISC.

Statement of the Problem

In order to enhance the educator's ability to assist the mentally retarded in reaching the educational goals of self-realization, human relationships, economic efficiency, and civic responsibility, knowledge of the importance of field dependence as related to this population must be garnered. If, in fact, the mentally retarded student cannot be classified as relatively field dependent, another factor must account for the retardates' supposed inability to concentrate on elements within their environments. This study examined field dependence among the educable mentally retarded.

Purpose of the Study

The purpose of the study was to investigate field dependence as it relates to the educable mentally retarded. It was hypothesized that:

1. The educable mentally retarded are field dependent rather than field independent in their cognitive styles.

2. The performance of educable mentally retarded students on the field dependent measurement relate more closely to the performance of normal students of the same mental age (MA) on the field dependent measurement rather than the performance of normal students of the same chronological age (CA) on the field dependent measurement.

CHAPTER II

Method

Subjects

Three groups of students served as subjects in this study. The samples were chosen from several Texas public schools located in predominantly Caucasian neighborhoods with some Black and Mexican-American children. The primary group contained educable mentally retarded (EMR) students. The remaining two groups contained intellectually normal students; one group had relatively the same CA as the EMR group; the other group had relatively the same MA as the EMR group.

Criteria for Group I.

1. Twenty subjects from several Texas public school districts.
2. Age range from 10 to 12 years of age.
3. Educable mentally retarded, 47 - 79 IQ.

Criteria for Group II.

1. Twenty subjects from several Texas public school districts.
2. Age range from 10 to 12 years of age.
3. Normal intellectual ability, 81 - 121 IQ.
4. CA comparable to that of Group I.

Criteria for Group III.

1. Twenty subjects from several Texas public school districts.
2. Age range from seven to nine years of age.
3. Normal intellectual ability, 84 - 118 IQ.
4. MA comparable to that of Group I.

Table 1 shows the summary characteristics of the three groups from the data given in Tables 7, 8, and 9 of Appendix C.

Measuring Instruments

Wechsler Intelligence Scale for Children - Revised (WISC-R). The revised WISC is designed as a test of general intelligence, a set of standardized questions and tasks to assess an individual's potential by measuring a subject's current intellectual capacity. This test is based upon intelligence defined as "the overall capacity of an individual to understand and cope with the world around him" (Wechsler, 1974, p. 5).

A deviation intelligence quotient is obtained by comparing the test performance of the subject to the scores obtained by the standardization group of his own age level. Therefore, a subject's obtained IQ does not vary from year to year unless his actual test performance as compared with his peers varies.

Table 1

Characteristics of the Three Groups

Variable	Group I	Group II	Group III
IQ			
Mean	66.30	98.65	98.85
SD	11.02	11.05	11.88
Range	47 - 79	81 - 121	84 - 118
CA (years)			
Mean	11.43	11.45	8.39
SD	.89	.72	.71
Range	10.08 - 12.92	10.25 - 12.33	7.50 - 9.75
MA (years)			
Mean	7.77	11.81	8.59
SD	1.24	1.94	1.40
Range	5.67 - 9.75	8.58 - 15.17	6.58 - 11.42

The WISC-R consists of twelve tests of which only ten are mandatory, five Verbal Tests and five Performance Tests:

Verbal	Performance
Information	Picture Completion
Similarities	Picture Arrangement
Arithmetic	Block Design
Vocabulary	Object Assembly
Comprehension	Coding

Because of the variety in its tests, the WISC-R often is used as a psychological or educational assessment tool. When the WISC was revised, special attention was paid to preserving the features which established the WISC as a useful clinical and diagnostic instrument. Some changes were made in the individual items, but the WISC-R as a whole remains structurally and contextually the same.

Children's Embedded Figures Test (CEFT). The CEFT (Witkin, Oltman, Raskin, & Karp, 1971) is a measure of Witkin's (1954) field dependence hypothesis appropriate for children. Complete instructions for its administration are included in Appendix A. With the CEFT, the subject is taught to discriminate an embedded shape through demonstration and practice, then is differentially reinforced for correct or incorrect responses in locating the embedded figure within a complex design--a meaningful object from which the figure may be removed. The score the subject earns

on this research instrument is the number of simple figures he correctly identifies. A high score reflects relative field independence.

Procedure

The Wechsler Intelligence Scale for Children - Revised (WISC-R) and the Children's Embedded Figures Test were administered to each member of the three sample groups. The usual one-to-one testing situation with the qualified examiner and subject was utilized. The subjects were tested within the familiar confines of their respective schools after permission of parents and school district administrators was obtained. The public school districts placed the results of the WISC-R in each subject's permanent file; the results of the CEFT were not recorded as the instrument can be used for research purposes only. The names of the subjects, their schools, and school districts are not used in the dissertation report. However, the results of the entire study were forwarded to the school districts taking part in the research.

Analysis of the Data

In this study, data were utilized from a total of 60 subjects comprising three groups of 20 subjects to a group. Data were gathered through the administration of the

two instruments: WISC-R and CEFT. For the WISC-R, the total IQ and MA were determined; for the CEFT, the total raw score was determined.

In order to analyze the data, the basic characteristics of the three groups were determined--the mean, standard deviation, and range of their chronological ages, mental ages, and IQ's as shown by the WISC-R. The mean, standard deviation, and range of each group's performance on the CEFT also were determined. Analysis of variance, with a significance level of .05, was tested to determine the null hypothesis that there is no significant difference among the mean of the CEFT for Group I, the mean of the CEFT for Group II, and the mean of the CEFT for Group III. Post hoc pairwise comparisons were determined with the Tukey Test; again, .05 was the level of significance.

CHAPTER III

Review of Research

The review of research will form a background for the investigation of field dependence as related to the educable mentally retarded. A basic knowledge of field dependence, its development and measurements, is imperative before proceeding to its usefulness with the mentally retarded.

Field Dependence

In recent years considerable attention has been given to the study of cognitive styles (Messick, 1969; Spotts & Mackler, 1967; Stanes & Gordon, 1973; Witkin et al., 1974). The term is a widely used but an ambiguously defined concept which describes the distinctive ways in which individuals come to grips with reality (Klein, 1951). These enduring patterns of personal cognitive consistency represent typical modes of perceiving, remembering, and problem solving. Cognitive styles account for some of the individual differences in personality and intellectualization and are inferred from the form of cognition consistencies as distinct from the level of cognitive performance (Messick, 1969).

Witkin (1964) and Kagan, Moss, and Sigel (1963) have studied a dimension of cognitive style which entails aspects

of the ability to segregate elements from their environmental whole situations. Witkin and his associates, probably the most arduous compilers of research in this field, have systematically investigated this dimension of personality in their work with field dependent and field independent cognitive styles. Dyk and Witkin (1965) postulate that field independence ability is a part of the articulation of experience; field independence is not the capacity for figure-ground separation. Figure-ground skill implies the ability to merely distinguish separate forms according to immediate importance while field independence is the ability to overcome the embedded context. The concept of field independence

> represents a continuous dimension ranging from analytical perception, in which the individual segments of the environment are perceived as distinct from their background, to global perception in which the influence of the background is difficult to oversome. (Sweeney & Fine, 1965, p. 757)

Witkin began his work on the personality dimension of field dependence in the late 1940s with studies investigating how the individual orients himself in space. His early work emphasized the importance of individual differences in the manner in which people perceive both the world and themselves. It appears that Witkin's work is influenced by the Gestalt tradition, particularly the work of Werner (1948) and Lewin (1935). The Gestalt school of psychology characterizes

perceptual experience as being derived from the organism's innate capacity for organizing stimuli. Perception is understood only in terms of the field in which it occurs. Many of Witkin's studies are concerned with the effect of field forces on perception which will become even more evident in the later discussion of his experimental materials. His earlier experiments were performed in collaboration with such representatives of the Gestalt tradition as Asch (Asch & Witkin, 1948a, b; Witkin & Asch, 1848a, b). This series of experiments grew out of a controversy beginning with Wertheimer (1912) and expanded by Gibson and Mowrer (1938) which concerned the nature of perception of the vertical. The studies of Witkin and Asch revealed that subjects attempt to utilize both postural cues and visual cues; when these cues are in conflict a compromise results so that the vertical is perceived as somewhere between the gravitational and visual verticals (Irving, 1970). The subjects are consistent in performance; this consistency in individual performance patterns triggered several decades of research on the relationship between personality and perception.

The original studies led Witkin to a concern for the possible implications of the differences observed between individuals. His findings as reported in Psychological Differentiation (Witkin et al., 1974) rest upon his earlier

work (Witkin, 1949) and the book Personaltiy through Perception (Witkin, Lewis, Hertzman, Machover, Meissner, & Wapman, 1954). Witkin and his colleagues found that situations which most clearly differentiate individuals as being field dependent or field independent are those in which the stimuli to be perceived are weak and difficult to perceive. They grouped their investigations into three broad areas of study: self consistency in perception; the relation between perception and personality; and developmental changes in perception and personality (Irving, 1970). The work of Witkin's group (1974) is based upon the hypothesis that a general cognitive style judged from performance in many perceptual and intellectual situations can be characterized. This cognitive style reflects the ability to find or manipulate an item which is embedded within a surrounding context.

Witkin and his associates (1954, 1974) have collected a large body of data on the perceptual dimension which they refer to as the field dependent dimension. This perceptual dimension is part of an underlying process of differentiation development. Differentiation functioning shows that the analytic level displayed in one area by an individual is positively related to his functioning in other areas. From knowledge of a person's level of differentiation, predictions

can be made regarding his functioning in such areas as personality, perception, and intelligence (Witkin, et al., 1974).

These data suggest that an individual's functioning can be characterized along a dimension reflecting an analytic versus a global approach to perceiving experience items. This dimension has been thoroughly studied through measures of field dependence, defined as "the ability to overcome embedded context in perception" (Witkin et al., 1954). Irving (1970) reports that studies to define types of cognitive styles utilize tests of field dependence.

> Both the field dependence hypothesis and the differentiation hypothesis are correlational. They rest on the stability of response mode across a number of different methods of assessing dependence of differentiation. (p. 105)

Field dependence relates to the ability to resist or produce figure-ground and perspective reversals if subjects are to resist or produce attention shifts (Haronian & Sugerman, 1966; Jackson, 1958). It refers to a style of perceptual response in terms of the degree of reliance on the prevailing visual field and is related to methods of structuring experience and identity. Stated succinctly, field dependence refers to individual differences in the ability to overcome embedded contexts (Witkin et al., 1974). This is consistent with the findings of Thurstone (1944). Not only

is the individual performance consistent from test to test, but there is a high degree of stability across time (Witkin, Goodenough, & Karp, 1967). Witkin et al. (1974) found that field dependent individuals are less "psychologically differentiated" from other people and from the external environment than field independent individuals. The former rely heavily on external cues while the latter are more attuned to self cues and rely less on external stimuli. Messick (1969) shows that the perception of relatively field dependent individuals is dominated by the overall organization of the environment while relatively field independent subjects readily perceive elements as discrete from their backgrounds.

Longitudinal studies suggest that an individual's characteristic approach to the world is largely determined by the age of eight (Goodenough & Eagle, 1963). However, the individual approach affects the degree and speed of perceptual style as it progresses from a relatively global perceptual approach at about eight years of age to a more analytical approach by young adulthood, with a sharp rise in field independence between 10 and 13 years of age (Witkin et al., 1954).

Fitzgibbons, Goldberger, and Eagle (1965), as well as Messick and Damarin (1964), are concerned about the impression that field independent individuals have an advantage over

field dependent peers. They have found that there are situations in which a strong reliance upon the environmental field, particularly in the area of social skills, is beneficial in the acquisition of incidental information. Field dependent subjects exhibited better memory for faces and social words even when their incidental memory for nonsocial stimuli was not superior. Noting that certain types of situations favor field dependent subjects over field independent subjects is extremely important. It highlights the value of viewing the opposing poles in the cognitive style of field dependence versus field independence in a nonjudgmental manner. Unlike convertional ability dimensions, field independence is not uniformly more adaptive than field dependence.

At this point mention must be made of those researchers who disagree with Witkin's findings. Gruen (1957) and Young (1959) indicate that field dependence is not a single coherent description of an individual; the style is too complex and sensitive to uncontrollable variables. Their evidence indicates that disembedding varies from test to test and population to population. Witkin's construct is not differentiated from spatial intelligence, and possibly not from general intelligence. Elliott (1961) suggests that the field dependent individuals become ineffective in strange and unstructured situations; field dependence is related merely

to uncertainty. Weckowicz (1960), in his studies, shows that field dependence represents a loss of an abstract or categorical attitude. However, Karp (1963) supports Witkin's hypothesis that field dependence involves the ability to overcome the effects of embedded contexts. He found that field dependence tests and other embeddedness tests load and define different factors from distraction tests, though they tend to be moderately correlated. Distraction is not synonymous with field dependence.

Measuring Instruments

Initially, field dependence was defined by the subject's performance on three individually administered laboratory spatial orientation tests. Each test required the subject to adjust his body or an object to an absolute upright position while conflicting visual and proprioceptive information was introduced into his environment (Jackson, Messick, & Myers, 1964). From there the Body Adjustment Test (BAT), the Rod and Frame Test (RFT), and the Embedded Figures Test (EFT) were developed as measures of field dependence. The BAT utilizes a chair within a small room, both of which can be tilted independently. The object is to move the chair to an upright position while ignoring the room which is being rotated to the right or left. The RFT contains an illuminated rod and frame both of which can be rotated. The subject is

required to adjust the rod to the upright position regardless of the orientation of the frame. On the EFT the subject is required to locate a simple figure embedded in a complex printed design. Scoring is based on the time taken to locate the figure. This test is a modification of the Gottschaldt Figures. The embedded figures task, orginated by Gottschaldt (1938), was constructed to explore the effect of past experiences on the organization of complex figures. Subjects were shown simple figures many times to determine if they could recognize the figures when they were embedded within a more complex figure. With this test Gottschaldt found that the organization of a perceptual field depends upon the properties of the stimulus figure rather than upon previous experience. Witkin (1950) modified the Gottschaldt Figures and added color to increase the difficulty level. His studies showed that the EFT correlated highly enough with the laboratory orientation measures to suggest its use as a measure of field dependence.

> The very circumstances which give rise to the need for the CEFT--i.e., that young children find the EFT too difficult--preclude the use of direct validation procedures which involve correlating CEFT scores with EFT scores. (Witkin et al., 1971, p. 25)

With validation data still incomplete, the authors recommend that, for the present, the CEFT be used for research purposes only. However, it is considered an adequate measure of

field dependence for the following reasons as suggested by Watson (1964):

1. Face validity is supported by a subjective task analysis as related to Witkin et al. (1974, p. 57) stating that "an analytical, in contrast to 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."
2. In the 9 to 12 age group the validity coefficients with the CEFT were high, ranging from .70 to .86. This indicates that both tests measure essentially the same characteristic of field dependence at that age level.
3. An examination of the standardization data shows that the analysis of variance indicates significant age effects with performance increasing with age. This suggests that the characteristic being measured exists at the early age and becomes more pronounced with increasing age.

In a series of factor analysis investigations of cognitive functioning (Goodenough & Karp, 1961; Karp, 1963) the subtests of the WISC and perceptual tests were studied. The perceptual organization factor on the WISC takes on a more

complete dimension when perceptual tests are added to the analysis. The common skill appears to be the ability to perceive figures as discrete from their environment. Witkin's group (1974) report that field dependence measures load highly on the performance, analytical, "spatial decontextualization," or "flexibility of closure" factors found by other investigations. Analytical style correlated more consistently with performance IQ than with verbal IQ (Goodenough & Karp, 1961) so that field independent subjects exhibit a marked advantage on analytical intelligence tasks, but they were not superior in verbal intelligence or general intelligence. In a study by Kagan, Rosman, Day, Albert, and Phillips (1964) nonretarded analytical elementary children scored significantly higher on certain WISC performance subtests than other nonretarded elementary children.

Field Dependence and Mental Retardation

The question now arises as to the relationship between field dependence and mental retardation. Witkin always has postulated that field dependence is not related to general intelligence. Busch and Ridder (1971) have found no relationship between intelligence and field dependent scores. They further state that it should not be necessary to control for effects of general intelligence in studies of field

dependence. The results of the Bigelow (1971) studies indicate that there are no significant differences between performances on the Children's Embedded Figures Test for high and low IQ groups.

There are several investigations which contradict the above studies. Haronian and Sugerman (1966) and Jackson (1957) found that a correlation of about .40 to .60 exists between field dependence and general intelligence for adults. Witkin (1964) counters this with his suggestion that some intellectual tasks may require the capacity to overcome embedded figures; therefore, the relationship between IQ scores and field dependence measures may be a function of this common factor. He negates the importance of intellectual factors in field dependence.

> The relation between the extent of field dependence and full scale IQ is carried specifically by portions of intelligence tests which like the perceptual tests . . . involve the capacity for analytical functioning. (Witkin et al., 1974, p. 80)

However, the results of the Dubois and Cohen (1970) study question the adequacy of Witkin's notion that relations reported between intelligence and field dependence can be explained on the basis of a common requirement for overcoming embedded figures.

Several studies, such as Guyette, Wapner, Werner, and Davidson (1964), have shown the importance of the linkage

between intellectual process and perception in the mentally retarded. Wyne, Coop, and Brookhouse (1970) studied 40 young educable mentally retarded children and concluded that field dependence is a viable determinant of the modes which retarded children utilize in processing information. "The mildly retarded show a range in their individual modes of cognitive style to be found in non-retarded subjects" (p. 375). Many investigators (Beck & Lam, 1955; Keogh, Wetter, McGinty, & Doulon, 1973; and Newman & Loos, 1951) have found that the mentally retarded, particularly the educable mentally retarded, tend to score higher on the performance scale than on the verbal scale of the WISC. Keogh et al. (1973) discovered that the educable mentally retarded scored highest on the analytical subtests.

In a different vein, Horne and Justiss (1968) compared 40 institutionalized retardates to 40 normal second and third graders of approximately the same mental age (not chronological age) and found no significant difference between raw scores of the two groups on embedded figures tests. A study by Olson (1971) showed that the apprehension of visual information is a function of the degree of retardation when chronological age was held constant but not when mental age was held constant. Similar results are found in the work of Brooks and Clair (1971). In conclusion, Das (1972) offers

the suggestion that the retarded and nonretarded may be using two distinct modes of coding information.

Many of the above mentioned studies involved the WISC, not the WISC-R. As of yet, no research is available on the latest revised edition of the test which could be applied to the present study.

Summary

It can be stated that elements of the present study have been researched previously; however, none of the elements has been combined in such a precise manner. Much of the current research is controversial and opposite conclusions have been drawn. To date, there has been no definitive indication of unanimity of results. The present investigation was undertaken in order to clarify the relationship between field dependence and mental retardation.

CHAPTER IV

The Findings

The results of the statistical analyses of the data are presented in this chapter. Table 2 shows the summary table for the data given in Table 10 of Appendix C.

Table 2

Summary of Performance on the Children's Embedded Figures Test

Group	Number	Mean	SD	Range
I	20	10.35	4.88	4 - 19
II	20	15.05	5.29	6 - 25
III	20	10.90	5.49	4 - 23

A one way analysis of variance was utilized to test the hypothesis (Ho_1) that there was no significant difference among the means for Group I, Group II, and Group III on the CEFT. Group I consisted of educable mentally retarded students, while Group II contained students of normal intelligence with comparable CA and Group III utilized students of normal intelligence with comparable MA. Table 3 gives the summary of the analysis of variance for the data in Table 2.

Table 3

Analysis of Variance Summary Table for Ho_1

Source	Sum of Squares	df	Mean Square	F-Ratio
Between	264.1	2	132.05	4.8395
Within	1555.3	57	27.29	
Total	1819.4	59		

At the .05 level of significance for a one way analysis of variance, the critical value for the test of Ho_1 is 3.16 (Hays, 1965). With the calculated value of the F-ratio being greater than the critical level of F, the null hypothesis is rejected. Therefore there is a significant difference among the three groups of children in their performance on the CEFT.

The task then was to explore the data to find the source of this comparison difference and to try to explain its meaning. Tukey's Test, with a .05 level of significance, was used to evaluate the significance of the differences among the means. Table 4 gives this information.

Table 4

Comparisons of Means

Groups	Ranked Means	Mean Difference	Tukey's Test Range Value
II and I	15.05 - 10.35	4.70	4.01803
II and III	15.05 - 10.90	4.15	3.67930
III and I	10.90 - 10.35	0.55	3.67930

If the mean difference exceeds the range product value of Tukey's Test, the means are significantly different. Each comparison was analyzed as a null hypothesis. Ho_2, that there is no significant difference between the mean of Group II and the mean of Group I on CEFT performance, is rejected because the mean difference exceeds the range value. The same conclusion was made for Ho_3, that there is no significant difference between the mean of Group II and the mean of Group III on CEFT performance. However, Ho_4, that there is no significant difference between the mean of Group III and the mean of Group I on CEFT performance cannot be rejected as the mean difference does not exceed the range value of Tukey's Test.

Following is a statement of the specific null hypotheses tested and their rejection or failure to reject at the .05 level of significance:

Ho_1: There is no significant difference among the mean of the CEFT for Group I, the mean of the CEFT for Group II, and the mean of the CEFT for Group III. (Rejected)

Ho_2: There is no significant difference between the mean of the CEFT for Group I and the mean of the CEFT for Group II. (Rejected)

Ho_3: There is no significant difference between the mean of the CEFT for Group II and the mean of the CEFT for Group III. (Rejected)

Ho_4: There is no significant difference between the mean of the CEFT for Group I and the mean of the CEFT for Group III. (Failed to reject)

Then a study was made to determine the relationship between the students' performance on several subtests of the WISC-R and the CEFT. As noted in Chapter III, several research projects have attempted to relate the subtests of the WISC to measures of field dependence. Goodenough and Karp (1961), as well as Karp (1963), found that Picture Completion, Block Design, and Object Assembly of the WISC and measures of field dependence load highly on the same factor called analytical ability. In the present study, the subjects' performance on these three subtests was compiled. Table 5 shows the summary statistics for the WISC-R subtests data given in Tables 11, 12, and 13 of Appendix C.

Table 5

WISC-R Subtests Summary Table for the Raw Scores

Subtest	Group I	Group II	Group III
Picture Completion			
Mean	14.70	19.55	16.05
SD	5.03	3.25	3.43
Range	3 - 21	11 - 24	9 - 22
Block Design			
Mean	14.35	28.85	17.15
SD	8.02	10.19	8.54
Range	1 - 27	11 - 48	4 - 36
Object Assembly			
Mean	16.75	21.80	18.30
SD	5.32	3.94	4.31
Range	6 - 25	14 - 30	12 - 26

The data were compared to CEFT performance by means of the Pearson Product-Moment Correlation. The correlation between the three individual subtests and the CEFT were tested to determine significant relationships between the subtests and the CEFT. Refer to Table 2 for the summary data of the CEFT. Table 6 lists the correlation data.

Table 6

Correlation Coefficients Between the Raw Scores of Three WISC-R Subtests and the CEFT Scores

Subtest	CEFT		
	Group I	Group II	Group III
Picture Completion	+.487	+.087	+.199
Block Design	+.485	+.562	+.625
Object Assembly	+.531	+.470	+.518

With any correlation coefficient above +.369 (Freeman, 1965) being statistically significant at the .05 level for a one tail test, several hypotheses were tested:

Ho_5: There is no significant relationship between CEFT scores and Picture Completion scores for Group I.
(Rejected - positive relationship found)

Ho_6: There is no significant relationship between CEFT scores and Block Design scores for Group I.
(Rejected - positive relationship found)

Ho_7: There is no significant relationship between CEFT scores and Object Assembly scores for Group I.
(Rejected - positive relationship found)

Ho_8: There is no significant relationship between CEFT scores and Picture Completion scores for Group II.
(Failed to reject)

Ho_9: There is no significant relationship between CEFT scores and Block Design scores for Group II.
(Rejected - positive relationship found)

Ho_{10}: There is no significant relationship between CEFT scores and Object Assembly scores for Group II.
(Rejected - positive relationship found)

Ho_{11}: There is no significant relationship between CEFT scores and Picture Completion scores for Group III.
(Failed to reject)

Ho_{12}: There is no significant relationship between CEFT scores and Block Design scores for Group III.
(Rejected - positive relationship found)

Ho_{13}: There is no significant relationship between CEFT scores and Object Assembly scores for Group III.
(Rejected - positive relationship found)

In summary, a positive relationship was found between all combinations of the variables with the exception of Picture Completion scores. There was no significant correlation between them and CEFT scores for Group II and Group III.

CHAPTER V

Discussion

Summary

The purpose of this study was to investigate field dependence as it relates to the educable mentally retarded. An attempt was made to determine if the educable mentally retarded are field dependent rather than field independent in their cognitive styles. It was hypothesized that the educable mentally retarded would relate more closely to normal students of the same MA rather than normal students of the same CA on the field dependent measurement. The validity of this hypothesis was to be determined from an analysis of variance of the field dependence performance of the three groups of students.

The design of the study allowed an investigation into the relationship between field dependence and three subtests on the Wechsler Intelligence Scale for Children - Revised for retarded and nonretarded pupils. The comparison was to be made through a correlational study on the Picture Completion, Block Design, and Object Assembly subtests to the Children's Embedded Figures Test performances of the three groups of pupils.

The study was conducted with sixty students from several Texas public school districts. They were divided into three groups with the primary group (Group I) consisting of students in educable mentally retarded programs who were in the 10 years through 12 years age range. Group II contained students of normal intelligence with CA comparable to the students of Group I while Group III utilized students of normal intelligence with MA comparable to Group I (see Table 1). The WISC-R was administered to determine the IQ and MA for all the subjects and their field dependence level was determined through the CEFT. The supplementary investigation utilized the same three groups and their performance on the three WISC-R subtests of Picture Completion, Block Design, and Object Assembly.

Conclusions

The major null hypothesis (Ho_1) tested was that there would be no significant difference among the educable mentally retarded group, its comparable CA group, and its comparable MA group in their performance on the CEFT. The data from the present study showed a rejection of this null hypothesis. In the pairwise comparisons, a clear picture emerged as to the statistical reason for the rejection. The analysis failed to reject the null hypothesis (Ho_4) that

there was no significant difference between the performances of the educable mentally retarded group and its comparable MA group on the CEFT. The remaining null hypotheses of no significant differences between (Ho_2) the educable mentally retarded group and its comparable CA group, and (Ho_3) between the comparable CA and MA groups, on CEFT performance were rejected.

The rejection of Ho_3 shows that field dependence levels as measured by CEFT do not remain static as the student progresses through childhood. There is a difference in field dependence abilities between the seven to nine year olds and the 10 to 12 year olds when intelligence is held constant, with the younger group being more field dependent. This concurs with the findings of Witkin et al. (1954) in that the individual progresses from a relatively global perceptual approach to a more analytical approach, with a sharp rise in field independence between 10 and 13 years of age.

Of more importance in this study is the rejection of Ho_2 and the failure to reject of Ho_4. Field dependence of the educable mentally retarded in the 10 to 12 years age range is comparable to normal students of the same MA and not comparable to normal students of the same CA. Clearly, field dependence is related to general intelligence when the educable mentally retarded are studied. This information

substantiates several previous studies. Haronian and Sugerman (1966) and Jackson (1957) found a positive correlation between field dependence and general intelligence for adults. Horne and Justiss (1968), in their work with institutionalized retardates, found no significant difference between the retardates and normal second and third graders of approximately the same mental age on an embedded figures test. Research by Olson (1971) and Brooks and Clair (1971) show that the apprehension of visual information is a function of the degree of retardation when CA is held constant but not when MA is held constant. Das (1972) concluded that the retarded and nonretarded may be using two distinct modes of gathering and interpreting information.

However, the results of the present study contradict the findings of other previous researchers in field dependence. Witkin has maintained that field dependence is not related to general intelligence. Busch and Ridder (1971) concur in that they found no relationship between intelligence and field dependence scores. They go so far as to state that it should not be necessary to control for effects of general intelligence in studies of field dependence. Also, Bigelow (1971) concluded that there are no significant differences between performances on the Children's Embedded Figures Test for high and low IQ groups.

In summary, the present study shows that general intelligence is related to field dependence. This is demonstrated through the findings that field dependence of 10- to 12-year-old educable mentally retarded (EMR) students is comparable to normal students of the same MA and not comparable to normal students of the same CA. With field dependence considered a dimension of cognitive style as well as of personality, the results indicate that the development of cognitive differentiation of the EMR is slower than that of his normal peers. The retardates' progression from a relatively global perceptual approach to a more analytical approach of coming to grips with their environment is arrested or develops more slowly. When compared to their normal peers, the EMR appear to rely more heavily on external cues and are dominated by the overall organization of their environment. The influence of the background is more difficult to overcome and will affect their modes of perceiving, remembering, and problem solving. Their personalities and cognitive styles seem to be more externally oriented. The relative field dependence among the mentally retarded may indeed account for their inability to concentrate on elements within their environments.

The additional investigation concerned the study of several more null hypotheses which entailed the subjects'

performance on Picture Completion, Block Design, and Object Assembly of the WISC-R as compared to their performance on the CEFT. These particular subtests were chosen because previous research, including that of Goodenough and Karp (1961) and Karp (1963), found that these and measures of field dependence loaded highly on the same factor called analytical ability. A study of the nine null hypotheses related to the correlation of WISC-R and CEFT performance shows that there is a significantly positive relationship between Block Design and CEFT, as well as Object Assembly and CEFT, for all three groups. However, the same results are not found when Picture Completion is one of the variables. There is a significantly positive relationship between Picture Completion and CEFT for the EMR group (Group I) only. There is no significant relationship between Picture Completion and CEFT for the two nonretarded groups (Groups II and III) regardless of chronological age.

The present study shows that Block Design and Object Assembly do indeed have some elements in common with field dependence for both the retarded and nonretarded and may load highly on the same intelligence factor. The Picture Completion subtest does not fit this pattern. No significant relationship was found between it and field dependence in the nonretarded groups in both age ranges, while a positive

significant relationship existed between Picture Completion and field dependence for the educable mentally retarded. The data show that Picture Completion and field dependence measurements have common elements only when both are administered to the EMR. Including Picture Completion as a subtest which loads highly on the analytical ability factor of intelligence is not warranted when testing the general population. Picture Completion and field dependence do not have enough commonality to be considered as high correlates on the same intellectual factor.

In summary, Block Design and Object Assembly of the WISC-R relate significantly to field dependence measurements for the EMR and nonretarded; Picture Completion of the WISC-R relates significantly to field dependence measurements for the EMR. No such relationship exists for the nonretarded. This discrepancy indicates that the EMR have a different cognitive style from their normal peers. Performance on Picture Completion as compared to CEFT shows an area in which the difference lies. Knowledge of an individual's field dependence level plus his performance on the Picture Completion subtest definitely gives a more complete picture of the manner in which information from the environment is gained.

Recommendations

The most important use of the results of the present study lies in the education of the retarded, particularly for the educable mentally retarded. Underlying any educational program is the testing procedure to determine the educational needs of the individual students. The assessment must now go beyond the staid notion of IQ levels to a broader concern with patterns of personality and cognitive functioning. The Children's Embedded Figures Test is inexpensive, easy to administer, and not time consuming. Although it must be administered individually, a similar embedded figures test (Witkin et al., 1971) has been developed for group situations. Both of the tests, however, are still research instruments and must be standardized before mass usage of them can be considered fully. An appraisal of both perceptual and intellectual domains provides a more effective characterization of the student than could come from IQ tests alone.

On the other hand, the results of the present study indicate that certain assumptions can be made about the EMR pupils without the need for extensive testing. It would appear that educable mentally retarded students, being relatively field dependent, require a different environment from their peers. Field dependence affects the student's entire functioning, including emotional, social, and

educational; this implies that the educable mentally retarded's external orientation must be considered in all aspects of his life. Educationally, these students' tendency to be more global than analytical in their perceptual approaches must be accounted for throughout the curriculum. Not only do they learn at a different level from their normal peers but they seem to learn in a different manner as well. Knowledge of the students' relative field dependence allows the educator to take advantage of this fact. Teaching methods which utilize external cues and environmental organization seem to enhance the EMR student's learning; their use should be a positive rather than a negative element in the learner's world. The education of the EMR individual requires the control of background influences in order for him to approach his maximum potential as a functioning human being.

The nature of teacher-pupil interactions and of social behavior in the classroom appears to be affected by relatively low field dependence as well. The mentally retarded student may not be able to conform to classroom demands in the areas of control and social interaction. He may not be deliberately antisocial or inattentive; his field dependence prevents him from acting as he or others would wish. Expectations of his behavior by those in his environment should take into consideration the mentally retarded's

level of environmental influence in the processing of information.

It would appear that an addition should be made to the curriculum of the EMR. A training program should be developed to assist this population in becoming more field independent so that they are more comparable to their normal peers. Although the entire curriculum indirectly assists the students in reaching this goal, a direct, specific, and structured program could produce tangible changes. The program could be similar to that of other types of perceptual therapy such as that of Barsch (1961), Frostig and Horne (1964), and Kephart (1960).

It seems imperative that educators and workers in the field of mental retardation become acquainted with the cognitive style and field dependence associated with personality and intellectual functioning of the retarded. This is particularly important to educators, psychologists, counselors, parents, and many other diverse groups. It is impossible to bring all of these individuals together so the training will have to take place within the separate disciplines and their training programs, both pre-service and in-service. Administrators will have to be the catalysts in this movement in the hope that changes will be made accordingly.

Knowledge of the importance and effect of field dependence on the EMR pupil offers several possibilities; the choices among them depend upon the particular educational goals. With the results of the present study showing a similarity of field dependence levels among the EMR population, there is the choice of placing them in homogeneous groups or in particular combinations.

> At this point it is by no means clear which particular placements will foster learning for individuals, just as it is by no means clear that homogeneous ability grouping is uniformly beneficial. (Messick & Damarin, 1964, p. 336)

The present controversial movement toward mainstreaming, in which heterogeneous grouping is thought to be more growth promoting than homogeneous grouping (Beery, 1974), must be interpreted in its broadest sense when educating EMR students. This entails valuing human differences by improving upon the past. Sight must not be lost of the major goal of meeting the students' needs while avoiding the pitfalls of faddism, pressure, and haste (Beery, 1974).

The present study indicates a number of areas of possible related research. The concept of an analytical ability factor of intelligence, as related to field dependence by Goodenough and Karp (1961) and Karp (1963), warrants further investigation. These authors found that several WISC

Performance subtests loaded highly on this factor along with field dependence. On the surface it would appear contradictory to have the educable mentally retarded score relatively low on a field dependence measurement, as in the present project, while they tend to score relatively higher on the Performance section rather than the Verbal section. Baroff (1959) found in his study of the educable mentally retarded that 80 percent of them had a higher Performance IQ than Verbal IQ on the WISC. Many studies on the WISC (Beck & Lam, 1955; Newman & Loos, 1955: Sloan & Schneider, 1951; and Vanderhost, Sloan, & Bensberg, 1953) show a trend toward a relative superiority of the Performance Scale over the Verbal Scale for mentally retarded children. However, the present study shows that field dependence of the educable mentally retarded compares significantly to total MA, without regard to Performance MA and Verbal MA levels on the WISC-R. Further research may show that field dependence relates more closely to one of the scales than the other for the mentally retarded. It also may give a possible explanation as to why the Picture Completion subtest related significantly to field dependence for the retarded but not for the nonretarded.

The existence of the analytical factor of intelligence may lead to further understanding of the concept of cognitive style as it relates to the mentally retarded. Studies

exploring this theory, and the part field dependence plays in the mentally retarded student's cognitive style, should prove to be most useful in the determination of the educational methods which are employed with this population. Field dependence is but one aspect of a very important construct.

The format of the present study lends itself well to an extension on several spheres. It would be important to study the field dependence of the educable mentally retarded at different age levels than the 10-to 12-year-old span used in this report. There are embedded figures tests (Witkin et al., 1971) available as research instruments for most age groups. These tests are relatively inexpensive and easy to administer as well as being comfortable for the participating subject. Gaining insight into this aspect of the problem could help resolve the question of whether field dependence in the EMR moves along the continuum to field independence at a slower rate than their normal peers, whether the EMR eventually reach the same level of field independence as their normal peers, or whether the EMR remain field dependent throughout their entire lives.

In addition, the design of the present study can be expanded to cover other intellectual levels such as the trainable mentally retarded as well as the mentally gifted.

The development from global perception to analytical perception can be determined for many mental ability spheres. This would involve data concerning the speed, regularity, and final level of this growth aspect along the field dependence continuum. Combining the information of the age expanded research with the intellectual levels expanded research certainly would produce an in-depth description of field dependence as an element of cognitive style. All students could benefit from such knowledge.

The construct of field dependence was developed during investigations in the province of psychology. It is now coming to the attention of professionals in education who are attempting to adapt it to the learning situation. It appears imperative that research be undertaken to show the relationship of field dependence to other areas of perception commonly trained in education. The research could relate an embedded figures test, such as the Children's Embedded Figures Test, to other measures of visual perception, such as that initiated by Frostig and Horne (1964). Since field dependence affects personality, the theory of perception and its utilization in education can be elaborated upon to a great extent. The next step might be the determination of whether a student's level of field

dependence can be altered through a structured training program. The research possibilities are boundless.

It appears now that the meaning of field dependence changes in the course of an individual's development, with the possibility of many variables affecting it. It would be interesting to make a comparison of this growth with Piaget's theory of development and with reports of other investigators in the area of children's growth and development. The understanding of the field dependence concept opens the door to many research comparisons, relationships, and analyses.

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APPENDIXES

APPENDIX A

Instructions for Administering the CEFT

The first small simple cut figure will be presented to the subject with the instructions:

> This looks something like a TENT, doesn't it? This black line at the bottom shows where our TENT rests on the ground. See if you can find another TENT that looks exactly like ours on this page. (Witkin et al., 1971, p. 22)

Four TENT discrimination cards are available where the subject will be asked to find the figure which has exactly the same size, shape, and orientation as the cut out TENT. These cards will be presented until a criterion of two successive correct discriminations is achieved.

Next, the first example discrimination card will be shown with the TENT cut out in view and the subject will be told: "A TENT like ours is hidden somewhere in this picture. The idea of our game is to find the hidden TENT. Show me where the TENT is." (Witkin et al., 1971, p. 22). The subject will be asked to verify his choice with the cut out TENT. If the subject is unable to locate the TENT figure, the examiner is to give the necessary assistance.

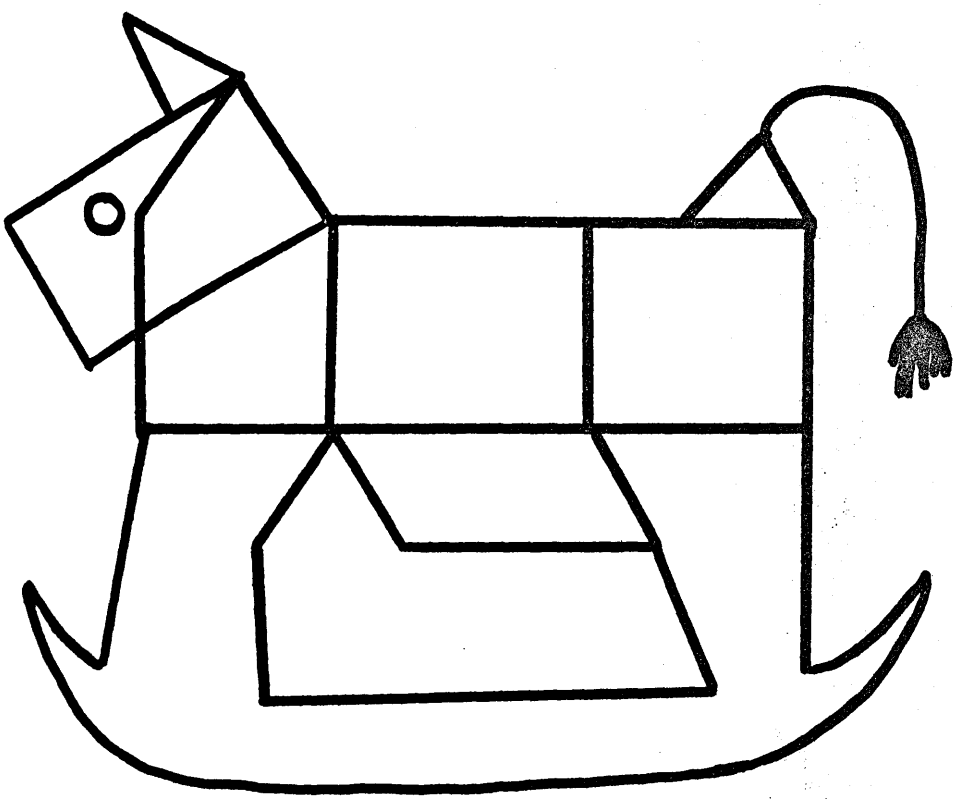
The second example discrimination card will be shown with the TENT cut out figure out of sight. The examiner

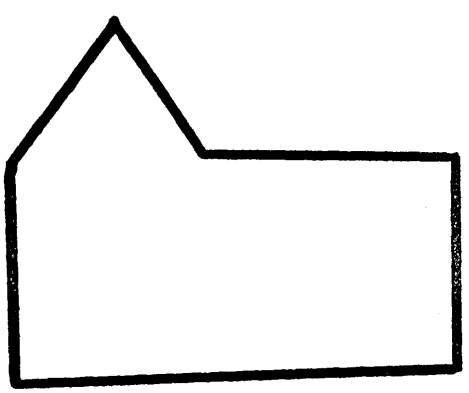
will point out that the embedded figure may now be made up of several shapes and/or colors. To encourage the subject to view the picture as a whole, the examiner asks: "What does this picture look like to you?" (Witkin et al., 1971, p. 23). The subject then will be asked to find the TENT and to verify his response with the cut out form. Help will be given when necessary.

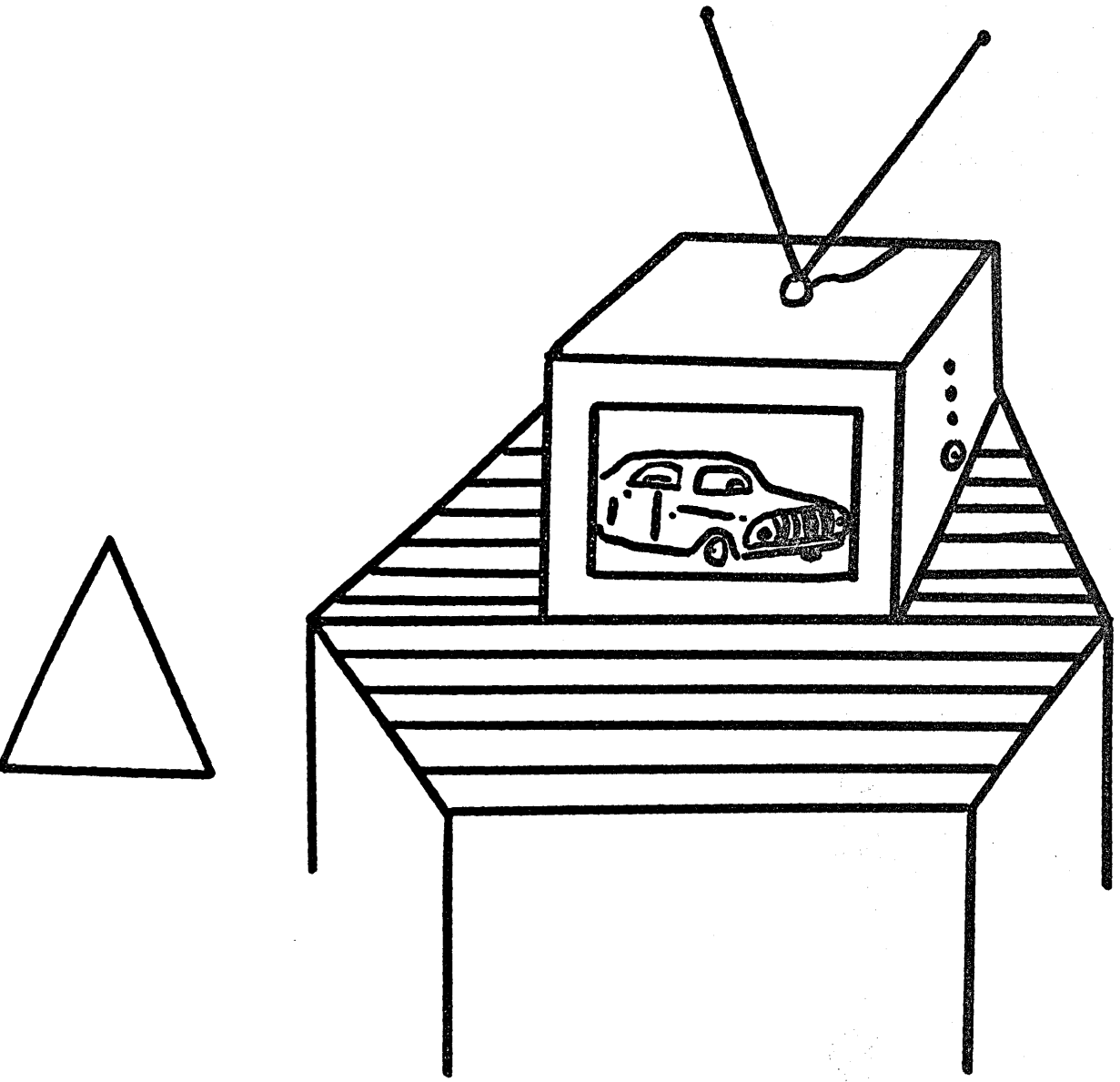
The HOUSE cut out figure will be presented upon the completion of the TENT series. Instructions for the HOUSE discrimination procedure will be the same as for the TENT procedure.

APPENDIX B

EXAMPLES OF THE CEFT FIGURES AND DISCRIMINATION CARDS







APPENDIX C

TABLES

Table 7

IQ's, CA's, and MA's for Group I

ID#	IQ	CA	MA
1	60	10.92	6.92
2	78	12.25	9.50
3	78	11.67	9.17
4	72	11.58	8.17
5	47	12.33	6.17
6	70	12.42	8.92
7	47	10.08	5.67
8	77	10.58	8.17
9	74	11.75	8.50
10	57	10.42	6.50
11	79	10.58	8.92
12	74	12.42	9.75
13	51	12.42	6.42
14	69	10.58	7.58
15	55	12.25	7.00
16	70	11.42	8.00
17	69	11.17	8.83
18	77	10.58	8.50
19	52	10.17	5.83
20	70	12.92	8.58

Table 8

IQ's, CA's, and MA's for Group II

ID#	IQ	CA	MA
21	84	10.75	9.25
22	121	11.83	15.00
23	109	11.92	13.42
24	103	10.33	11.58
25	105	12.25	13.83
26	100	12.33	13.00
27	101	10.67	10.92
28	115	12.50	15.17
29	100	12.00	12.42
30	90	10.25	9.33
31	89	10.75	10.42
32	98	12.33	12.33
33	97	12.50	12.50
34	88	11.58	10.00
35	91	11.75	11.83
36	109	11.92	13.33
37	96	10.92	10.42
38	81	10.42	8.58
39	84	11.50	9.67
40	112	11.83	13.67

Table 9

IQ's, CA's, and MA's for Group III

ID#	IQ	CA	MA
41	108	8.25	8.83
42	86	7.50	6.58
43	101	9.58	10.17
44	108	8.58	9.83
45	92	8.17	7.83
46	89	8.58	7.50
47	114	7.75	8.92
48	101	7.83	8.00
49	89	9.75	9.00
50	85	9.17	7.67
51	94	8.33	8.25
52	84	8.33	7.17
53	87	8.42	7.58
54	117	9.25	11.33
55	98	8.50	8.83
56	116	9.42	11.42
57	85	7.67	6.67
58	109	7.75	8.92
59	118	7.83	9.83
60	96	8.08	7.92

Table 10

Scores on the Children's Embedded Figures Test for the Three Groups

Group I	Group II	Group III
4	6	4
5	8	4
6	10	4
6	11	5
6	11	5
6	11	7
6	12	8
6	12	9
7	13	9
9	13	11
10	14	11
11	15	12
13	18	12
14	18	13
14	18	14
14	20	14
16	21	15
17	22	17
18	23	21
19	25	23

Table 11

Raw Scores for Group I on Three Subtests of the WISC-R

Picture Completion	Block Design	Object Assembly
3	1	6
5	2	8
9	6	10
9	6	12
12	10	13
12	10	14
13	10	14
15	10	15
16	11	16
16	14	17
16	14	17
16	15	18
17	15	18
18	16	21
18	20	21
19	22	21
19	25	22
20	26	23
20	27	24
21	27	25

Table 12

Raw Scores for Group II on Three Subtests of the WISC-R

Picture Completion	Block Design	Object Assembly
11	11	14
14	14	17
16	15	17
17	18	19
17	21	19
18	22	19
19	23	20
19	25	20
20	29	20
20	30	21
21	30	22
21	32	22
21	34	24
22	34	24
22	34	24
22	34	25
22	36	26
22	43	26
23	44	27
24	48	30

Table 13

Raw Scores for Group III on Three Subtests of the WISC-R

Picture Completion	Block Design	Object Assembly
9	4	12
10	6	12
13	10	12
13	10	13
13	10	15
14	10	15
14	10	15
15	12	17
16	14	17
16	14	18
17	16	20
17	18	20
17	22	20
18	23	21
19	23	22
19	25	22
19	25	23
20	27	23
20	28	23
22	36	26