

**INDEPENDENT BEHAVIOR IN EARLY CHILDHOOD:
THE REFINEMENT OF A RESEARCH
INSTRUMENT**

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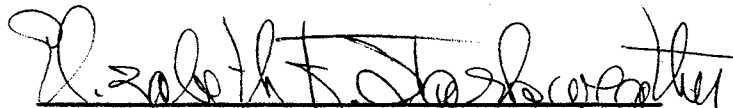
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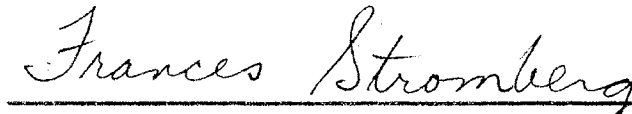
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CHAPTER I

INTRODUCTION

Purpose

The purpose of this study was to refine the Starkweather Independence Test. This was accomplished by modifying the testing procedure as specific problems and possible solutions were identified during the testing of a small group of children.

Problem

One characteristic of the creative person is independence. In the young child, both emotional independence and behavioral independence can be observed; however, in creativity research, the characteristic with which researchers are concerned is behavioral independence. The creative person is independent in thought and action, and he is motivated toward individual goals rather than group goals. He is motivated by situations which demand independent behavior and he is less motivated by situations which demand conforming behavior.

One can well believe that many creative students chafe under the discipline of group activities and requirements of the classroom. It is not that they are lazy, or that their level of aspiration is low, or that in their rebellious attitudes they are "rebels without a cause." The problem (if we permit it to become a problem) derives from their high level of energy which they seek to channel into independent, nongroup-coordinated strivings for extremely high goals of achievement--goals which they set for themselves and which may well conflict with goals that have been set for the group.

It is thus a fundamental characteristic of creative subjects that they are strongly motivated to achieve in situations in which independence of thought and action is called for and that they have much less interest or motivation to achieve in situations which demand conforming behavior. (MacKinnon, 1965, p. 164).

Behavioral independence is referred to as a positive quality in creative living when a person works by himself and does so freely; however, behavioral independence is a negative quality when a person is compulsive about working by himself and cannot accept help even in a difficult situation.

Behavioral independence is exhibited when a child initiates his own activities and copes with difficulties without seeking help . . . In this context, instrumental independence is considered a positive quality. However, when instrumental independence is compulsive and the child cannot permit himself to accept help even in difficult situations, instrumental independence is a negative quality . . . Creativity theory suggests that free rather than compulsive behavior is necessary for creative expression; therefore, neither the compulsively dependent nor the compulsively independent person has the freedom necessary for optimum creative living. (Patton, 1969, p. 2).

As a part of the creativity research with young children at Oklahoma State University, the development of a test of behavioral independence has been initiated. The test is a most promising instrument but is in need of refinement; and it is the refinement of this test on which the present research is focused.

CHAPTER II

REVIEW OF LITERATURE

The review of literature presented in this chapter includes a description of the research methods used in studies of behavioral independence. The development of the puzzle box independence test, specifically designed for use with young children, is also discussed.

Research Methods

A variety of research methods have been used successfully in studies of dependence and independence. These include observations in structured and unstructured situations, interviews and questionnaires, and research instruments specifically designed to measure independence.

Observations

Some researchers have studied independence by observing children during their free play. One technique frequently used in these studies has been time-sampling, in which the child's behavior is observed for brief intervals over a period of days or weeks. In some studies, the child's behavior has been categorized at the time of the observations, and in other studies written records are kept and the child's behavior is analyzed after all data have been gathered. (Heathers, 1955; Marshall and McCandless, 1957; Crandall, Preston and Rabson, 1960;

Clapp, 1966). A less structured method has been the informal observation of children over a period of weeks or months with each child then being rated without the benefit of written records. (Beller, 1955; Clapp, 1966).

Some researchers have studied independence by observing parent-child or adult-child interactions in structured situations. One of the most common methods of studying dependent behavior in a structured situation is that of observing the attention-seeking behavior of young children. Gewirtz (1954) studied the attention-seeking behavior of young children when an adult was nearby and attentive (high-availability) and when an adult was at a desk busy with papers (low-availability). In both situations the child was occupied with easel painting, and his attention-seeking behavior was studied in relation to the availability of the adult. Clapp (1966), in a study of dependence and competence, used a structured situation of low-availability and high-availability similar to that described by Gewirtz (1954). He was interested in the relationship of parental treatment of young children to children's dependence and competence. Hatfield, Ferguson and Alpert (1967) were interested in the independence aspect of socialization. They observed mother-child interactions when the mother was occupied filling out a questionnaire and again when the mother was unoccupied and attentive to her child.

Questionnaires and Interviews

Most researchers have used questionnaires and interviews with parents in their studies of dependence in young children. Stendler (1954) was interested in the relationship of overdependency in young

children to the mother's approach to child care practices. In interviews information was obtained about the mothers' training practices and about the children's dependency in specific areas: eating, physical habits, playing with others, and contact with parents. Sears, Maccoby, and Levin (1957), in an extensive study of child-rearing patterns, interviewed mothers about their training practices and attitudes in the areas of feeding, toilet training, sexual behavior, dependency, and aggression. In this study, the questions related to dependency training were primarily concerned with emotional dependence rather than behavioral independence. Smith (1958) used observations and interviews to obtain information about emotional dependency (clinging or whining), physical dependency (wanting help while dressing), conditions under which dependency occurred, and the areas in which the child tried to be dependent. Clapp (1966) was interested in the relationship of parental treatment of young children (four-year-old boys) to the children's dependence and competence; and he developed a questionnaire for use with the children themselves rather than depending entirely upon interviews with parents.

Research Instruments

Specific research instruments have also been designed for the measurement of independence in early childhood. These include several types of puzzles -- inlay puzzles, picture puzzles, and puzzle boxes. Children who have completed the puzzles with little or no help have been identified as behaviorally independent, and

children who have requested or accepted help in order to complete the puzzles have been identified as behaviorally dependent.

Tether (1961) used inlay puzzles in order to measure the independent behavior of first grade children. She was interested in independence as one criterion of conscientious effort.

Griffin (1964), White (1967) and Baxter (1968) used a puzzle box in their studies of preschool children's independent behavior. The puzzle box was one originally developed by Keister (1937) for use in the study of children's reactions to failure. Problems which were encountered with the puzzle box led to the development of the Starkweather Independence Test.

Development of the Independence Test

The creativity research at Oklahoma State University began with a study of the conscientious effort of first grade children (Tether, 1961) and a study of preschool children's freedom to express themselves in a play situation (Azbill, 1961). These two early studies have served as a basis for later creativity research.

Tether (1961) identified three characteristics of conscientious effort that she observed in first grade children. These were persistence, behavioral independence, and a willingness to take calculated risks. She used inlay puzzles to measure the characteristic of independence. Each child worked two of these puzzles, and his independence was determined by the extent to which he requested help or accepted offers of help while completing the puzzles.

This approach to the measurement of behavioral independence, led to the adaptation of a puzzle box developed by Keister (1937). This

puzzle box was originally used in the study of young children's reactions to failure, but as an independence test it was administered just as Tether (1961) had administered the inlay puzzles. As each child played with the puzzle box, he was offered help at regular intervals and he was given help whenever he asked for it. His independence score was indicated by the number of times that he actually accepted help. The Keister puzzle box, adapted in this way, was used as a test of behavioral independence by Griffin (1966), White (1967), and Baxter (1968). The puzzle box is illustrated in Figure 1.

The major problem encountered in the use of the Keister puzzle box as a test of independence was that it did not provide the child with experiences of success when he was offered help, and therefore, he had no way of knowing that he had actually received genuine help. These particular problems were overcome by the development of two series of puzzles graded in difficulty -- a series of picture puzzles (Smith, 1969) and a series of puzzle boxes (Patton, 1969). In these series, the child experienced success with the completion of each picture puzzle or puzzle box, and success was usually experienced by the child soon after each offer of help, thereby providing him with evidence that he had in fact received genuine help.

A comparison of the two instruments developed by Patton and Smith, indicated that the puzzle boxes as a test of independence provided the better instrument for use with young children. Both were designed to meet the criteria that had been established for measuring behavioral independence in young children. Both were statistically reliable and both were accepted as having face validity.

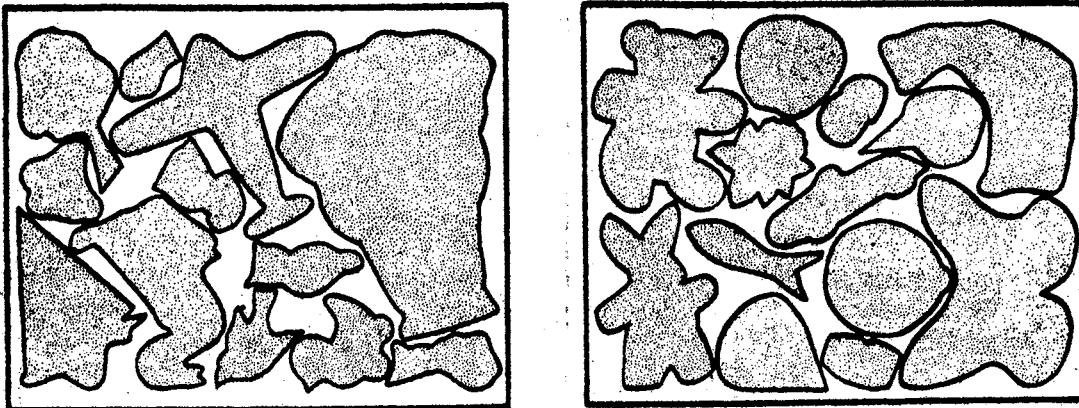


Figure 1. The First Puzzle Box Independence Test - an adaptation of a puzzle box developed by Keister (1937).

However, in the validation study (Smith, 1969), in which children's independence scores were compared to their responses on a pictorial questionnaire designed to identify independent behavior in everyday situations, only the validity of the puzzle boxes as a test of independence was supported.

Another observation which indicated that the puzzle boxes provided the better test of independence was that in a group of 74 children to whom the puzzle boxes and the picture puzzles were administered, nine children reached the ceiling with the puzzle boxes; that is, these children completed the tests without accepting any help whatsoever. One explanation offered for the difference between the two tests was that the picture puzzles were a familiar type of task for the children and the puzzle boxes were novel. (Patton, 1969).

The puzzle box test of independence, as originally designed by Patton (1969), consisted of a series of eight small flat boxes, each containing from two to five puzzle pieces. These puzzle boxes were

approximately four inches by five and one-half inches in size. The pieces were painted on one side so that the upright side could be easily identified by the child.

Several ways of administering the puzzle boxes as a test of independence were explored by Patton (1969). Some children were permitted to choose one puzzle box at a time until they had completed all the boxes. When this method of administration was used, the order of the boxes was different for each child. For other children the puzzle boxes were presented in a prescribed order, beginning with the two-piece puzzles and ending with the five-piece puzzles. Patton also explored possible ways of offering help to the children during the test. As a result of this exploratory work, she recommended the order of presentation of the puzzle boxes and the manner of offering help described below.

For the puzzle box test of independence, Patton (1969) chose an order of presentation which gave each child an initial demonstration with a puzzle box before he began the test proper, and which provided a sequence for the actual test which made it possible for the child to start with a box with which he would experience quick success and to end with a box with which he would again experience quick success. For the first four puzzle boxes the difficulty for the child gradually increased, and for the last four boxes the difficulty gradually decreased. (For the first four boxes the number of puzzle pieces in each box was two, three, four, and five in that order; and for the last four puzzle boxes the number of puzzle pieces was five, four, three, and two in that order.)

Patton (1969) developed a method of scoring for the puzzle box independence test which reflected the relationship between the difficulty of the task for the child and the amount of help he accepted in completing the task. Independence was specifically measured in terms of the number of puzzle pieces the child picked up to put into a box and the number of times that he accepted help in completing that box. This method of measuring independence demanded that the ways of offering help to the child be clearly defined. Some children specifically asked for help, and when this occurred, offering help was no problem. Other children were reluctant to ask for help or possibly were unable to do so. Because of this problem, Patton chose arbitrarily to offer help each time a child had made ten attempts to place puzzle pieces in one of the boxes.

Another problem encountered by Patton (1969) was related to the way the children requested help. Frequently a child would comment that a puzzle was hard; or referring to a piece he was holding, he would ask, "Where does this go?" These comments and questions did not necessarily mean that the child wanted help; and therefore, when any child made a comment such as this, Patton recommended that the experimenter respond with the question, "Do you want me to help?" Only when the child specifically indicated that he wanted help was he to be given help.

The design of the puzzle box test of independence was such that it had face validity; nevertheless, the need for further validation was recognized. (Patton, 1969). The test offered the children a situation in which they were faced with a difficult task and showed their independence by working alone or showed their dependence by

accepting help. To this extent the test had face validity; nevertheless, the independence which a child showed in the test situation may or may not have reflected the independence that he might show in his everyday activities. The need for further validation was evident and a pictorial questionnaire was developed for this purpose by Smith (1969).

The pictorial questionnaire (Smith, 1969, pp. 56-62), designed as a validation instrument, offered children choices between dependent and independent situations in everyday activities. The children's responses to this questionnaire were compared to the independence that they showed when solving the puzzle boxes. A Mann-Whitney U test indicated that the children who were high-scoring on the independence test scored significantly higher on the questionnaire than did the children who were low-scoring on the independence test. This difference between the two groups of children was statistically significant beyond the .05 level. On the basis of this comparison, the puzzle box test of independence was accepted as a valid instrument.

The reliability (internal consistency) of the puzzle box test of independence was determined by a split-half analysis. The correlation coefficient, corrected by the Spearman-Brown formula, was +0.70 ($p < .01$). On the basis of this comparison, the independence test was accepted as reliable. A description of the puzzle box independence test, now known as the Starkweather Independence Test, is presented in Appendix B.

Implications for the Present Research

Subsequent to Patton's research (1969), attempts were made to use the Starkweather Independence Test in the creativity research program

at Oklahoma State University, but problems were encountered in the administration and scoring of the instrument. These problems indicated the areas on which the current refinement of the test should be focused: (1) how the behavior of the child should be recorded as he attempts to complete each puzzle box; (2) when help should be offered to the child; and (3) how specific help should be given to the child.

CHAPTER III

METHOD AND PROCEDURE

The purpose of this study was to refine the Starkweather Independence Test. This was accomplished by modifying the testing procedure as specific problems and possible solutions were identified during the testing of a small group of preschool children. This chapter includes a description of the subjects who participated in the research, the steps involved in the refinement of the instrument, and a statement about the data analysis.

Subjects

The subjects who participated in this study were 26 preschool children, 14 girls and 12 boys. The age range of the children was from three years three months to six years one month. Most of the children were from day care centers in Stillwater and Oklahoma City, Oklahoma; and these children were tested at the day care centers. Two children were tested in their own homes.

Refinement of the Instrument

The refinement of the Starkweather Independence Test included changes in the method of recording the child's attempts to complete each puzzle box and clarification of the frequency and method of offering help to the child. These were the problem areas which had

been indicated during the attempted use of the test in creativity research. When these problems were eliminated, still another problem became apparent. The test proved to be long and frustrating; and as a last step in the refinement, one of the more difficult puzzle boxes was eliminated.

Method of Recording Child's Attempts

The recommended method of recording the child's attempts to solve the puzzle boxes was to count each piece that he picked up to put into a box. This meant that the recording was done before the child actually completed his attempt. This type of recording was confusing and was difficult to score objectively.

The recording of the child's attempts was changed to a count of each puzzle piece when he released it rather than when he picked it up. The fact that the child's action was completed when it was counted was probably the major factor in making this aspect of the scoring more objective.

Because of the variety of ways in which the children worked with the puzzle boxes, several specific directions for recording attempts were needed.

1. Frequently a child tries to place one puzzle piece in several different positions. His attempt is counted only when he has removed his hand from the piece, and his effort is then recorded as one attempt no matter how many moves he made with that one piece before releasing it.

2. A child may move a puzzle piece which was already placed in the box. When the child removes his hand from the piece, the move is then recorded as one attempt.

3. A child may move several pieces simultaneously, changing their position in the box, and doing so with one hand or with both hands. When he removes his hands from the puzzle pieces, each piece is then recorded as one attempt. In other words, if a child used one hand to move two pieces in the box simultaneously, this would be recorded as two attempts.

4. Frequently a child may try to match two pieces or fit two pieces together either on the table surface or inside the box. This is recorded as one attempt.

5. Some children take time out to play with the puzzle pieces, particularly if they remind them of animals or toys. Such activity is not included in the scoring inasmuch as it is not a part of the child's attempts to solve the puzzle box.

Frequency of Offering Help

The recommended method of offering help was simply to ask the child, "Would you like me to help?" This was done whenever the child's behavior suggested that he needed help, and was done regularly after the child made ten attempts independently. Help was also given whenever the child specifically requested it.

Two major problems were immediately apparent when the experimenter tried to follow these directions for offering help. Subjective judgments were necessary to determine when the child's behavior indicated that he needed help; and some children seemed to lose interest or

become discouraged if help was offered only after ten independent attempts. Changes in the directions provided for more frequent offers of help.

1. Help is offered regularly after the child has made five independent attempts to complete the puzzle box.

2. Some children sit quietly staring at the box or at the pieces, without making any apparent effort to solve the puzzle. This quiet staring, which is in marked contrast to a child's studying the pieces in an attempt to solve the puzzle, may occur immediately after a puzzle box is presented or it might occur after a child has made a few attempts independently. In either case, when the experimenter observes this type of behavior, she waits five seconds and then offers help. Offers of help under these circumstances serve to bring the child back to the task at hand, and he either renews his independent efforts or immediately accepts the offered help.

3. Some children respond to offers of help by saying "Yes" while continuing their own independent efforts. In spite of the child's verbal acceptance of help, help is not given unless the child stops his work on the puzzle box.

4. Help is always given to the child, if when he is offered help, he stops his work on the puzzle box in order to receive the help. The child may or may not respond verbally, but he must stop his own independent efforts or no help is given.

Method of Giving Help

The recommended method of giving help to the child was to remove incorrectly placed pieces and replace one piece in the box correctly.

These directions were vague and there was no assurance that the child understood what was happening or believed that he had received genuine help. Changes in the directions include explanations which are given to the child when the puzzle boxes are demonstrated and specific directions for giving help with each puzzle box.

1. At the beginning of the test, when the demonstration boxes are introduced, the experimenter explains, "These puzzles are different from the picture puzzles you're used to playing with. See, the pieces don't fit together." With her fingertips, the experimenter may then wiggle the pieces in the box to demonstrate their loose fit. "There are five pieces in my box. (She counts them.) Do you have five pieces?" In this way, the experimenter encourages the child to touch and count the pieces in his demonstration box. As the puzzle boxes in the test proper are presented, the child is encouraged to count the pieces in a similar manner, in order to be sure that he looks at the box carefully before the pieces are removed.

2. A method of giving help, which would be the same for all children, was developed. When a child requests or accepts help, the experimenter removes all incorrectly placed puzzle pieces from the box and then places one large piece correctly, saying, "Let's put this piece right here." If the child again requests or accepts help, the experimenter again removes all but the correctly placed pieces and places another piece in the box correctly. This process is repeated each time the child wants help. The order in which the pieces are placed in the boxes by the experimenter is illustrated in Figure 2. When a child is helped in this manner, it is always

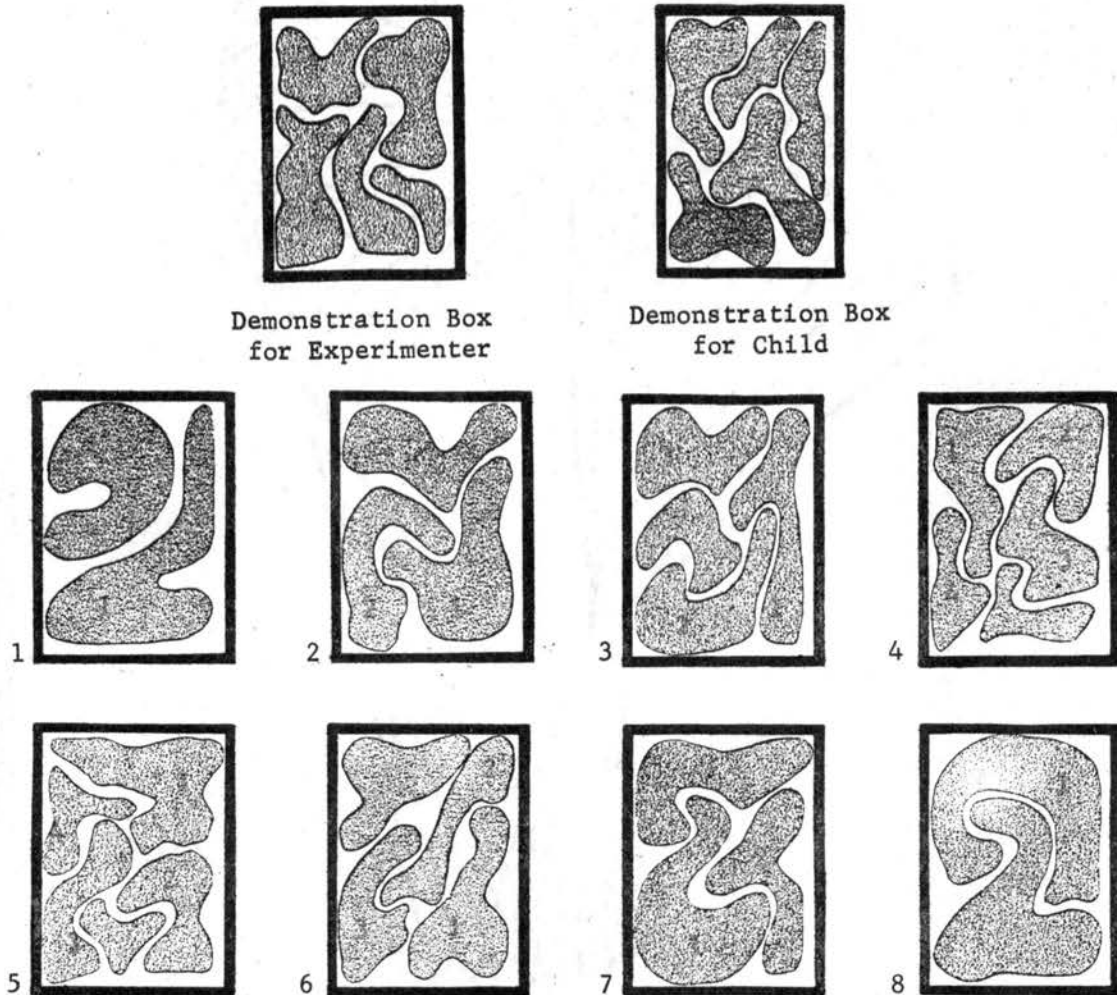


Figure 2. Starkweather Independence Test - Order in which puzzle pieces are placed as the experimenter gives help to the child.

possible for him to experience success by placing the last piece in the box by himself.

Length of the Test

The puzzle box independence test, modified according to the recommendations described above, was administered to 15 children. For these children, the test seemed to be unnecessarily long, and a particular point of frustration or losing interest seemed to occur when the children were working on the second 5-piece puzzle box. Because of this, these children's test responses were scored in two ways in order to determine whether or not the second 5-piece puzzle box could be eliminated. One independence score was calculated using each child's responses to all eight puzzle boxes, and a second independence score was calculated using his responses to seven boxes, the second 5-piece puzzle box being eliminated from this scoring.

The two sets of independence scores are presented in Table I. A Spearman rank correlation yielded a coefficient of +0.979, significant beyond the .01 level. On the basis of this finding, the second 5-piece puzzle box was eliminated from the independence test.

The independence test, modified as described above, was then administered to eleven more children. The scores of 26 children were then available for analysis. In Appendix A, Table V, descriptive data and test scores for these children are presented.

Analysis of Data

The following scores are available for each child: the number of difficult puzzle boxes, the level of help offered, the level of

TABLE I

TEST SCORES CALCULATED FROM RESPONSES TO
SEVEN AND EIGHT PUZZLE BOXES
(N = 15)

Sex and Code No.	Independence Scores	
	8-Boxes	7-Boxes
M-1919	5.56	3.90
F-1949	4.30	5.36
M-1974	4.16	4.09
F-2029	4.07	3.47
F-2026	3.04	3.04
M-1989	2.87	3.44
M-2028	2.34	1.99
F-1940	1.86	2.15
M-1978	1.75	1.75
M-2023	1.58	1.69
M-1996	1.55	1.72
M-2027	1.53	1.64
F-1945	1.36	1.35
F-1929	0.95	1.04
F-2025	0.80	0.95

Spearman rank correlation coefficient: $+0.979$; $p < .01$.

help accepted, the level of difficulty, and an independence score. The relationships among these scores provide answers to questions such as whether the amount of help a child accepted was influenced by the amount of help that he was offered, whether the offering of help influenced the child's independent behavior, and whether the amount of help a child accepted and the difficulty level at which he chose to work are qualities independent of each other. The Mann-Whitney U Test and the Spearman rank correlation were the two statistical methods used in these analyses.

CHAPTER IV

RESULTS

During the refinement of the Starkweather Independence Test, the test was administered to 26 children. For each of these children the following scores are available: the number of difficult puzzle boxes, the level of help offered, the level of help accepted, the level of difficulty, and an independence score. Descriptive data and these test scores for the individual children are presented in Appendix A, Table V.

Test Scores

In Table II, the scores of Child M-1996 and Child F-2026 are presented. These particular scores are used to illustrate the explanations of the test scores presented here.

Number of Difficult Puzzle Boxes

Each child's independence score was calculated from his responses while solving the puzzle boxes with which he had some difficulty. If a child completed a box without help and did so with the number of his attempts equalling the number of pieces in the box, that box was not included in the calculation of his independence score. For example, if a child completed a 3-piece box with no help and did so by merely placing the three puzzle pieces in the box one at a time (three

TABLE II
 EXAMPLES OF INDEPENDENCE TEST SCORES

	Child M-1996	Child F-2026
Age	5:0	4:3
Number of Difficult Puzzle Boxes	6	5
Level of Help Offered	2.00	3.20
Level of Help Accepted	1.67	1.40
Level of Difficulty	2.87	4.26
Independence Score	1.72	3.04

attempts), that box offered no difficulty and was not included in the calculation of the child's scores.

The independence test included a total of seven puzzle boxes. As indicated in Table II, six boxes offered difficulty for Child M-1996 and five boxes offered difficulty for Child F-2026. Child M-1996 completed the last 2-piece box with no difficulty, and Child F-2026 completed the first 2-piece box and the first 4-piece box with no difficulty.

Level of Help Offered

The score for the level of help offered is an indication of the mean frequency with which help was offered for the puzzle boxes with which the child had difficulty. Child M-1996 was offered help a total of 12 times, which gave him a mean frequency of 2.00 for the six boxes with which he had difficulty. Child F-2026 was offered help a total of 16 times, which gave her a mean frequency of 3.20 for the five boxes with which she had difficulty.

Level of Help Accepted

The score for help accepted indicates the mean frequency with which a child accepted help as he worked the puzzle boxes. Child M-1996 accepted help a total of ten times, which gave him a mean frequency of 1.67 for the six boxes with which he had difficulty. Child F-2026 accepted help a total of seven times, which gave her a mean frequency of 1.40 for the five boxes with which she had difficulty.

Level of Difficulty

The score indicating the level of difficulty at which the child chose to work is an indication of the relationship between the attempts made by the child and the number of puzzle pieces in each box. For example, Child M-1996 tried 11 pieces in the 4-piece puzzle box before completing it, thus earning a score of 3.75 for the level of difficulty at which he worked on that box. This child's level of difficulty for the total test, as shown in Table II, was 2.87. This score is the mean of the scores calculated for each of the six boxes with which

he had difficulty and indicates that on the average he made two or three attempts for each puzzle piece that he placed successfully during the test. For Child F-2026, the level of difficulty score was 4.26, indicating that she made more than four attempts for each puzzle piece successfully placed during the test. The general level of difficulty at which Child F-2026 chose to work was higher than that at which Child M-1996 chose to work.

Independence Score

The independence score indicates the relationship between the level of difficulty at which the child chose to work and the extent to which he accepted help. This score is calculated by dividing the mean level of difficulty by the mean level of help accepted. For Child M-1996, 2.87 is divided by 1.67, which yields an independence score of 1.72.

For Child F-2026, 4.26 is divided by 1.40, which yields an independence score of 3.04. Children with scores of 2.00 or more tended to refuse offers of help and were most persistent in their attempts to solve the puzzle boxes independently. Children with scores of 1.00 or less tended to request help frequently and solved only the easiest puzzle boxes independently.

Relationship of the Test Scores to the Difficulty of the Independence Test

One indication of the difficulty of the Starkweather Independence Test is provided by the number of puzzle boxes which were difficult for each child. Thirteen of the children in the present study had

difficulty with only two, three, or four of the puzzle boxes; and the remaining 13 children had difficulty with five or six of the puzzle boxes. Even though only those boxes with which a child had difficulty were considered in the calculation of his independence score, the question remains as to whether the difficulty of the test as a whole was related to the independent behavior exhibited by the child. In order to answer this question, the test scores of children having difficulty with four puzzle boxes or less were compared to the scores of children having difficulty with five boxes or more. The distribution of these test scores is presented in Table III.

There was no significant difference between the test scores of the children for whom the independence test was relatively easy and those for whom the test was relatively difficult. The level of help offered, the level of help accepted, the level of difficulty, and the independence scores were similar for both groups of children. The Mann-Whitney U test was used in these analyses and indicated that there were no statistical differences among these groups of scores.

The implication here is that the recommended scoring of the Starkweather Independence Test provides a measure of behavioral independence whether the test as a whole is relatively easy or relatively difficult for the child.

Correlations among Test Scores

An analysis of the relationships among test scores is necessary in order to answer such questions as whether the amount of help a child accepts is influenced by the amount of help that he is offered, and whether the amount of help a child accepts is related to the

TABLE III

THE RELATIONSHIP OF TEST SCORES TO THE
DIFFICULTY OF THE INDEPENDENCE TEST

	Number of Puzzle Boxes with which the Child had Difficulty			
	(N = 13) 2-3-4 Boxes		(N = 13) 5-6 Boxes	
	Median	Range	Median	Range
Level of Help Offered	2.50	0.75 - 3.50	2.00	1.17 - 3.20
Level of Help Accepted	1.50	0.60 - 2.50	1.40	0.60 - 2.00
Level of Difficulty	2.95	1.38 - 5.20	2.80	1.89 - 4.26
Independence Score	1.68	1.04 - 5.36	1.98	0.95 - 4.16

difficulty level at which he chooses to work. If the amount of help offered influences the amount of help accepted, then the manner in which help is offered would seriously influence the child's independence score. If the amount of help a child accepts is related to the level of difficulty at which he chooses to work, then these two variables are not independent of each other. Independence scores are calculated from the amount of help accepted and the level of difficulty at which

the child works, and if these two qualities are not independent of each other, the resulting independence score would be weighted and could not be accepted as a valid or reliable measure of behavioral independence.

Spearman rank correlations among the various test scores are presented in Table IV. Scores for the total group of 26 children were included in these analyses.

Level of Help Offered and Help Accepted

A Spearman rank correlation between scores for the level of help offered and the level of help accepted yielded a coefficient of -0.030 , which was not statistically significant. The amount of help that a child was offered as he worked the puzzle boxes was not related to the amount of help that he accepted. The implication of this finding is that the directions for offering help, as modified in the present research, are adequate. The original directions were vague, and the manner in which help is offered was one part of the administration of the independence test that was refined.

A Spearman rank correlation between scores for the level of help offered and the level of difficulty at which the child chose to work yielded a coefficient of $+0.867$, which was significant beyond the $.001$ level. This positive relationship is logical inasmuch as help is offered at regular intervals as the child works, and the longer a child works independently the more help he is offered. The important fact here is that, in spite of the positive relationship between help offered and level of difficulty, offers of help did not influence the child to accept help.

TABLE IV
 SPEARMAN RANK CORRELATIONS AMONG
 INDEPENDENCE TEST VARIABLES
 (N = 26)

	Independence Score	Level of Difficulty	Level of Help Accepted
Level of Help Offered	+0.467 p < .02	+0.867 p < .001	-0.030 n. s.
Level of Help Accepted	-0.835 p < .001	-0.124 n. s.	
Level of Difficulty	+0.582 p < .01		

Level of Difficulty and Help Accepted

A Spearman rank correlation between scores for the level of difficulty and the level of help accepted, yielded a coefficient of -0.124, which was not statistically significant. These two variables are independent of each other, and therefore, are acceptable for use in the calculation of the independence scores.

Independence Scores

Each child's independence score is calculated from the two scores which indicate the level of help the child accepted and the level of difficulty at which he chose to work. The assumptions on which this method of scoring is based are (1) that the more help a child accepts, the less independent he is, and (2) that the more difficult the level at which the child chooses to work, the more independent he is. These two assumptions suggest that the relationship between independence scores and level of help accepted should be negative, and that the relationship between independence scores and the level of difficulty should be positive.

Spearman rank correlations supported these assumptions. The correlation between independence scores and help accepted was negative ($\rho = -0.835$; $p < .001$); and the correlation between independence scores and level of difficulty was positive ($\rho = +0.582$; $p < .01$).

Summary

The Starkweather Independence Test, as modified in the present research, was administered to 26 children. An analysis of the test scores of these children indicated the following:

1. The scoring of the independence test provides a measure of behavioral independence whether the test as a whole is relatively easy or relatively difficult for the child.
2. The directions for offering help to the child, as modified in the present research, are adequate. The amount of help that a

child is offered as he works the puzzle boxes is not related to the amount of help that he accepts, even though the amount of help offered is logically related to the level of difficulty at which the child chooses to work.

3. The level of difficulty at which the child chooses to work and the amount of help that he accepts are two variables which are independent of each other, and therefore, are acceptable for use in the calculation of independence scores.

4. The relationship between independence scores and level of help accepted is negative; and the relationship between independence scores and the level of difficulty is positive. These relationships support the assumptions on which the method of scoring is based; namely, the more help a child accepts, the less independent he is, and the more difficult the level at which the child chooses to work, the more independent he is.

CHAPTER V

SUMMARY AND IMPLICATIONS

The purpose of this study was to refine the Starkweather Independence Test. This was accomplished by modifying the testing procedure as specific problems and possible solutions were identified during the testing of a small group of children.

The subjects who participated in this study were 26 preschool children, 14 girls and 12 boys. The age range of the children was from three years three months to six years one month. Most of the children were from day care centers in Stillwater and Oklahoma City, Oklahoma; and these children were tested at the day care centers. Two other children were tested in their own homes.

There were two steps involved in the refinement of the instrument. The use of the puzzle boxes as an independence test continued to suggest problems in administration and scoring. These problems indicated three areas on which the refinement of the test was focused. These were (1) how the behavior of each child should be recorded as he attempts to complete the puzzle boxes; (2) when help should be offered the child; and (3) how help should be given to the child. The puzzle box test, modified in these three areas was then administered to 15 children. For these children, the test seemed to be unnecessarily long, and a particular point of frustration or losing interest seemed to occur when the children were working on the second 5-piece puzzle

box. An analysis of these children's test responses indicated that the independence test could be shortened by eliminating the second 5-piece puzzle box. The independence test, refined in this manner, was then administered to 11 more children. The scores of 26 children were then available for analysis.

For each of the 26 children to whom the Starkweather Independence Test was administered, the following scores were available: the number of difficult puzzle boxes, the level of help offered, the level of help accepted, the level of difficulty, and an independence score. An analysis of these test scores indicated the following:

1. The scoring of the independence test provides a measure of behavioral independence whether the test as a whole is relatively easy or relatively difficult for the child.
2. The directions for offering help to the child, as modified in the present research, are adequate. The amount of help that a child is offered as he works the puzzle boxes is not related to the amount of help that he accepts, even though the amount of help offered is logically related to the level of difficulty at which the child chooses to work.
3. The level of difficulty at which the child chooses to work and the amount of help that he accepts are two variables which are independent of each other, and therefore, are acceptable for use in the calculation of independence scores.
4. The relationship between independence scores and level of help accepted is negative; and the relationship between independence scores and the level of difficulty is positive. These relationships support the assumptions on which the method of scoring is based;

namely, the more help a child accepts, the less independent he is, and the more difficult the level at which the child chooses to work, the more independent he is.

Implications for Future Research

The present study has been limited to the refinement of a test designed to measure behavioral independence in young children, the Starkweather Independence Test. Intensive work with a small group of children, 26 in all, provided evidence for several major changes which seem to have made the instrument highly effective. Now an extensive study of behavioral independence should be undertaken, and the validity and reliability of the instrument reexamined.

The Starkweather Independence Test is designed so that it has face validity. The puzzle boxes offer the child a situation in which he is faced with a difficult task and is free to work by himself or to accept help in completing the task. In such a situation a child who prefers to work by himself is behaviorally more independent than a child who accepts help; nevertheless, the puzzle boxes are just one type of situation and may or may not reveal the independence that a child shows in his everyday activities.

The Pictorial Questionnaire (Smith, 1969) was originally designed as a validation instrument for the puzzle box independence test. It offered the child choices between independent and dependent behavior in everyday situations, and it discriminated between children who were high-scoring and low-scoring on the independence test prior to the refinements which were made in the present research. Logically, this questionnaire should be used as the validation instrument for

the refined Starkweather Independence Test. However, refinement of the questionnaire itself is advisable before it is again used for validation purposes. Conferences with parents might indicate a need to eliminate or add certain situations to the questionnaire; and the accuracy of the children's responses should be verified in interviews with parents.

The Pictorial Questionnaire can be used only with children for whom the pictured situations are familiar; and therefore, the children used in the validation of the Starkweather Independence Test will necessarily be a homogeneous group. On the other hand, the puzzle boxes provide a novel situation in which a child can express his independence, and therefore, the test itself can be used with heterogeneous groups. In the recommended extensive study of independence in early childhood, several hundred children should be included; and age, sex and socio-economic differences in independent behavior can then be examined.

One specific goal in future research should be a study of independence and creativity. Independence is a characteristic of the creative person, and the development of behavioral independence in early childhood must be understood if creative learning is to be encouraged.

Ultimately the relationship between behavioral independence and other personality characteristics should be explored. The Starkweather Independence Test has a major contribution to offer in this broad area of research.

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APPENDIX A

TABLE V
DESCRIPTIVE DATA AND TEST SCORES OF INDIVIDUAL CHILDREN
WHO PARTICIPATED IN A STUDY OF INDEPENDENT BEHAVIOR
IN EARLY CHILDHOOD
(N = 26)

Sex and Code No.	Age	Number of Difficult Puzzle Boxes	Level of Help Offered	Level of Help Accepted	Level of Difficulty	Independence Score
M-2027	3:3	3	2.67	2.00	3.28	1.64
M-2028	3:9	4	2.50	1.50	2.98	1.99
M-1996	5:0	6	2.00	1.67	2.87	1.72
M-1974	5:1	5	2.00	0.80	3.27	4.09
M-2004	5:1	5	2.00	2.00	2.33	1.17
M-2023	5:5	6	2.33	1.67	2.83	1.69
M-2001	5:8	3	1.33	1.67	1.97	1.18
M-1978	5:9	5	2.40	1.60	2.80	1.75
M-1979	5:10	3	2.33	1.00	2.68	2.68
M-1989	6:0	5	3.20	1.20	4.13	3.44
M-1919	6:0	5	1.80	0.60	2.34	3.90
M-1843	6:1	4	2.50	0.75	2.95	3.93
F-1973	4:0	5	1.60	1.80	2.10	1.17
F-2026	4:3	5	3.20	1.40	4.26	3.04
F-2025	4:3	6	1.17	2.00	1.89	0.95
F-1945	4:11	2	3.00	2.50	3.38	1.35
F-2030	5:0	4	2.50	2.25	3.01	1.36
F-1944	5:3	3	1.67	1.33	2.23	1.68
F-1930	5:4	4	1.75	2.00	2.32	1.16
F-1940	5:5	5	2.40	1.20	2.58	2.15
F-1949	5:6	4	2.50	0.50	2.68	5.36
F-1728	5:9	4	2.50	1.00	3.86	3.86
F-2029	5:10	4	3.50	1.50	5.20	3.47
F-1929	5:11	3	0.75	1.33	1.38	1.04
F-1937	5:11	5	1.20	1.20	2.37	1.98
F-1972	6:0	5	2.00	0.80	3.33	4.16

APPENDIX B

STARKWEATHER INDEPENDENCE TEST**FOR PRESCHOOL CHILDREN***

developed by

Elizabeth K. Starkweather**Oklahoma State University
Stillwater, Oklahoma**

The Starkweather Independence Test is designed to measure the behavioral independence of preschool children. Independence is operationalized as the relationship between the level of difficulty at which a child chooses to work and the extent to which he accepts help. The criteria for the instrument were (1) that the task be of interest to young children, (2) that it appear easy and yet be difficult, (3) that it provide opportunity for help to be offered to the child, (4) that it provide the child with experiences of success, and (5) that it be objectively scored. A series of ten puzzle boxes, graded in difficulty, met these criteria. The boxes and puzzle pieces are made of one-half inch plywood, and the top surface of the puzzle pieces is painted so that the upright side can be identified easily. The ten puzzle boxes are illustrated in Figure 1.

Administration

Two of the 5-piece puzzle boxes are used in a preliminary demonstration of the task for the child. The experimenter places one box before the child and one before herself. She then tells the child to remove the pieces from the box and to replace them. "Here is a puzzle box for you and one for me. Let's dump the pieces out." This is done by turning the puzzle box over completely so that the pieces are on the table with the colored side down. "Now let's turn the pieces over." The experimenter turns her pieces over so that the colored sides show and the child does the same with his. "Now you try to get all your pieces back inside your box and I'll try to get mine back into my box." The experimenter then slowly puts her pieces back into her box, using only one hand in order not to obstruct the child's view of what she is doing, and working in such a way that she makes several attempts before completing the box correctly. As they work with the demonstration puzzle boxes, the experimenter tells the child, "I'll help you if you want me to."

Following the demonstration, the eight remaining puzzle boxes are presented to the child in a predetermined order. The order is such

*The Starkweather Independence Test was developed as a part of the creativity research supported by the Research Foundation at Oklahoma State University.

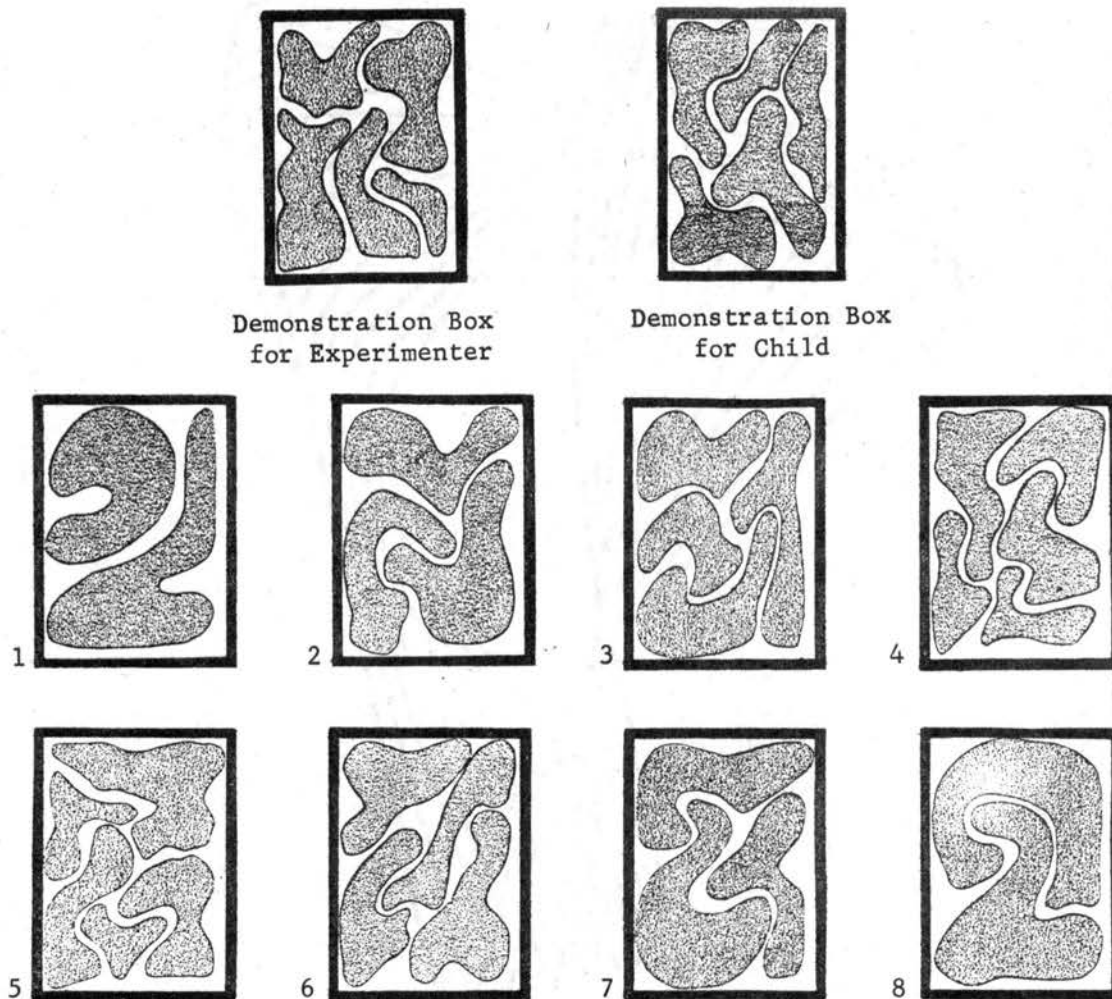


Figure 1. The puzzle boxes for the Starkweather Independence Test.

that the child begins and ends with an easy puzzle box which assures him of success. The order of presentation of the puzzle boxes is such that with the first four boxes the difficulty gradually increases, and for the last four boxes the difficulty gradually decreases. The number of puzzle pieces in each box is two, three, four, five, and then five, four, three, and two, in that order.

As each box is presented to the child, he is instructed to dump the pieces out and then turn them over so that the colored side shows. Then, while working each box, he is offered help at regular intervals whether or not he asks for help. The experimenter counts each puzzle piece that the child picks up to put into the box, and after ten pieces have been picked up, she asks, "Would you like some help?" If the child asks for help or accepts help, the experimenter removes all incorrectly placed pieces and places one piece in the box correctly. The experimenter also offers to help the child at any time that his behavior indicates that he might want help. For example, if a child makes a comment such as, "Where does this one go?" or if he stares expectantly at the experimenter, she asks specifically whether he wants help. At such times help is given only if the child clearly indicates that he wants help. Many children refuse help when it is offered even though they have specifically asked where a certain puzzle piece could go.

Scoring

The scoring of the Starkweather Independence Test is based on (1) the number of puzzle pieces in each box, (2) the number of pieces the child picks up to put into each box, and (3) the number of times the child accepts help. Each child's independence score indicates the relationship between the level of difficulty at which he chooses to work and the extent to which he accepts help. Independence equals the mean level of difficulty at which the child chooses to work divided by the amount of help that he accepts.

The score sheet for Child M-1624 is used to illustrate the method of recording and scoring. The vertical marks indicate the number of attempts the child makes in completing each puzzle box, i.e., the number of times that he picks up a puzzle piece to put it in the box. Child M-1624 made 11 attempts in completing the first 3-piece puzzle box and made 45 attempts in completing the first 4-piece puzzle box. Each "o" indicates a point at which the experimenter offered to help the child; each "?" indicates a point at which the child's behavior indicated that he might want help; and each "h" indicates that help was given. In the illustration, Child M-1624 was offered help (o) after making ten attempts to complete the first 3-piece puzzle box, and he accepted help (h) at that time. Then with one more attempt, he completed that puzzle box. When he was working on the first 4-piece puzzle box, his behavior after nine attempts indicated that he might want help (?), and the experimenter offered help at that time (o), but the child refused it. In completing that particular puzzle box, the child made a total of 45 attempts, was offered help five times, and accepted help twice.

SCORE SHEET - STARKWEATHER INDEPENDENCE TEST

Name CHILD M-1624 Date 2/25/69

Birthdate 7/10/63 Age 5:7 School KOLLINS

Demonstration help III No. M-1624

2-piece II

3-piece III III OH I

4-piece III IIII ? O III III O III III OH III III O III ? OH I

5-piece III III OH III III OH III I

5-piece III ? OH IIII

4-piece III III I OH IIII

3-piece III III OH I

2-piece II

<u>Puzzle Boxes</u>	<u>Attempts</u>	<u>Level of Difficulty</u>	<u>Help</u>
2-piece	2	----	-
3-piece	11	3.666	1
4-piece	45	11.250	2
5-piece	26	5.200	2
5-piece	7	1.400	1
4-piece	15	3.750	1
3-piece	11	3.666	1
2-piece	2	----	-
		<u>28.932</u>	<u>8</u>

Mean Difficulty: 4.822
 Mean Help: 1.333
 INDEPENDENCE SCORE: 3.617

The scoring of the Starkweather Independence Test takes into consideration all of the puzzle boxes with which the child has some difficulty. These are the puzzle boxes for which the child's attempts exceed the number of pieces in the box and the puzzle boxes with which the child accepts help. For Child M-1624 these include all of the puzzle boxes except those with only two pieces.

Steps involved in figuring the independence score are as follows:

(1) The level of difficulty at which the child chooses to work each puzzle box is calculated by dividing the number of attempts by the number of puzzle pieces in the box. For Child M-1624, the level of difficulty for the first 3-piece puzzle box was 11 divided by 3, or 3.666.

(2) The mean level of difficulty is calculated by summing the levels of difficulty and dividing this figure by the number of puzzle boxes included in the scoring. For Child M-1624, the sum of the levels of difficulty was 28.932. This sum divided by 6 yields a mean level of difficulty of 4.822.

(3) The mean amount of help is calculated by dividing the number of times the child accepted help by the number of puzzle boxes included in the scoring. For Child M-1624, help was given a total of eight times. The mean level of help for this child is 8 divided by 6, or 1.333.

(4) The independence score is then calculated by dividing the mean level of difficulty by the mean level of help. For Child M-1624, the independence score is 4.822 divided by 1.333, or 3.617.

Reliability

The Starkweather Independence Test was administered to 116 children, ranging in age from two years ten months through six years four months. The responses of these children were used in an analysis of the reliability of the instrument. A split-half correlation, corrected by the Spearman-Brown formula, yielded a correlation coefficient of +0.70 ($p < .01$). Internal consistency was demonstrated and the test was accepted as reliable.

Validity

The Starkweather Independence Test is so designed that it has face validity. The puzzle boxes offer each child a situation in which he is faced with a difficult task and has the option of working by himself or accepting help. In such a situation, a child who prefers to work by himself is behaviorally more independent than a child who accepts help. Nevertheless, the puzzle boxes offer only one type of situation and may or may not reveal the independence that a child shows in his everyday activities.

In order to obtain a more general picture of instrumentally independent behavior, a Pictorial Questionnaire, which offered children choices between independent and dependent situations in everyday activities, was developed. This questionnaire was administered to 48 children as a validation test. The validity of the Starkweather Independence Test was then examined by comparing the children's independence scores with their responses to the Pictorial Questionnaire. A Mann-Whitney U test was used to compare the 15 children who were high-scoring and the 15 children who were low-scoring on the independence test. The results of this analysis indicated that the children who were high-scoring on the independence test scored significantly higher on the questionnaire than did the children who were low-scoring on the independence test ($U = 63.5$; $p < .05$). On the basis of these findings, the Starkweather Independence Test was accepted as a valid instrument.

Age and Sex Differences

The scores of 116 children were used in an analysis of age and sex differences. A Mann-Whitney U test analysis indicated no significant difference between the independence scores of the boys and girls; however, the boys chose to work the puzzle boxes at a significantly more difficult level than did the girls ($z = 2.39$; $p < .01$). A Kruskal-Wallis analysis of variance indicated that the older children made significantly higher independence scores than did the younger children ($H = 29.2$; $p < .001$). The older children chose to work the puzzle boxes at a significantly more difficult level than did the younger children; and the younger children accepted significantly more help than did the older children.

Recommendations

The Starkweather Independence Test was developed for use in a battery of tests designed to measure characteristics related to creativity in early childhood. However, prior to the inclusion of the puzzle boxes in creativity testing, an expanded study of independence should be undertaken in order to identify any refinements needed in the instrument.

VITA 2

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Thesis: INDEPENDENT BEHAVIOR IN EARLY CHILDHOOD: THE REFINEMENT OF
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