BEHAVIORAL TRAITS RELATED TO PSYCHOLOGICAL DIFFERENTIATION IN PRE-ADOLESCENT BOYS

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ABSTRACT

BEHAVIORAL TRAITS RELATED TO
PSYCHOLOGICAL DIFFERENTIATION
IN PRE-ADOLESCENT BOYS

by Gerald Paul Beckerle

This study is an attempt to elucidate the dimension of psychological differentiation by studying measures drawn from the Hidden Figures test of field dependence in relation to selected behaviors, teacher ratings, and achievement indices.

The Hidden Figures test Cf-1 (from the Educational Testing Service battery) was administered to 263 fifth grade boys in the Lansing and East Lansing Catholic schools. The reliability measure of separately timed halves for a non-representative subgroup of the subjects was +.70.

Perceptual scores were corrected to allow for the influence of the Verbal I.Q. so that none of the differences in dependent variables could be attributed to variations in verbal intelligence. Then the boys were placed into high, moderately high, moderately low, or low categories on the basis of their percentile standing in their class. Twelve groups of boys, each group containing a boy from each category, were selected for further study. They were observed in a play setting structured for competitiveness and cooperativeness, interspersed by a free play situation during

which the examiner left the room. Most measures showed adequate reliability.

Three of the seven hypotheses dealt primarily with the game or play setting. Scores and ranks from the competitive setting found a non-significant trend for the high group to be dominant. The second prediction -- that the moderately high group would be dominant in the cooperative setting -- was not supported; the direction of differences was the same as in the competitive setting, again not significant. A significant 'between groups' difference may have decreased some of the differences between levels. What difference did show between groups was interpreted as the result of more permanent personality characteristics rather than of response to different experimental conditions. Contrary to the original hypothesis, the differentiated subjects were more active. However, this finding fits with the notion that the field independent was more active and involved -- and a more likely leader.

Teacher ratings found high articulation boys higher on leadership as predicted. Also, the more highly developed inner controls of the differentiated boys were exhibited in their significantly greater resistance to distractibility. The hypothesis that field-dependent subjects would be rated more dependent was not supported.

The discovery of a significant association between low differentiation and overachievement, contrary to the next hypothesis, was the most perplexing finding of the

study. One explanation was offered from specific test factors which may have been at work. The final hypothesis of a positive relation between decline in achievement and low articulation as well as a relation of rise in achievement and high articulation was supported for the first portion. The second segment was in the predicted direction but far from significant. Further research on differentiation and achievement should include school measures in addition to those of tests.

The picture of the highly differentiated boy which has developed from this study is the following: He is not as driven by competition and achievement as was originally expected. However, he tends to be more active, interested, and involved in different situations. He is considered a leader or, at least, capable of leadership by his teachers; data from the structured play setting, while not significant, tend to support such a picture.

The highly differentiated boy is neither a consistent over- or under-achiever while his peer from the low end of the scale is most often a better performer on achievement tests than would be expected. The field-dependent boy accomplishes this in spite of his higher distractibility in the school setting and his decline in functioning from earlier tests.

Further research on a cognitive style should incorporate a non-linear model, such as Crego's (1966) pattern-analytic approach.

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and secretaries spent considerable time for which they could expect no reward or benefit.

At the end of a stage of life, we tend to look back and to realize all that the love and support of family and friends has meant to us. With this in mind, I would like to dedicate this work to my parents as "partial fulfillment" for all they have invested of themselves in me.

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INTRODUCTION

Theoretical Background

The development of the human personality is an issue of concern for any psychological theory. This holds true whether such an issue is a primary focus, for example, Piaget's work,or of importance only in clarifying 'fully developed' functioning. The aim is to identify consistencies in the human being as he develops toward mature functioning.

There is increasing evidence that significant theorizing and research must be concerned with formal rather than substantive aspects of such functioning. One popular body of theory which seems to be molding itself along these lines is the neo-analytic ego psychology of Klein, and Fairbairn, (Fairbairn, 1952) and of Hartmann, and his colleagues (Hartmann et al., 1946; Hartmann, 1958).

Freud first conceived of the ego as an organization of mental processes, but in his early theory made the ego the resultant of promptings of id, superego, and reality. In his later works, the ego autonomously initiates defenses and turns passively experienced anxiety into a form of active participation. Thus, Freud conceived of adaptation as only a response to the dangers of reality.

It was Hartmann, Kris, and Lowenstein's task (1946) to bring a theory of object relations within the realm

of psychoanalysis. For these authors, the ego did not develop from the id, instead they conceived both ego and id as originating in an undifferentiated matrix. The independent roots of ego development were ego apparatuses of primary autonomy (motility, perception, memory, and the like) which develop from an undifferentiated state, eventually to become the ego's major control and executive apparatuses.

Hartmann and his associates (1946) argue that some structures do not arise from conflict, but are the development of constitutional "givens," to deal with an "average expectable environment." Some structures are born of conflict and are dealt with by neutralization of psychic energy; it is in this context that the distinction of mobile and bound energy is developed. Rapaport, in discussing these structures, proposed: "Data are needed to reveal similarities and differences between analogous structures (and motivations) on different hierarchic levels of psychic organization" (Rapaport, 1959).

W. R. D. Fairbairn, an English analyst who studied the breakdown of object relations in schizoid and other disturbed states, related the split in the original ego to ambivalent feelings toward an object which is introjected. The object is split into accepted and rejected objects, and frequently other techniques are used in coping with them. Examples are the obsessional mechanism which internalizes both objects, the paranoid which

externalizes the rejected object, and the phobic, which externalizes both objects.

The splits in the ego, shown so emphatically in schizoid phenomena, are found to some degree in all people. At the extreme, these splits give rise to detachment, isolation, and preoccupation with inner reality -- all evidences of an extreme reliance on self. Though the world, as viewed by Fairbairn's insight into his client's problems, is much more foreboding, the focus is similar to Hartmann and his colleagues'. The human being uses certain structures, mechanisms, or apparatuses to deal with the environment and its psychic representation within himself. While mainly clinical in nature, these two closely related theories can provide a background for a much more general approach to man's interaction with his surroundings. In Fairbairn's view, the individual is in conflict with his environment of other people. Attempts to cope with this conflictual state always entail mechanisms which place the focus either within or exterior to the person in conflict. Perception of a person's environment must color and be colored by such a focus.

Another body of psychological knowledge, drawing more heavily on experimental findings, received considerable impetus from the work of Witkin and his associates. (1954, 1962) Their work has focused on individual differences in perceptual behavior. Originally, they studied how a person orients himself in space. Sitting on a tilted chair in a tilted room, does he align himself with the true

vertical or the "tilted vertical" of the room? Witkin's research broadened to a related perceptual ability, that of separating an item from its embedding context. This research still seemed quite isolated and unrelated to general personality theory.

However, the gradual introduction of the differentiation hypothesis led the investigation into the broader area of social behavior. Noting a communality in many of their findings, the investigators looked for the common denominator.

The developmental nature of their findings suggested to them that progress toward differentiation would be expressed in increasing articulation (that is, analysis and structuring) of experience.

The human organism is an open system. This statement posits a flow, or interaction,not only between various parts of the organism, the personality in action, but also between the organism and its surroundings. This interaction is represented by various types of experience. First, there is the sense of the body: our experience of and our reflection on the internal and external impingements on the body. Second, there is the sense of self, or identity, by which a person feels himself to be separate from his environment of people and things. Third, there is the experience of the various portions of the world outside as relatively vague and diffuse or as relatively 'broken up.' This latter type of experience requires both analysis and synthesis if the world is to be perceived as a meaningful

group of stimuli. The work on psychological differentiation has shown these types of experience to be closely related.

The level of psychological differentiation of an organism is not the same as its effectiveness. To further subidivde an organism or to further develop its system so that it experiences things as more structured is not to guarantee that the elements of its experience will be dealt with more efficiently. The fact that a successful business executive and a backward schizophrenic can function at a given level of differentiation shows that mode of expression as well as its level must be considered. Crego (1966) has presented experimental evidence on this point.

An Overview of the Characteristics of Psychological Differentiation

Perception is a process of interaction between the entire organism and its surroundings. Thus the typical textbook split between perception and personality is a pseudo-distinction. The consistencies found in individuals' styles of 'perceptual' experience were found to be related to certain aspects of 'personality.' What, then, are some of the characteristics associated with low and high psychological differentiation?

According to Witkin et al. (1962) the field dependent or less differentiated person takes a long time to locate a familiar figure in a complex pattern. He experiences ambiguous stimuli, such as inkblots, as vague and indefinite. He often has trouble with Block Design, Picture Completion, and Object Assembly tasks on intelligence tests. He lacks

flexibility in approaching problems which call for a new use of a familiar object. His figure drawings show little sexual differentiation. He tends to change his views in the direction of an authority, and his impressions of people are based more on externals. Shown a picture with hostile content, he is likely to respond immediately with feelings of aggression. The central characters that he portrays in stories are not likely to have a driving interest in achievement.

The person with highly differentiated experience, whom Witkin calls field-independent, has many characteristics opposite to the above. He generally functions with a fair degree of autonomy but sometimes carries this to an extreme. For example, some highly differentiated persons are over-controlled, isolated, and cold. They do not enjoy social interaction and are little aware of the effect they have on others.

These thumbnail sketches describe persons whose performances are rather extreme on tests of differentiation. People do not fall into one or the other category, but range along a continuum. Few of the characteristics of this dimension have been presented but one can assume that it is normally distributed.

Related Research

In little more than a decade, much research has flowed from Witkin's limited beginnings. The communality of this differentiation dimension of personalities has been found in other areas as well. These orientations or

dimensions have been labelled cognitive styles or cognitive control principles. Gardner and associates (1959) list six such styles: leveling and sharpening; focus, or scanning; constricted-flexible; equivalence range; tolerance for unrealistic experiences; and field articulation. These are considered structures through which drive discharge takes place. They also exert a modulating or controlling function on the drive in its confrontation with reality. In the results of this study and a further elaboration in 1960, Gardner et al. find that tests of the constricted-flexibility dimension and the "flexibility of closure" factor load quite highly with the field articulation tests. This finding fits well into the context of past correlations of versions of the Gottschaldt test with flexibility of closure tests.

One of Witkin's earliest findings which pointed to the meaningfulness of the differentiation dimension was its developmental character. Young children tended to perceive in a more field dependent fashion. (Witkin, et al., 1954)

Individual differences appeared even at early ages, (eight years is the earliest reported), and these differences were consistent. Throughout development, individuals tend to hold the same relative positions with reference to their peers.

Witkin et al (1954) found that general passivity, lack of self-awareness, poor control of impulses, and low

self-esteem were related to a "field dependent" approach. They also found that field-dependent subjects were more scattered, i.e., less organized, in an unstructured play setting. Achievement needs (measured by the Edwards Personal Preference Scale) were also found to correlate with field articulation. (Wertheim and Mednick, 1958) Marlowe (1958) failed to replicate these results regarding the achievement scale, but found field independence positively related to the Succorance scale. Moving more into the area of personal relationships, Bieri, Bradburn, and Galinsky (1958) found that difficulty with the Embedded Figures Test was associated with the use of external constructs in describing people or objects. Bieri (1960) reported an association of father identification and Embedded Figures Test (EFT) scores for women but not for men.

Several investigators have studied how people at various levels of the field dependence dimension are viewed by others. Gordon (1953) presented evidence that the low articulators see themselves and are seen by others as socially dependent. The exception to this finding was ulcer patients for whom denial of dependency seems to be the major factor in their maladjustment. Crutchfield et al. (1958) had fellow officers do Q-sorts on Air Force captains whose style of field approach was ascertained by the Rod and Frame Test from the original Witkin battery. They set forth the following continuum: field dependents -- concerned

with good impressions, gregarious, affectionate, considerate; intermediate -- energetic, adventurous, social poise, nonconforming; moderately field independent -- demanding, effective leaders, takes ascendant role, manipulates people, self reliant; extremely field independent -- cold and distant, unaware of social stimulus value, concerned with philosophical problems, individualistic, strong. While Air Force captains are certainly not a representative sample and would be expected to cluster at the highly differentiated levels, Crutchfield's work moves a step beyond the approach of previous studies which stressed the dichotomization into high and low groups.

Several behavioral measures have also been found to relate to the dimension of differentiation. Witkin (1954) found that ratings of organizational pattern of play, as well as handling of hostile and sexual concerns, were related to perceptual performance. Generally, only the field independent child could provide overt, but rationally controlled, expression of such play. Conformity in an autokinetic setting and measures of attitude change were associated with field dependence. (Linton, 1955)

The articulation cognitive control principle has shown regularly some relation to measures of intelligence. For example, Jackson (1957) reported a correlation of -.53 for EFT solution time versus ACE scores. Again Witkin (1962) lists correlations of .57 for boys and .76 for girls.

For other groups of children, the correlations range from .36 to .73 for these measures. Bieri, Bradburn, and Galinsky (1958) found a high relation of EFT to the Mathematics, but not Verbal sections of the SAT.

Through factor analysis, Witkin (1954) discovered that his perceptual tests loaded on a factor along with the Block Design, Picture Completion, and Object Assembly subtests of the WISC. His perceptual index correlated .66 with this group of subtests but only .26 with the verbal factor subtests, and .18 with the attention factor subtests. Neither of the latter correlations is significant. The argument that it is meaningless to investigate the field articulation factor on the grounds that differences reflect nothing other than variations in intelligence, would be called to question by the above results. Jackson (1957) suggests a more profitable way of viewing the issue: "However, in a broader sense, the historical priority of the concept of intelligence need not imply its conceptual pre-eminence; it may be fruitful to consider intellectual abilities and perceptual mode as manifestations of more general dimensions of personality style." (p. 458) This is the concept of cognitive style introduced above.

The determinants of the field articulation dimension is yet another area that has received considerable attention. Constitutional factors are suggested as one source of variation. Studies of wide differences in activity level,

threshold level and related characteristics in infants suggest that some infants may be more richly endowed for the development of differentiation.

Along the line of environmental determinants, Bieri's work (1960) on identification and differentiation has been mentioned above. He found that acceptance of authority was more closely related to EFT performance in his study. Dyk and Witkin (1965) found that highly differentiated or field independent boys had more stories in which parents were depicted as supportive. An interview measure of the mother's degree of fostering differentiation was highly associated with the boy's perceptual index, as were measures of the mother's sophistication-of-drawing scores. These authors quote an unpublished study by Seder (1957), who sent a questionnaire to mothers of children of known perceptual style. She reported that field dependent boys were punished significantly more severely and less consistently; punishment was also dictated more by parental moods for these boys. On the other hand, field independent boys were punished significantly more by their fathers than their mothers; they were disciplined more democratically, and they interacted more with their fathers.

The Problem

The defintion of the field articulation dimension and its personality correlates at first glance seems to be well established. Yet there have been several criticisms

of Witkin's work. One is that his correlations with the perceptual scores were spurious to an unknown degree because he first examined protocols for pertinent variables then placed them into the sample. His attempts to replicate his findings almost invariably yield lower, frequently insignificant correlations. Young's (1959) replication yields data which, though not as impressive as Witkin's, still support a common factor of field articulation with its suggested personality correlates.

A second criticism has been that Witkin and Young make far-reaching inferences on the basis of some very questionable measures. Both make assumptions about their subjects from Rorschach scores, such as, M: Sum C (called Outgoing), WPC total (called Coping), and MHFA total (called Introspectiveness). The one set of behavioral measures arising from Witkin's research on children was gathered from the miniature Toy Play setting which minimized contacts between the children and the examiner.

This Toy Play portion of Witkin's work as well as other studies suggest that the field articulator is autonomous, assertive, and organized, even when dealing with conflictual material. Yet such observations, for the most part, have been made in laboratory situations of a quite artificial nature.

In spite of these criticisms, the control principle of field articulation is gradually evolving into a meaningful psychological dimension. Its future utility as a

psychological construct seems to lie in its development along two lines. The first is to clarify it through research concerned with behavior closer to real life situations and not relying on projective testing. The second is to investigate the mode of expression as well as the level of expression of the differentiation dimension. The first line of investigation is the concern of the present study.

The present study is an attempt to define more sharply the field articulation dimension by observing a subject's performance on an embedded figures task in relation to certain behavioral dimensions in a relatively heterogeneous sample of ten-year-old boys. Rather than making inferences from projective materials about a subject's personality, certain aspects of it were assessed directly by observing the boys in competitive and cooperative play settings. Thus a subject's assertiveness and leadership were examined in the context of his primary reference group for these traits. Other areas of behavior were assessed by observing the boys in a free play setting and by analyzing teacher ratings on these dimensions.

Hypotheses

This study tested the following hypotheses:

1) Boys who score high on field independence will be most assertive in a competitive setting and will be rated highest on leadership by the observers. Further, their teachers will rate them highest on masculinity, self-sufficiency, and leadership.

2) Boys moderately differentiated will be the most effective leaders in a cooperative setting.

3) The extreme low articulators will be rated highest in overall activity level in a free play setting and rated highest in activity level by their teachers.

4) The extreme low differentiation boys will behave more dependently toward the examiner and will be rated as more dependent by their teachers.

5) Highly differentiated boys will be rated as less distractible by their teachers.

6) Low differentiation will be associated with underachievement as measured by the discrepancy of intelligence and achievement scores.

7) Decline in school achievement in relation to previous years will be associated with low articulation scores; conversely, a rise in achievement scores will be related to a high level of differentiation.

METHOD

Subjects

Past findings on the field independence dimension (Witkin, 1950; Witkin et al., 1962) have disclosed consistent sex differences not only in the level of differentiation -- males score higher -- but also in the consistency and unity of the dimension. Compared with boys, girls' performance on field independence tests varies more and is not so factorially 'clean.' Thus, it was decided to limit this study to boys. Though ten-year-olds are still relatively field dependent, they have been shown to have wide individual differences on the differentiation dimension (Witkin et al., 1954). The subjects in the present study, therefore, were fifth grade boys.

The subjects were drawn from the eight Lansing and East Lansing parochial schools. The total number of fifth grade boys available in these schools on the testing days was 263. The smallest class contained twenty-nine boys, the largest forty-three.

From this pool of subjects to whom the measure of field independence was administered, twelve groups of four boys each were selected for further study. The subjects were selected on the basis of their adjusted scores on the Hidden Figures Test from each of the following percentile

ranges: 1st to 15th; 25th to 40th; 60th to 75th; 85th to 99th. The comparisons were made within each school. The adjustment allowed for the moderate (+.25) correlation found between Verbal I.Q. on the California Test of Mental Maturity and the Hidden Figures score. Each group of four boys, chosen for observation in the play setting, contained one boy from each of the above ranges. In each group, then, one boy was quite low, one moderately low, one moderately high, and one was quite high in his ability to articulate a perceptual field as compared to other boys in his school.

Instruments

1) The Hidden Figures Test:

The level of psychological differentiation was measured by scores on the field dependence-independence dimension. The Hidden Figures Test, a test of the perception of embedded figures, was administered in a group to all fifth grade boys of a given school. The Cf-1 Hidden Figures Test from the Educational Testing Service battery is an adaptation of Thurstone's Gottschaldt Figures Test (Thurstone, 1955). Several studies have indicated that such a test reliably measures field dependence-independence, and that flexibility of closure and the field dependence dimension are the same (Gardner, Jackson, and Messick, 1960; Jackson, Messick, and Meyers, 1964; Witkin et al., 1952).

The test contains thirty-two achromatic patterns divided into two sections. The Educational Testing Service advised that the time limit be extended from an original ten minutes per section to fifteen minutes for this sample. (Personal communication to the author, 1966) There are five simple figures at the top of each page, one of which is embedded in each complex pattern. Only minimal use of memory is required. The score, number correct minus one-fourth of the number incorrect, makes an adjustment for guessing.

A) Administration of the Hidden Figures Test:

Most of the schools were divided into two sections at the fifth grade level, each of which contained both boys and girls. Thus relocation of at least some of the boys was required in all but one school for the Hidden Figures Testing. With two exceptions, one in a cafeteria and one in a library, the testing was conducted in classrooms.

The subjects took the Hidden Figures Test during the regular school day. Typically, instructions and testing required one class period of fifty minutes. The examiner told the boys about a type of hidden figures test from the comics, with which most were familiar. He next asked them to read along with him as he read aloud the instructions printed on the front of the test. Time was allowed for the examples given until a majority of subjects had completed them.

B) Adjustment of the Hidden Figures Score:

The scores on the Hidden Figures Test Cf-1 correlated +.25 with the boys' Verbal I.Q. taken from the 1964 administration of the California Test of Mental Maturity. To correct for this correlation, scores on both tests were converted to standard deviation scores. The subjects' Verbal I.Q. deviation score was multiplied by the +.25 correlation. The perceptual score was adjusted as many standard deviations as the foregoing product.

For example, a subject scores one standard deviation above the mean on Verbal I.Q. Five points represent one standard deviation on the Cf-1. Then 1 1/4 points are subtracted from his perceptual score because this amount is .25 of a standard deviation on the perceptual data. The formulae involved:

$$Z'_{cf\text{-}1} = {}^{rz}\ v.i.q.$$

$$Z \text{ corrected } cf\text{-}1 = Z_{cf\text{-}1} - Z'_{cf\text{-}1}$$

2) The Teacher Rating Scale:

The Teacher Rating Scale was devised especially for this study. It contains twenty-four items, which focus on fairly specific examples of behavior. The teachers are asked to judge a given boy's likelihood of performing a certain act. The six choices range from "extremely unlikely" to "extremely likely" for each item. Four items were constructed to assess each of the following behavioral characteristics: masculinity, self-sufficiency,

leadership, dependency, distractibility, and activity level. Each teacher was asked to fill out the rating scale on ten boys in his section. About three-fourths did so.

3) Achievement Measures:

A) Under-and Over-Achievement:

In the Lansing parochial school system, the California Achievement Test (CAT) is administered biennially to all children from the fourth grade on. The California Test of Mental Maturity (or California Short Form at earlier levels) is given annually to students at all grade levels. The master copy of CAT results contains the student's obtained grade placement and that expected from his most recent intelligence test. An average discrepancy score for all subjects was computed from these data. For purposes of defining achievement standing, subjects were considered to be under- or over-achieving if they had an average discrepancy of plus or minus half a grade for each area of study.

B) Fluctuation Over a Span of Two Years:

The only achievement measures available for the subjects from more than a year prior to the present study were their third grade reading scores. To measure the variation in achievement over time, the discrepancy was computed between fifth grade reading scores and the earlier scores. Approximately one-quarter of the subjects showed a gain of less than one year in their reading ability over

the two-year span. Another quarter of the group showed gains in reading ability of greater than two years. A Chi-square test and *z* tests were used to ascertain the relation of all achievement measures to perceptual performance on the Cf-1.

Play Session Setting

For the competitive and cooperative games, and the free play between the two sessions, the boys were taken to the Michigan State University Psychological Clinic playroom. This is a 29' x 15' room with one door, a large one-way mirror and one window. A microphone is connected to the adjacent observation room.

The floor space was clear with the exception of a small sand box, two tables with chairs, and a sink. Many toys are available in shelves in one corner of the room: doctor kits, animals, household furniture, guns, trucks, art materials, games, dolls, and an assortment of balls.

The game was set up on a table with one narrow end flush against the wall beneath the microphone and one-way mirror.

Procedures of the Pretest and the Main Study

Many pretest sessions were required to revise rules and instructions to form an appropriate test of the hypothesis. Many chance factors enter into the basic game chosen for the

study. Modifications were made so that these factors would not enter into the final competitive and cooperative scores.

A Parcheesi board was used for the game, but each subject was allowed only one 'man' or piece, and only one die. All subjects wore bandanas the same color as their piece so that each boy as well as the observers knew which color each boy had in the game. The competitive setting was conducted first. The experimenter read the following instructions to the four boys:

> I want to watch you boys so I can learn about how boys play games. I think all of you have played a game where you <u>try to win by rolling a die</u>. Some of you may recognize that this is a Parcheesi board, but we're going to use it for a different game -- one that I made up.
>
> Now, in this game, there will be <u>only one winner</u>, and the winner will get this prize. (Two comic books were shown and left in clear view.)
>
> 1) (Positions were assigned: "You're red; . . .") Each of you has a man and each of you has a die. You start where your man is sitting now. (Point.) The winner will be the one who gets his man Home first. (Point.) There will be only 20 minutes to play. (Point to clock). So if by the end of 20 minutes, nobody has gotten Home, the winner will be the boy who is closest to Home.
>
> The way to get to Home is to go around the board to your right on the white spaces. (Trace.) So you have to get all the way around before you can start for Home. (Trace on in Home.) You can't start for Home until you are all the way around the board. Do you understand?
>
> 2) Now I'll tell you how to play each round. Each of you shakes his die at the same time. But only two of you move your men on a single round. And you all must decide which two it will be before you move any men. There are no rules about which two will be the ones to move. You all must decide. You move your

man as many spaces as you roll on the die. (Example) I also want you to mark down your score on the paper in front of you each time you roll the die.

Let's try one throw for practice. . . Now don't touch your man until you make your decision about which two boys will move. (Practice round.)

3) Sometimes it will be a good plan to move, but other times it won't be a good plan. See these blue spaces? If you land your man on a blue space, you must go back six spaces. (Show) So you don't want to land on the blue spaces, because that will slow you up.

4) Now I'll go through a few rounds to show you how it goes. I'll use this man. Say I roll a five. I count up the spaces, and I see that if I move on this round, then what will happen to me? (Wait for answer) Right, I'll land on the blue space and will have to move back six -- and that's no good. So on this round, I'm going to try to get someone else to move. Or let's say I roll a 3 and you roll a 4. (Turn die to these numbers.) Then I'm going to try to move, and make you not move, since if we both move, you'll be one ahead of me. But remember, two boys move on each round! So each of you must figure out on each round: First, whether it's a good plan for you to move, and second, which other boy should move so that you have the best chance of winning.

Now let's say that it's the second round, and I moved and you moved on the first round. (E sets men appropriately). And we'll say on the second round that I roll a 3, you roll a 2, you roll a 5, and you roll a 5. This time, two of you rolled 5's, but your 5 will get you 5 spaces ahead, while your 5 will land you on a return. So, I want to try to move and I want him to move. I certainly don't want him to move. (Point to appropriate boys).

The instructions, the time limit, the prize and the fact of only one winner are mentioned again.

After the competitive session, the examiner left the room on the pretext that he had something else to do in the building. He told the boys that he would be back in ten minutes and that they could play in the room if they wished. The examiner then joined the observer in the

adjacent room to make rankings of the boys' free play activity. The dimensions ranked were masculinity, activity level, dependency, peer approach, and leadership.

After fifteen minutes the examiner returned and set up the cooperative setting with these instructions:

> Now we're going to play another game and this time you should try to work together. If you all work together well, you'll all get a prize. You are to roll your die and mark your score as you did in the first game. And again only two of you move in each round.
>
> The object of this game is to move the four men around the board in as few moves as possible. So you must decide among yourselves each time, which two men should move. Usually, it would be best for the man with the highest score to move. But if you choose a man with a 5 who would land on a return spot over a man with a 4 who would not have to return, it would take you more time to get all the men around the board.
>
> There will be a time limit of 20 minutes so if all the men are not Home at that time, we will quit. So try to work together as a group. If you work well together as a team, you will win a prize. But this would be given to everybody and it depends on how well you play the game.

Treatment of Data

1) Scoring of Observational Material:

For each round of play a subject could be scored on one or more of the following measures:

- ✓ - for moving at another's instigation.
- M - for moving of own initiative.
- Ⓜ - for moving of own initiative against another's decision.
- P - for making the primary decision about which piece, or pieces, is to move.

S - for making a supporting decision about which piece, or pieces, is to move.

NM - for failing to move when it seems apparent that he should.

R - for landing on a return spot and counting it as a move.

Ⓡ - for landing on a return spot, approaching it, or seeing the return in advance and not counting it as a move.

The computation of scores for leadership in the competitive and cooperative setting were complex. Three factors were used as criteria of establishing the scores: first, the elimination of chance factors; second, evidence of some range of a score so that it would differentiate between subjects; third, evidence that the measure was an expression of effective competing (or leadership in the cooperative setting) within the rules of the game.

The actual scores used for leadership in the competitive and cooperative settings were based on four measures: PM - making primary decision and moving oneself, Ⓜ P, and S. These did not have equal influence on the conduct of the game so they were weighted as follows: PM = 1 1/2; P = 1; S = 1/2. The few instances of Ⓜ were categorized with PM. Thus the actual leadership score was PM (1 1/2) + P (1) + S (1/2).

The ranks of the above scores were analyzed by the Friedmann F test. An analysis of variance (blocks x levels with one observation per cell) was also conducted on the scores from both conditions of the twelve observation sessions.

2) Inter-rater Reliability:

For almost all of the pretest and regular sessions, an additional observer stationed behind the one-way mirror, also scored the game and ranked the free play behavior.

Final competitiveness and cooperativeness scores (1 1/2 PM + P + 1/2 S) were converted to ranks. The Spearman rank-order correlation coefficient was used for all analyses. The following table presents these reliabilities.

Table 1. Average Spearman coefficients for the official and pretest sessions.

	Official		Pretest	
Variable Ranked	Correlation	Number of Comparisons	Correlation	Number of Comparisons
Competitive	.83**	12	.84**	5
Cooperative	.76**	12		
Leadership	.63**	12	.75**	9
Masculinity	.63**	8	.60**	9
Activity Level	.40*	8	.56**	7
Peer Approach	.26	11	.62**	8
Dependency	-.12	8	.32	8

* $p < .05$ ** $p < .01$

3) Teacher Ratings:

The Teacher Rating Scale contained twenty-four items, of which four pertained to each behavioral dimension. A mean score was computed for each of these dimensions. A t test was used to compare the means of these behavioral dimensions for the twelve highest and lowest differentiation subjects who were rated by their teachers.

RESULTS

The Hidden Figures Test was administered to 263 fifth grade boys in the Lansing and East Lansing Catholic schools. Individual differences were displayed in the range of correct items, 0 to 23; incorrect items, 0 to 29; and scores, -4 1/4 to 23. Table 2 summarizes the data for the eight schools.

Table 2. Mean items correct and incorrect for the 32 item Hidden Figures Test (Cf-1) with the number of subjects from each school.

School	Mean Correct	Mean Incorrect	N
St. Therese	8.32	8.55	43
St. Casimir	8.94	9.00	33
Immaculate Heart	7.96	9.36	30
Holy Cross	7.10	15.73	37
Resurrection	8.55	13.42	31
St. Gerard	7.34	8.41	29
St. Mary	7.86	11.76	29
St. Thomas Acquinas	11.07	5.35	31
	8.38	10.25	263

The average score from the formula, number correct minus number incorrect over k-1, was 5.82. The standard deviation computed from 222 subjects with a mean score of 6.29 was 4.99. These were the subjects whose intelligence test scores were available for adjusting the perceptual scores. The reliability measure of separately timed halves, assessed by the Spearman-Brown correlation coefficient on the scores of thirty-one boys from St. Thomas Aquinas, was .70.

In view of the wide variability in number incorrect from one school to another, comparisons will also be presented using raw number correct as the measure when groups of subjects from different schools are compared.

The correlation of Verbal I.Q. with the Cf-1 scores, +.25,was reported above in connection with correcting for the effect of verbal intelligence on these scores. The scores correlate +.345 with Performance I.Q. taken from the CTMM. Table 3 gives information for these intelligence measures.

Table 3. Means and standard deviation for the Verbal and Performance intelligence quotient of the California Test of Mental Maturity. N=222.

	Mean	Standard Deviation
Verbal Quotient	112.76	13.62
Performance Quotient	109.50	22.09

The reliability of the observational ratings was a key issue in the study, since scores had been derived from an adaptation of a common children's game. Estimates of reliability were derived from the ranks of the final calculated scores of the competitive and cooperative conditions. Coefficients also were assessed for the rankings of the behavioral observations. Table 1 reports all interrater reliabilities for the play sessions.

On all scales, except Dependency, the raters show moderate to considerable agreement in ranking the subjects.

If two negatively correlated sessions are removed from the Peer Approach comparisons, the correlation for the official sessions would jump from +.26 to +.50. The raters reported that Dependency was the most difficult dimension to assess, since there was no adult in the playroom during the free play session.

The first hypothesis was concerned with the highly differentiated group. They were expected to be dominant in the competitive setting and to be rated highest on leadership by the observers. Table 4 presents the observational data relevant to this hypothesis. The Friedman F test was used for the ranks. In its conversion from the Chi-square value this test yields the fractional degrees of freedom noted below and in subsequent tables.

Table 4. Means and tests of significance for the four perceptual levels of some scores and ranks derived from the observation data. N=12 groups, 4 subjects per group.

Measure	High	Mod. High	Mod. Low	Low	(F Value)
Competitive Rank from game*	1.96**	2.58	2.79	2.66	1.02n.s. (df=2.8,30.8)
Competitive Score*	10.25	9.00	6.25	6.75	1.40n.s. (df=3,33)
Leadership Rank by observers	2.86	2.71	2.29	2.13	.85n.s. (df=2.8,30.8)
Masculinity Rank by observers	3.00	2.72	2.39	1.88	1.27n.s. (df=2.8,26.8)

*Competitive Score PM (1 1/2) + P (1) + S (1/2)
**Highest value is underlined.

It will be noted from Appendix D that the observer rankings of masculinity, activity level, and leadership intercorrelate positively and significantly.

Though all scores and ranks from the game situation, including the additional Masculinity rank, are in the predicted direction, none of them reach the level of statistical significance. An *F* test for 'blocks', on the competitive scores, i.e., differences between groups, produced a value of 5.31 which is significant beyond the .01 level. This significant value indicates a 'group contagion' effect whereby an individual is influenced strongly by the level of competitiveness of his group. The second part of the first hypothesis is concerned with teacher ratings; the highly articulated boys were expected to have the highest ratings on the masculinity, self-sufficiency, and leadership scales. Not all teachers filled out the scales; this leaves some boys without ratings. Table 5 therefore summarizes data for the twelve highest and lowest differentiated boys who were rated by the teachers. The means in parentheses are those based on raw correct perceptual score; no *t* values are given for these.

The second hypothesis also pertains to the observational setting: "Subjects moderately highly differentiated will be the most effective leaders in the cooperative

Table 5. Means of three scales of the teacher ratings for high and low differentiation boys. N=12 per group.

Scale	Mean High Group	Mean Low Group	t Value
Masculinity	3.45* (4.20)	3.25 (4.70)	.47 n.s. (22 df)
Self-sufficiency	4.43 (3.65)	4.56* (3.58)	.31 n.s. (22 df)
Leadership	4.01* (4.38)	3.04 (3.39)	2.29** (22 df)

*Underlined score = highest value
**$p < .02$

setting." The results associated with this hypothesis are given in Table 6.

Table 6. Further means and tests of significance from the observation data. N=12 groups of 4 subjects.

Measure	High	Mod. High	Mod. Low	Low	(F Value)
Cooperative Ranks from games*	1.79**	2.70	2.87	2.63	1.79n.s. (df=3,30)
Cooperative Scores*	11.08**	8.91	5.41	6.87	1.45n.s. (df=3,33)

*Based on PM (1 1/2) + P (1) + S (1/2)
**Highest value is underlined.

Though the results are non-significant, there is a trend toward significance with the extreme high, not the moderately high, group again more dominant in this cooperative setting. An inspection of mean values for the two conditions from Tables 4 and 6 reveals that the magnitude

of these values corresponds closely across conditions. (The interaction F value was .026 - not significant.)

Multiple comparisons of the means of both the competitive and cooperative conditions by Duncan's "studentized range" test revealed a trend toward significant differences between the extreme high group and both of the low groups.

The third hypothesis predicts that the extreme undifferentiated group would be highest in overall activity level. Table 7 summarizes the teacher's ratings on this dimension.

Table 7. Means, pooled variance, and t test of teachers' ratings of activity level for high and low articulation boys. N=12 per group.

	Mean Low Group	Mean High Group	t Value
Activity Level	3.14 (3.60)	3.39 (3.16)	.72 n.s. (22 df)
		Pooled variance = .657	

Another test of this hypothesis was taken from observers' rankings for the free play session. Table 8 shows a strong tendency for the highly differentiated boys to be selected as most active.

Table 8. Mean ranks and Friedmann's F test for the observational Activity measures. N=10 groups of 4 subjects.

	High	Mod. High	Mod. Low	Low	F Value
Activity Level	3.30*	1.95	2.20	2.55	2.34 n.s.** (df=2.8,25,5)

*Highest value is underlined.
** .10 > p > .05.

The fourth hypothesis states, "The extreme low articulation boys will show more dependent behavior toward the examiner, and will be rated as more dependent by their teachers." The game situation apparently was so engrossing that little interaction occurred between the boys and the examiner. Thus it seemed futile to count "dependency behaviors." The free play ranking related to this dimension, Dependency and Peer Approach, yielded non-significant group differences. These rankings also did not achieve satisfactory reliability. The data given in Table 9 pertain to teacher ratings of dependency and fail to support the hypothesis.

Table 9. Means and test of significance for teacher ratings of Dependency. N=12 per group.

	Mean High Group	Mean Low Group	$\underline{t}$ Value
Dependency	3.08 (3.43)	3.01 (3.10)	.17 n.s. (22 df)
	Pooled variance = .99		

The fifth hypothesis states that highly differentiated boys will be rated as less distractible by their teachers. The strongly supporting data for this hypothesis are found in Table 10.

Table 10. Means and test of significance for teacher ratings of Distractibility. N=12 per group.

	Mean High Group	Mean Low Group	t Value
Distractibility	2.69 (2.52)	4.44* (4.12)	4.12** (22 df)
	Pooled variance = 1.02		

*Underlined value is highest.
**p < .001 level.

A correlation of -.44 was found between Leadership and Distractibility, the two teacher scales yielding significant differences between high and low groups. This indicates that these are not entirely independent measures.

The sixth hypothesis dealt with the relation of underachievement and the differentiation dimension; it was expected that underachievers would come more often from the low differentiation group. Of the fifty boys who had a meaningful (+ or - 1/2 grade) difference in their obtained and expected CAT test scores, thirty-four were in the opposite direction predicted by the hypothesis. Table 11 covers these contradictory findings.

Table 11. The relation of underachievement and overachievement to psychological differentiation. N=50.

	Underachievers	Overachievers
High Differentiation	11	11
Low Differentiation	5	23

$\chi^2 = 4.04$; $p < .05$; df = 1.

If the above comparison is based on raw rather than corrected scores, differences are in the same direction, with a p value of approximately .10. Among the overachievers four subjects would be classified in the high rather than low group.

A binomial test was conducted on the low differentiation subjects to see whether a significantly greater number occurred in the overachiever category. The $|z|$ value for this test was 3.20, significant beyond the .01 level. The overall association is explained, then, by the quite perplexing association of low differentiation and overachievement.

According to the final hypothesis which also pertains to school achievement, changes in achievement over time will be associated with psychological differentiation. The only available achievement data with a two-year time span, reading scores, were assessed by the χ^2 test reported in Table 12.

Table 12. The relation of high and low reading gain over time to psychological differentiation. N=56.

	Low Gain	High Gain
Low Differentiation	21	11
High Differentiation	9	15

$\chi^2 = 4.36$; $p < .05$; $df = 1$.

If the above comparison is based on raw rather than corrected score, differences are in the same direction with a p value of .20. Three more 'low gain' subjects would be in the high differentiation category.

The overall association of reading gain and psychological differentiation was significant. The binomial test revealed that this significance results from a significant association of low gain, defined as less than one year gain in the two-year interval, with low differentiation. Thus the data support the first part of the hypothesis. The hypothesized relation of high achievement gain and high differentiation failed to reach significance, though the results were in the predicted direction.

DISCUSSION

The independent variable of psychological differentiation was assessed by the Hidden Figures Test, which has been used in several studies to measure field dependence-independence. From the results of this study it also seems a valid indicator for fifth-grade boys. The study disclosed a wide range of individual differences. The correlations with intelligence quotients were lower than those generally reported for individually administered intelligence tests. The finding of a higher correlation with the Performance than the Verbal section was consistent with past results. The lower level of relation and the slight distinction between the Verbal and Performance correlations may mean that the differentiation dimension is not so factorially pure at this age level. It may mean, on the other hand, that the particular intelligence measure used, the California Test of Mental Maturity, is less reliable than previous measures used by Witkin and others.

The boys in one school, St. Thomas Aquinas, seems to be superior to the others in differentiation performance. Since this is an East Lansing school, many of the boys have fathers in professional and professorial occupations. Coming from this socio-economic group, for which more permissive child-rearing practices are generally reported,

may have significantly influenced the boys' level of field independence. (Inspection of their CTMM results turns up a Verbal quotient 1 1/2 points above average and a Performance quotient six points above average. The latter value approaches statistical significance with a p value of approximately .10.)

The range of mean incorrect items is rather perplexing. The instructions contained a warning about open guessing; these were read to the boys in each school. Questions were permitted after the instructions were read, and this may explain the individual differences. In some schools several questions focused around this issue and more boys may have grasped the idea of intelligent guessing.

The correlations of the observational material are generally sufficiently large to support the contention that the raters overlap in their notions of the behaviors they were assessing. In several instances the raters agreed that it was impossible to assess differences among the boys. In these cases the boys played a structured game, such as stick-ball, or behaved so competitively that they all seemed tied at a given level on one or more variables.

The lack of the effect of the different sessions, competitive or cooperative, has been mentioned in the results section. Groups of boys at the different levels performed basically the same regardless of condition. This similarity across conditions suggests that the individual

comparisons between group means, which showed a trend toward significance, may be reflecting a more basic style of interacting rather than a response to a specific situation or instructional set. The significantly higher leadership ratings by teachers for the highly differentiated boys lend strong support for this view. In this group of boys, those quite highly articulated tended to be dominant regardless of the situation.

The significant difference between groups, indicating that the boys' response to this unique testing situation depends in large part on the group of which they are a member, may have decreased the differences between the individuals' styles of activity or leadership.

The results pertinent to the third hypothesis, indicating a strong, non-significant, trend for the high group to be chosen as more active, are contrary to the hypothesis. This prediction was based on Witkin's (1954) finding that relatively undifferentiated children were more scattered in an unstructured play setting. From his evidence and the poorer impulse control imputed to this low perceptual group, it was expected that they would behave in a more driven fashion in the relatively stimulating playroom.

Other evidence from Witkin's work can be cited which incorporates the activity findings. For example, Witkin found that TAT ratings for self-assertiveness of a sample of young adults correlated positively to their score

on his perceptual index. Studies on posture and dream content also indicate field independent subjects to be more active in orientation. The relationship of psychological differentiation and activity seems complex. Future research may have to spell out more completely the conditions in which the activity is to occur.

The evidence from the first three hypotheses lends a suggestion that in this context highly differentiated subjects may be more involved and active.

No support was found for the hypothesis that low articulation boys would be seen by their teachers as more dependent. Past evidence regarding differentiation and dependency has been drawn from some rather specific behaviors such as attitude change or time spent looking at teachers during exams. Again the specific dependency behaviors and the context in which they occur may be very important in determining how this variable is related to differentiation.

The fifth hypothesis that teachers will rate highly differentiated boys as less distractible was strongly supported. While all behavior rated by the teachers occur in the school setting, it is likely that such differences in distractibility behavior will be found in similar non-school behaviors.

The distractibility finding ties in well with Witkin's discovery of less impulse control in field dependent persons. While the finding offers us little help in

understanding the mechanism involved, it again points out the less articulated person's "dependence" on incoming stimuli, i.e., his relative inability to filter his surroundings. This labile style of cognitive control is another indicator of the passivity involved in low differentiation. It is tempting at this stage to take a theoretical jump and begin to talk about distractibility as indicative of an "avoidance" defensive style and to speculate about its antecedents. The data, unfortunately, do not give enough evidence for such second-level speculation.

Data for the hypothesis regarding under- and over-achievement disclosed a significant association which went contrary to the hypothesized direction. This occurred primarily because of the association of low differentiation and over-achievement. That a field dependent boy should be more likely to be an overachiever is inconsistent with the picture that has been developing from this study and past research. He, instead, is less active and involved, is not seen as the leader, and is more distractible. Witkin depicts his passivity as extending into a lower need for achievement.

It would be convenient to dismiss this finding as somehow a function of intellectual level. Indeed, the I.Q. of the low perceptual and overachieving boys is approximately half a standard deviation below the overall group average. But so is the I.Q. of the low perceptual

and underachieving boys. A possible clue may lie in the Verbal-Performance breakdown.

The underachievers had mean Verbal and Performance quotients of 106.6 and 105.8, respectively; these values for overachieving boys were 113.8 and 96.0. Thus the roughly similar overall I.Q.'s were arrived at in entirely different fashions. The items of the Performance section of the intelligence test call more heavily on psychological differentiation than Verbal items. Moreover, perhaps, differentiation also is more important for Performance CTMM items than for achievement items from the CAT. Two considerations might support this interpretation. First, performance on the Hidden Figures Test correlates more strongly with the Performance than the Verbal section of the intelligence test; second, clinical opinions generally holds that at lower levels of schooling, achievement is based highly on rote learning and is quite highly reliant on Verbal skills.

Three studies seem closely related to this discussion. The first is Crandall and Sinkeldam's (1964) work on dependency, achievement, and the field dependence dimension. They found that achievement behavior in a summer camp setting correlated positively with performance on the Embedded Figures Test. However, the two highest correlating measures, task persistence and concern with fine motor mastery, might be activity measures rather than achievement indices. Crandall et al. (1954) found that high achieving girls have

less affectionate and nurturant mothers, though few significant findings were discovered for parental correlates of boys' academic achievement. From these results the authors postulate differences in motivation toward academic achievement for boys and girls. Perhaps the style postulated for girls, that achievement is more oriented to reactions from others, may also be characteristic of the extreme field dependent boys.

The third study, by Ferguson and Maccoby (1966), reported that high-verbal children were most susceptible to distraction, whereas the high-number children resisted distraction best. The field-dependent and overachieving boys of the present study were similar to the above group in the Ferguson and Maccoby study in that they performed better on Verbal tasks and were seen as more distractible.

If this perplexing association of low psychological differentiation and overachievement is the result of high verbal loading of achievement test items, or some other specific test factors, it will be quite important for future research to look into measures of achievement in school performance as well as those derived from standard achievement tests.

The first portion of the final hypothesis -- that decline in achievement over time will be associated with low articulation scores -- was supported. A slight trend for an achievement rise to be associated with high differentiation was also found. These data fit well with many past findings on psychological differentiation but

are particularly difficult to incorporate into the over-achievement findings from the preceding hypothesis. If test factors were operating to produce the over-achievement results, then how are these significant findings to be explained? Can we say, as might be suggested from combining these results, that the low group was even more 'overachieving' in the past? Again more data are needed -- this time, perhaps, other achievement tests would suffice -- to ferret out what may be specific test factors from more durable personality factors influencing school achievement.

The results of the last two hypotheses provide an interesting and challenging, though rather confusing, starting point for further investigation of the differentiation and achievement relationship. Past findings of periodic fluctuations and reversals of trend in intelligence patterns over time point out the utility of a longitudinal approach in this area of study. The research on I.Q. changes has described meaningful inflections in the developmental curves for these measures. (Baker, et al., 1958) Another study (Sontag and Baker, 1958) links I.Q. ascendance or decline with personality measures, such as aggression, self-initiation, and competitiveness.

General Considerations

The independent variable of this study was level of psychological differentiation. As in past studies, it has shown some significant and near-significant relations

with social behaviors in such a way that a pattern of characteristics, generally consistent with past studies, has developed. The failure to discover even more solidly identified behavioral styles may be attributed to the linear model under which research in this area, including this study, has been operating.

Crego (1966) showed in his recent pattern analytic study that a more meaningful model considers not only level of expression of differentiation, but also mode of expression. A non-integrated mode of expression would be exemplified by the highly field-independent person who assesses control of reinforcement for behavior as coming from external, not internal, sources. This assessment of reinforcement goes contrary to the highly developed internal frame of reference evidenced by the field independent performance; such a contrary state was found, as predicted, to have a high level of defensive sensitization associated with it. Crego's study should influence future research on differentiation; it provides a methodological attack for the issues raised by Gardner and associates in their monograph. (Gardner, Jackson, and Messick, 1960)

It is impossible to conjecture the results of this study if a model like the above had been used. In terms of an overview of research, however, there have been many strong associations discovered as well as others approaching significance (or significant findings which

fail on replication). And many of these latter are necessary for a solid gestalt of differentiation characteristics. The hope is that the non-linear, multi-factor method provided by Crego can give such a gestalt.

SUMMARY

This study is an attempt to elucidate the dimension of psychological differentiation by studying measures drawn from the Hidden Figures test of field dependence in relation to selected behaviors, teacher ratings, and achievement indices.

The Hidden Figures test CF-1 (from the Educational Testing Service battery) was administered to 263 fifth grade boys in the Lansing and East Lansing Catholic schools. The spread of scores and correlations with intelligence measures were fairly consistent with past research suggesting that this test is a valid indicator of differentiation for this group of boys. A split half reliability for a subgroup of the subjects was +.70.

Perceptual scores were corrected to allow for the influence of the Verbal I.Q. so that none of the differences in dependent variables could be attributed to variations in verbal intelligence. Then the boys were placed into high, moderately high, moderately low, or low categories on the basis of their percentile standing in their class. Twelve groups of boys, each group containing a boy from each category, were selected for further study. They were observed in a play setting structured for competitiveness and cooperativeness, interspersed by a

free play situation during which the examiner left the room. Interrater reliability was significant for all scores and rankings, except dependency and peer approach ranks.

Three of the seven hypotheses dealt primarily with the game or play setting. Scores and ranks from the competitive setting showed a trend in the predicted direction of dominance in the highest group. Teacher ratings found high articulation boys higher on leadership as predicted. The second prediction -- that the moderately high group would be dominant in the cooperative setting -- was not supported. Rather the data were similar to those of the competitive session, again trending toward significance. A significant difference 'between groups' may have decreased some of the differences between levels. What difference did show between groups was interpreted as the result more of permanent personality characteristics than of response to different experimental conditions. Data from the third hypothesis regarding activity level revealed a strong trend opposing the prediction. However, this finding fits with the notion that the field independent was more active and involved -- and a more likely leader.

The 'dependency' hypothesis was not supported; that on distractibility was very strongly supported. The more highly developed inner controls of the differentiated boys were exhibited in their greatest resistance to distractibility.

The discovery of a significant association between low differentiation and overachievement, contrary to the next hypothesis, was the most perplexing finding of the study. One explanation was offered from specific test factors which may have been at work. Further research on differentiation and achievement should include school measures in addition to those of tests.

The final hypothesis of a positive relation between decline in achievement and low articulation as well as a relation of rise in achievement and high articulation was supported for the first portion. The second segment was in the predicted direction but far from significant.

The picture of the highly differentiated boy which has developed from this study is the following: He is not as driven by competition and achievement as was originally expected. However, he tends to be more active, interested, and involved in different situations. He is considered a leader or, at least, capable of leadership by his teachers; data from the structured play setting, while not significant, tend to support such a picture.

The highly differentiated boy is neither a consistent over- or under-achiever while his peer from the low end of the scale is most often a better performer on achievement tests than would be expected. The field-dependent boy accomplishes this in spite of his higher distractibility in the school setting and his decline in functioning from earlier tests.

Future research might produce an even more impressive body of evidence if a pattern analytic model such as Crego's is incorporated as a standard for such studies of cognitive style.

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APPENDIX A

HIDDEN FIGURES TEST

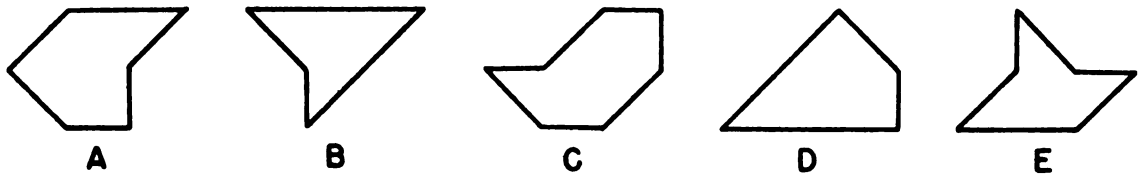
Name: _____

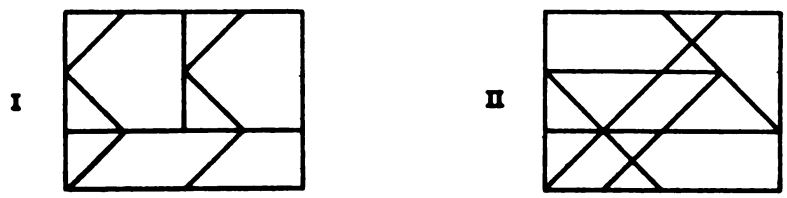
HIDDEN FIGURES TEST — Cf-1

This is a test of your ability to tell which one of five simple figures can be found in a more complex pattern. At the top of each page in this test are five simple figures lettered A, B, C, D, and E. Beneath each row of figures is a page of patterns. Each pattern has a row of letters beneath it. Indicate your answer by putting an X through the letter of the figure which you find in the pattern.

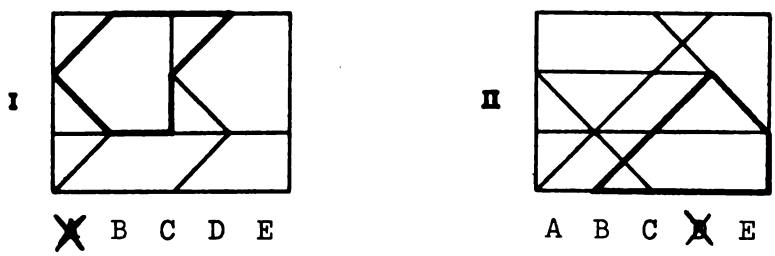
NOTE: There is only one of these figures in each pattern, and this figure will always be right side up and exactly the same size as one of the five lettered figures.

Now try these 2 examples.





The figures below show how the figures are included in the problems. Figure A is in the first problem and figure D in the second.



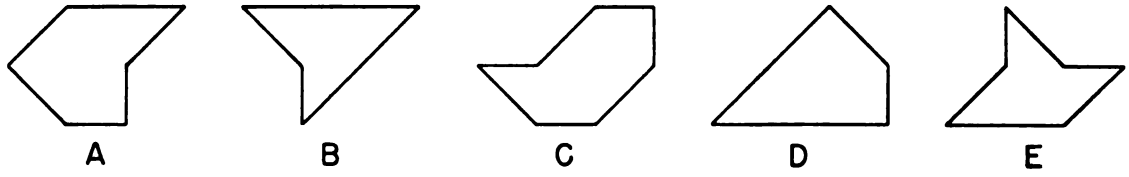
Your score on this test will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 10 minutes for each of the two parts of this test. Each part has 2 pages. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Developed under NIMH Contract M-4186

Part 1 (10 minutes)



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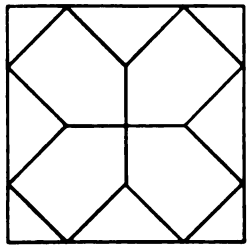
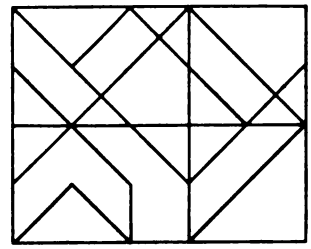


A B C D E

2.



A B C D E

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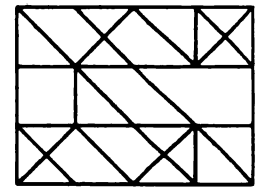

A B C D E

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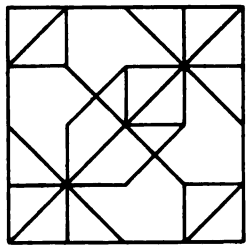

A B C D E

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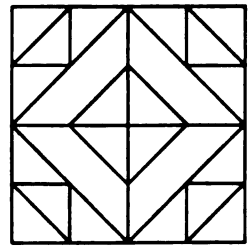

A B C D E

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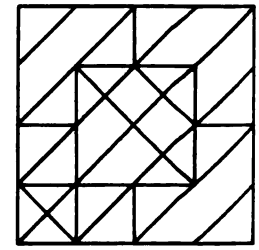

A B C D E

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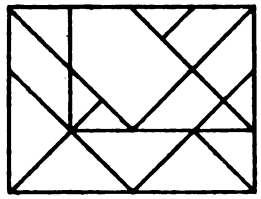

A B C D E

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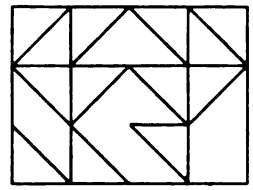

A B C D E

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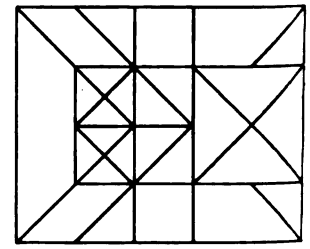
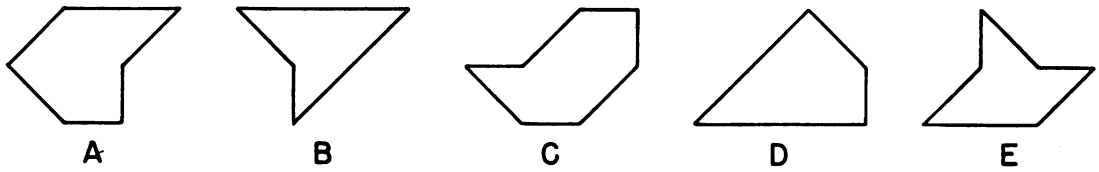


A B C D E

GO ON TO THE NEXT PAGE

Part 1 (continued)



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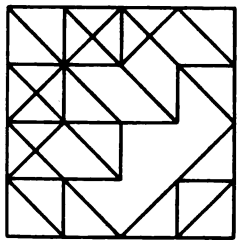

A B C D E

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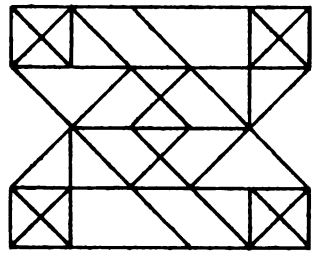

A B C D E

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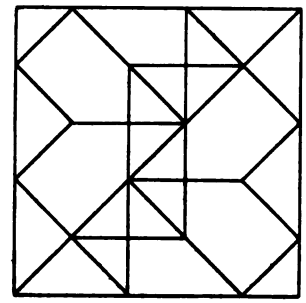

A B C D E

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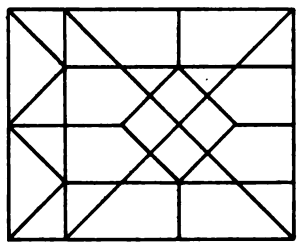

A B C D E

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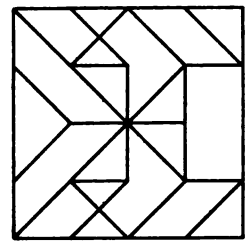

A B C D E

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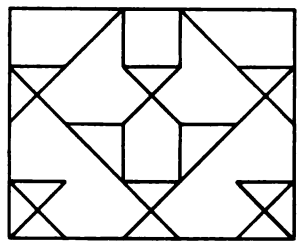

A B C D E

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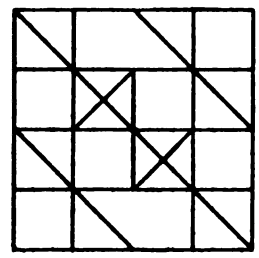
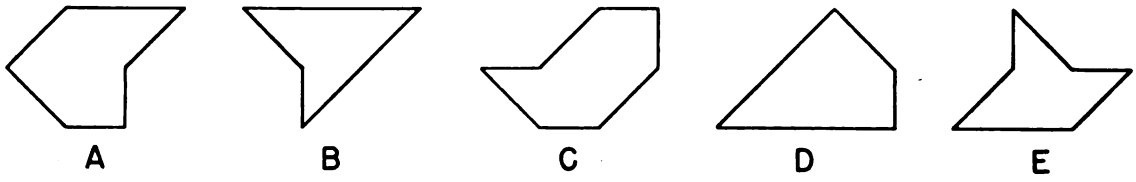


A B C D E

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

STOP

Part 2 (10 minutes)



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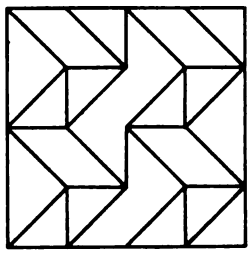

A B C D E

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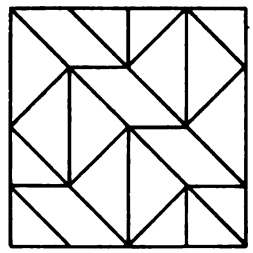

A B C D E

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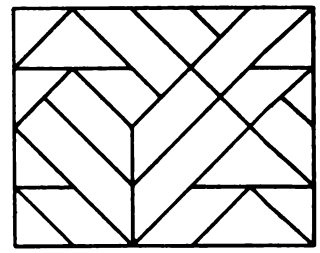

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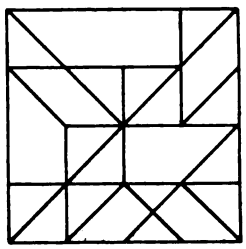

A B C D E

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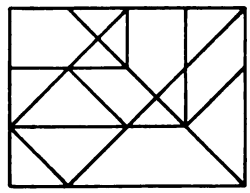

A B C D E

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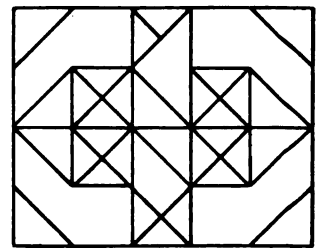

A B C D E

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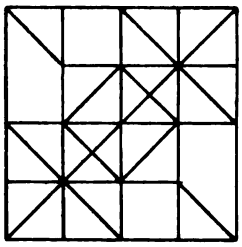

A B C D E

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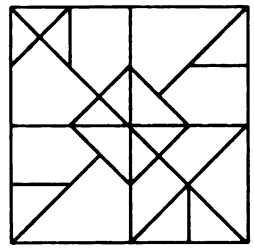

A B C D E

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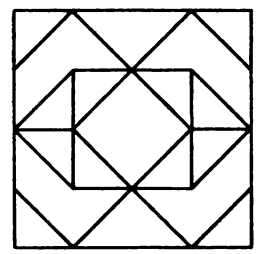

A B C D E

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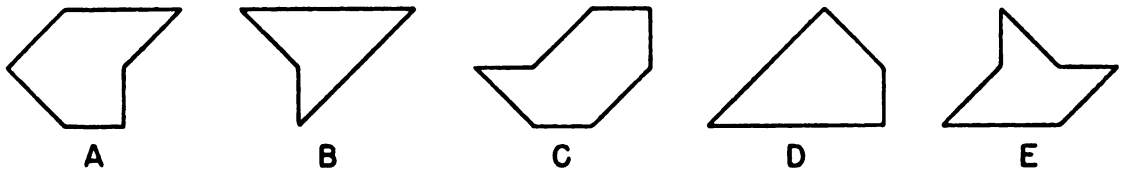
Part 2 (continued)



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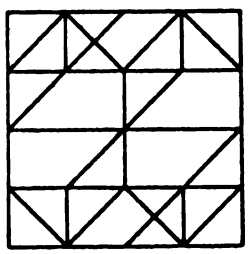

A B C D E

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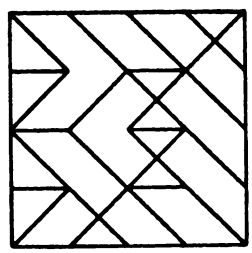

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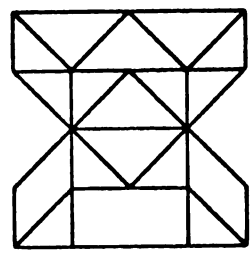

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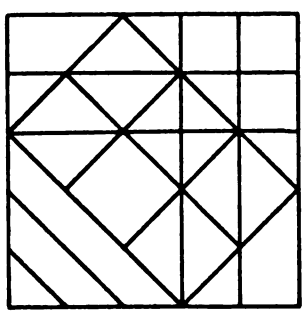

A B C D E

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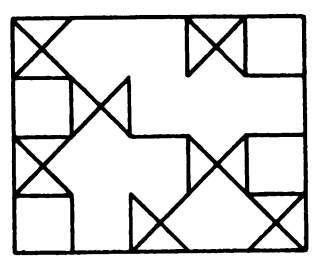

A B C D E

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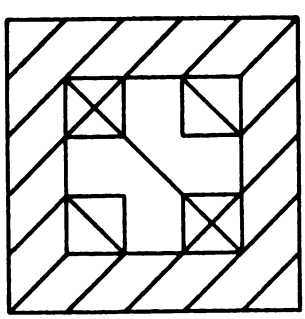

A B C D E

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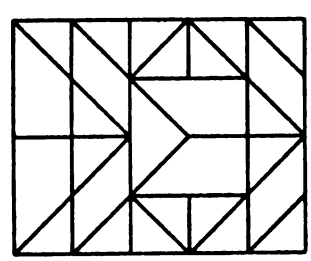


A B C D E

DO NOT GO BACK TO PART 1, AND
DO NOT GO ON TO ANY OTHER TEST UNTIL ASKED TO DO SO.

STOP.

APPENDIX B

TEACHER RATING SCALE

TEACHER RATING SCALE

In this scale you are asked to judge a given boy's likelihood of performing certain acts. We think these sample some important kinds of things boys of this age do. Try to fill out these scales, as much as is possible, with the idea of the normal fifth-grade boy as your guideline. A few questions may ask you to judge behavior outside of the school setting. If you feel that you do not have enough information for such a judgement, use the ? rather than a rating from 1 to 6.

Don't Know	Extremely Unlikely	Quite Unlikely	Rather Unlikely	Rather Likely	Quite Likely	Extremely Likely
?	1	2	3	4	5	6

1. If X were in a playroom, how likely would he be to play with cooking utensils or other doll-house toys?
2. If X is trying something new, how likely is he in the beginning to resist any help?
3. If X is in school but not in class, how likely is he to hang around you or another adult?
4. If there is a slight commotion in the hallway, how likely is X to lose interest in what he is doing?
5. If X is given a choice, how likely is he to choose indoor play versus outdoor play?
6. How likely is X to succeed in influencing his friends' opinions?
7. If X were in a playroom,how likely would he be to take part in a quiet activity or play a sedentary game?
8. How likely is X to assume responsibility for deciding the activity of his group?
9. If X is having "clothes problems," such as unbuttoning his coat or zipping up his galoshes, how likely is he to come to you for help?
10. If the class is having a silent study period,how likely is X to keep at his work?
11. If X were at a party with all his classmates, how likely would he be to spend part of his time playing with girls?
12. If X is reading a new book, how likely is he to look at you for help?
13. In a playroom, how likely would X be to engage in boisterous, runabout activity?
14. How likely is X to avoid facing things normally frightening to children?
15. How likely is X to present problems or questions to you on a one-to-one basis for which you think he has the answer or solution?

16. If a stranger is visiting the classroom, how likely is X to be distracted from his work?

17. How likely a candidate would X be for a job controlling other children, such as, school patrol?

18. In a stimulating situation, how likely would X be to be one of the last boys playing?

19. In class how likely is X, compared to his peers, to raise his hand to answer a question of moderate difficulty?

20. If X is taking a test, how likely is he to work along without looking around or attending to something else?

21. How likely would X be to be chosen "the physically most energetic boy" in his group?

22. If no adult were present and X realized the need for control, how likely would he be to try to keep order?

23. If X is allowed to choose his play activity, how likely is he to choose baseball, football, and rough-and-tumble games?

24. How likely would X be to attempt something new, such as, a shopping trip, if he received neither strong support nor discouragement?

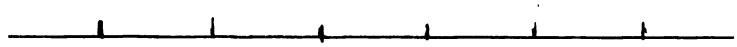
The following scales are assessed by the items indicated below.

Masculinity:	1	5	11	(23)
Self-sufficiency:	2	(9)	(14)	24
Dependency:	3	12	15	19
Distractibility:	4	(10)	16	(20)
Leadership:	6	8	17	22
Activity Level:	(7)	13	18	21

The items circled are reversed, e.g., 6 instead of 1, before they are added together with other items to form a scale. A high score indicates a high probability of a certain behavior in all cases except masculinity. A high masculinity score indicates that the boy is not likely to show masculine behavior.

APPENDIX C

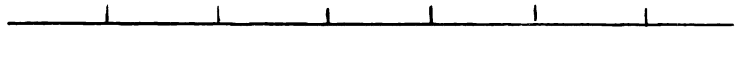
RATING SHEET FOR PLAY SESSION

1. Leadership 

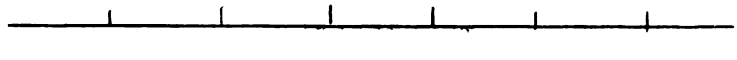
(Defined as the ability of a boy to influence or control the other boys.)*

2. Masculinity 

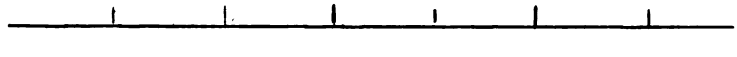
(Defined as the tendency of a boy to play with 'sex-appropriate' toys and to play 'sex-appropriate' games.)

3. Activity Level 

(Defined as the tendency of a boy to sustain a high level of activity during the free play session.)

4. Peer Approach 

(Defined as the tendency of a boy to begin conversations, to attempt to engage another boy in a game, or to stand near a boy who is engaged in some activity.)

5. Dependency 

(Defined as the tendency of a boy to ask the examiner questions not necessary for playing the game or to glance at the examiner for cues.)*

*Observers included the behavior of the boys in the competitive and cooperative settings in these rankings.

APPENDIX D

AVERAGE CORRELATIONS OF THE OBSERVER RANKINGS

Average Correlations of the Observer Rankings

	Act Level	Leadership	Dep.	P. App.
Masculinity	+.39*	+.54**	-.12	-.16
Activity Level		+.41*	-.17	-.08
Leadership			+.09	-.23
Dependency				+.19

*.05 **.01