THE EFFECTS OF DESCRIPTIVE SOCIAL REINFORCEMENT
ON CREATIVE RESPONSES IN CHILDREN'S
EASEL PAINTING

by
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ABSTRACT

The easel painting behavior of four kindergarten children (two boys and two girls) was analyzed in terms of the various forms manifested in any completed tempera painting, and found to contain few different forms in baseline sessions. Descriptive social reinforcement, given contingent on the production of any form not previously constructed within any current session (i.e., every first appearance of any form within a session was reinforced but no subsequent appearances of that form within that session were), increased the number of different forms built per session. It was also found that new forms (forms never observed before in the child's total prior sequence of painting sessions) emerged at higher rates during periods of reinforcement of different forms (first appearances) than during baseline sessions. Social validation data collected on the children's art work suggested that expert judges rated the children's paintings more creative than their own baseline measures following reinforcement procedures and about equal in creative forms compared to some of their peers. Follow-up data suggested that the children's creative painting generalized across time.

CHAPTER 1

INTRODUCTION AND REVIEW OF THE LITERATURE

Creative responses in children's art is a characteristic highly valued by parents and educators. Many conceptions of creativity purport that it is inherent in the individual suggesting that there are "creative" and "noncreative" persons. Many efforts to work with creative individuals have thus been based on identification and facilitation of already existing traits or states.

It is only recently that attempts have been made to modify behaviorally specified components of creativity and its enhancement. This approach lies within the behavioral psychology orientation (Kazdin, 1975; Sulzer-Azaroff and Mayer, 1977) and places a greater role on environmental influences in facilitating creative performance. Most of these attempts have been in areas other than the visual arts. For example, Maltzman and his associates (Maltzman, Bogartz, and Bregar, 1958; Maltzman et al., 1960) have demonstrated enhancement of verbal novelty. Maltzman et al. (1958) found that by pairing instructions to be verbally novel with contingent reinforcement of verbal novelty, college-age students could significantly increase levels of verbal novelty. A replication study by Maltzman et al. (1960) varying reinforcement under five conditions found similar results. Reese and Parnes (1970) demonstrated the efficacy of increasing creativity test

scores through the use of programmed materials designed to facilitate problem solving.

Research conducted in applied behavior analysis has been extremely useful in elucidating some specific components of creativity (Holman, Goetz, and Baer, 1977). In this approach various environmental conditions are actively manipulated to establish or maintain certain features of behavior that are observable and operationally specified. A variety of different tasks have been employed in this research. Brigham, Graubard, and Stans (1972) placed reinforcement contingencies on some aspects of composition on 13 fifth-grade students. Three objective aspects of composition, total number of words, number of different words, and number of new words, were selected as target responses to increase. Following contingent and sequential introduction of points, the writing output of all students was greatly increased. Maloney and Hopkins (1973) also demonstrated that reinforcement of certain aspects of student's writing, operationally defined as creative, increased subjective impressions of levels of creativity evidenced in the student's writing. Glover and Gary (1976) applied instructions, reinforcement, and practice to four defined creative behaviors of eight fourth- and fifth-grade students. All four aspects (number of different responses, fluency; number of verb forms, flexibility; number of words per response, elaboration; and statistical infrequency of response forms, originality) were successfully modified. Moreover, the procedures raised student's scores on Torrance's Tests of Creativity (see Torrance, 1971). Recently, Glover and Sautter (1977) modified through reinforcement procedures operationally defined equivalents of Torrance's four components of

creative behavior in the written work of a high school psychology class and raised these operationally defined variables on the Torrance Thinking Creatively with Words Test.

There is also an area of research where there has been a change in emphasis from verbal to visual media. In some of these studies researchers have also focused on preschool children engaged in block building. Goetz and Baer (1971; 1973) demonstrated that creative responses could be enhanced on block building tasks. In the Goetz and Baer (1973) study, social reinforcement, given contingent on the production of any form not previously constructed within a current session was reinforced (but no subsequent appearances of that form within that session were), increased the number of different forms built per session in three preschool girls. Social reinforcement which was given for all second and later appearances within the session decreased the number of different forms built per session. New forms (forms never seen before in the child's total prior sequence of block building sessions) emerged at higher rates than during periods of baseline or reinforcement of same forms (second and later appearances).

In a series of two experiments Holman et al, (1977) repeated the basic procedures previously found useful in generating new child behaviors (Goetz and Baer, 1973). The studies examined the possibility of generalized changes in other baselines of children's behavior. Results of the two studies (reviewed in more detail below) suggested that experimental procedures increased form diversity and new forms. However, generalization across tasks, while somewhat evident, was quite variable, inconsistent, and of limited magnitude.

Several investigators have focused on children's art activities (Fallon and Goetz, 1975; Goetz and Salmonson, 1972; Holman et al., 1977). In a representative study in this series, Goetz and Salmonson (1972) demonstrated that the number of painting forms could be increased through the use of descriptive reinforcement (i.e., the teacher's comments were directed toward a specific form describing it). The three preschool children involved in the investigation initially demonstrated a low number of different forms in their easel paintings. Through the application of teacher-administered reinforcement procedures, the children increased in form diversity. In the study briefly discussed above, Holman et al. (1977) conducted two experiments. In Experiment One a reinforcement contingency was placed on form diversity of easel painting, by reinforcing the first appearance of each new form painted by the children within a current experimental session. Block building performances by the children were examined concurrently for correlated changes. Both the number of different forms and the number of new forms were monitored. In Experiment Two, four concurrent baselines on child behavior were examined: drawing with felt-tip markers, easel painting, block building and Lego-block construction. Training of form diversity was conducted with marked drawing, and generalization was examined in the "similar" activity of easel painting as well as in the "dissimilar" activities of block building and Lego construction.

Results of these two experiments, combined with the Goetz and Baer study (1973) have demonstrated that four children's art media are subject to environmental influences: block building, easel painting, pen drawing, and Lego construction. Results of these studies suggest

that various reinforcement procedures increased form diversity and the emergence of new forms. Moreover, some generalization to untreated tasks was seen, but this was quite variable and of limited magnitude. Finally, a third form of generalization was noted in Experiment Two of the Holman et al. (1977) research: the children's performance remained relatively durable subsequent to the termination of the training techniques.

Statement of the Problem

The purpose of the present study is to extend work in the applied behavior analysis of creative responses in children's easel painting activities. Specifically, the present study represents a systematic replication of the experimental analysis provided in the literature (Goetz and Salmonson, 1972; Holman et al., 1977). A systematic replication represents the application of the same experimental variables used in previous research, but with different subjects, experimenters, and settings (Hersen and Barlow, 1976). In this regard, descriptive reinforcement procedures were implemented to increase aspects of creativity. As in previous studies (e.g., Goetz and Baer, 1973), both the number of different forms produced per session (form diversity) and the number of forms new to that session and all previous sessions (new forms) were considered as relevant dependent variables. Second, the study extends work in this area by moving to older subjects (i.e., kindergarten) involved in a public school setting. Third, the study extends previous research in this area by employing descriptive reinforcement procedures as an instructional package. Fourth, the

present study incorporates measures of transfer across time by recording six-week post checks on relevant response measures after formal training was completed. A final feature of the study is the use of external social validity criteria to provide artist judgments of the improvement in creative performance of each child over baseline measures.

In summary, the present study employs social reinforcement procedures of same and different art forms to demonstrate that such results yield findings that can be labeled diverse and creative. The study provides an example of procedures that contribute to an educational technology to produce creativity in art.

Overview of Creativity

Creativity typically has been deemed a highly prized quality attributed to rare individuals who produce original work or novel solutions to various problems. Creativity is nevertheless not just limited to a select few. It is purported to exist to a greater or lesser degree in all people (McCandless and Trotter, 1977). Children for example, because of social experiences must constantly face new problems, sometimes without specific exposure to possible solutions. In many cases they are able to develop original and novel solutions. Although the solution that they come up with may be the same for many other children, the solution is new to the child for whom the problem is new. In this regard, the child engages in creative thinking when a solution has been involved that is original for the child. It has been quite difficult to advance a specific definition of creativity and/or originality and although many definitions have elements in common, there

are also considerable differences. The following definitions display various positions.

The original must be defined relative to the unusual and the degree of originality must be specified statistically in terms of incidence of occurrence (Barron, 1955, p. 274).

Creativity occurs best in unpressured, permissive, but task-oriented atmosphere with one-to-one testing . . . but . . . the burden of proof of possession rests primarily with the individual (Gross and Marsh, 1970, p. 267).

Originality refers to behavior which occurs relatively infrequently, is uncommon under given circumstances, and is relevant to those conditions (Maltzman, 1960, p. 229).

The type of definition accepted will promote different kinds of research and so there has been a great deal of diversity here. Some authors for example, have interrelated facets of creativity and personality (e.g., Barron, 1955; Dillehunt, 1973), examined family-environmental transactions which facilitate or inhibit creativity (e.g., Getzel and Jackson, 1963; Newmeyer, 1973), and have investigated specific factors which facilitate certain creative behaviors, as in applied behavioral psychology (e.g., Holman et al., 1977).

It is sometimes useful to distinguish creativity from intelligence (Mussen, Conger, and Kagan, 1974). A child with a rich store of knowledge such as facts, rules, concepts, and so forth could be regarded as intelligent. A child who uses these riches in an original and constructive way can be regarded as creative. In this analysis, a child who displays a great deal of "intelligence" may or may not display creative behavior.

There is some research to support this separation of intelligence and creativity (e.g., Wallach and Kogan, 1965). In this study,

fifth-grade children were given standard tests of intelligence as well as tests of creativity. The tests for creativity required the child to generate many unusual hypotheses. On one test the child was told a characteristic and asked to name as many objects as (s)he could that had the characteristic (e.g., name all the things that you know are sharp). The children were also asked to think of varied uses for objects (e.g., taking different ways to use a newspaper). In a third test the child was shown line drawings and asked to think up all the things each drawing might be. (S)he was also shown line designs and asked to say all the things these designs made him think of. The child was classified creative if (s)he gave many answers to each of the tests and if some of his/her answers were very unusual in comparison to the answers given by the other children. The children were grouped into four categories: high intelligence and high creativity, high intelligence and low creativity, low intelligence and high creativity, low intelligence and low creativity.

Wallach and Kogan (1965) found that the girls who were both highly intelligence and highly creative were self-confident in school and were popular with their friends. High creativity, but low intelligent girls, on the other hand, seemed to have the opposite personality characteristics. They were cautious, hesitant, and had better self-confidence. The low intelligence, low creativity girls were slightly less cautious and hesitant and were more popular and outgoing with their friends than the high creativity, low intelligence girls. Finally, the high intelligence, but low creativity girls were sought out by others, but they often failed to reciprocate such overtures, as

if they were a little aloof or cautious with the other girls. Differences in creativity among boys did not relate closely to their social behavior with peers.

The Wallach and Kogan study (1965) seems to indicate that the creative child who is intelligent was willing to take a chance or risk ideas. The girl who is both intelligent and creative seems to be successful both in school and in peer relationships. These children appear confident and free of anxiety over generating nonconventional ideas.

These types of findings may suggest that creativity and the characteristics typically associated with positive socialization go together. Some studies of the family lives of creative and less creative children has suggested that certain parental attitudes and child rearing practices are correlated with the development of creativity. Parents of highly creative children were found to be comparatively less critical of their children and their schools, were liberal and tolerant in general outlook, interested in their children's values, and open to experiences, interests, and enthusiasms (Getzel and Jackson, 1963). It has also been suggested that a low degree of punishment in the home, low pressure for conformity, and emotional support of and satisfaction with the children are related to higher rates of creative thinking in children (Sears, 1969).

Homes may not be the only place where environments conducive to creativity are developed. Schools have also been examined for elements that promote the development of creativity (Torrance, 1963). Some studies have shown that classrooms in which creative output seems

to be low are those in which challenging activities are seldom pursued, children are rarely allowed to ask questions or explore, a strong division is made between work and play, and pressures for absolute intellectual and social conformity are applied.

Depending on one's definition of creativity, a variety of procedures might be developed to assist and train creative behaviors. Generally there are two somewhat different approaches to this endeavor. One represents a more traditional psychological orientation which depends on psychological testing and training of certain characteristics. The more recent approach has been articulated in applied behavioral psychology. In a behavioral orientation, a specific response class of creative behavior is defined and repeated measurement occurs on the selected behaviors. Training procedures typically employ various environmental manipulations such as reinforcement to increase creative responses. The research reviewed below represents some of these varying approaches.

Traditional Perspectives on Creativity

Much of the aforementioned research and definitions reviewed actually represent the more conventional approach to creativity. It is important to elucidate how creativity has been assessed and trained within this traditional conceptualization.

Traditional Assessment of Creativity

A variety of standardized tests have been employed to measure creativity or creative potential. The rationale for such tests is based on the assumption that creative individuals should be selected

and exposed to enriching experiences so that their talents can be further developed (Holman et al., 1977). One of the most widely used "creative tests" is the Torrance Tests of Creative Thinking (1966). This instrument is composed of both verbal and figural tests, each purportedly assessing different components of creativity. Quite diverse tasks are employed. The verbal section includes "ask-and-express," product improvement, unusual uses, unusual questions, and "just-suppose" activities. The figural part includes picture construction, incomplete figures and parallel line tasks.

The basic test activities differ but each is scored for fluency, flexibility, originality and elaboration on the assumption that problem solving may be effected either creatively or uncreatively. Fluency refers to the number of relevant responses produced by a child, whereas flexibility refers to the number of different categories of questions, causes, consequences, products or uses. The statistical infrequency of the response, based on previous empirical research, justifies the originality measure, and the number of embellishments on responses provides an elaboration score. Scores for fluency, flexibility, originality, and elaboration are summed separately across all verbal and all figural subtests.

Guilford (1967) designed the Unusual Uses Test as a test of creativity. The test requires a subject to tell all the ways (s)he can think of to use, say, a common brick. Gross and Marsh (1970) evaluated an objective instrument (Gross Geometric Forms) designed to identify "expressive creativity" in three to seven year-old children. The authors developed an instrument with age-appropriate tasks to circumvent

problems of unequal motor development and verbal learning. The task presented to the child was that of using simple geometric shapes to construct whatever picture concepts the child was capable of producing. Products were scored for form, name, verbal elaboration, action, color, and communicability. Results indicated that age was generally associated with an increase in creativity; there were no sex differences; and a moderate positive correlation with verbal intelligence and perceptual differentiation measures appeared to indicate that creativity and intelligence, as global concepts, were not easily separable operationally.

Unfortunately, there are two major problems in using standardized tests to measure creative potential. First, it seems that creativity assessed in such a structured situation as a test does not generalize even to untimed situations. A study by Torrance (1969) adds some credibility to this notion. In the study, 75 sixth-grade children were administered the Torrance tests in a group setting with the standard 5-minute test limit. The children were then asked to work on tests for the next 24 hours, adding ideas as they occurred. Although a correlation of .23 between the two scores was observed, the predictive power of the first set of scores was low.

A second problem with the standardized form of assessment of creativity is that children who do not score high on various measures of creativity may not receive special services. Only those children who possess creative potential, as reflected in high scores, are typically placed in specialized programs where the potential can be actualized.

Other approaches (discussed below) place more emphasis on environmental influences and hence try to facilitate creative responses in all children. Even those children who do not score high can thus be exposed to special programs designed to make them more creative.

Training Creativity: General Research

A number of researchers have attempted to train various components of creativity. In this section some representative research from a conventional psychological approach to creativity will be reviewed.

Reese and Parnes (1970) evaluated the effect of programming creative problem solving in high-school students as measured by various standard creativity tests (e.g., Torrance Product Improvement Test). Three groups of subjects were used in a pre-post-test design. Group 1 served as a control; Group 2 worked through programmed booklets of problems; and Group 3 worked through the booklets with an instructor. Compared to the control group, the second group yielded significant gains on standard measures. The third group who worked with an instructor yielded even higher gains.

Zimmerman and Dialessi (1973) investigated modeling influences on children's creative behavior by examining whether the behavior of a human model can vicariously influence an observer's subsequent creative responding. Four groups (N=120 fifth-grade children) separately observed a model who was either high or low in the fluency (number) and flexibility (quality) dimensions defined by Guilford (1967). Statistical procedures were used to assess treatment effects on

children's fluency and flexibility measures (written responses), collected on parallel and very different types of creative tasks, as assessed by the Torrance Tests of Creative Thinking (1966). The results indicated that high model fluency significantly increased child fluency and flexibility on the parallel task. A marginally significant increase in observed fluency was also noted on the different creative task. Contrary to predictions, however, model flexibility produced significant decreases in observer fluency and flexibility measures on both the parallel and dissimilar tasks.

Carter, Richmond, and Bundschuh (1973) evaluated the effects of a creativity-training program on the creative development (measured by the Torrance Tests of Creative Thinking) in 26 mentally retarded children aged 7 to 16 years. The subjects were assigned to three groups. The first group was an untreated control group. The second group was a visual-motor treatment in which youngsters were exposed in group sessions to a variety of artistic experiences such as cutting, pasting, finger painting and encouragement from staff to be imaginative. The third group, labeled the Kinesthetic-motor treatment, was exposed both in group and individual sessions to a variety of exercises, tumbling, games, and so forth.

The results obtained by Carter et al. (1973) suggested that both treatment groups achieved higher creativity scores than the control, but the finding was not statistically significant. The only significant difference occurred for the flexibility factor, and this difference was due primarily to the visual-motor training.

Working with older group, Roweton (1972) conducted a correlational study with college students. Performance on the Hidden Figures Test (a cognitive-style measure of perceptual sensitivity) and grade-point averages were related to several indices of creativity as affected by a checklist procedure and verbal pretraining. The "idea" checklist provided subjects with general or specific lists of ideas suggesting physical improvements; verbal pretraining involved controlled free association warm-up prior to problem solving. The author reported that neither the Hidden Figures Test nor grade-point average scores correlated significantly with creativity; the short checklist did not greatly enhance idea quality; and verbal pretraining facilitated idea fluency, but not originality.

One could conclude from this brief overview that many traditional attempts to train creativity have not met with a lot of success. Although the assessment approach has stimulated the development and use of a multitude of creativity measures, the tentativeness of the findings, and failure to replicate other findings does limit the conclusions that can be drawn from this area. In contrast to this approach, recent efforts by behavioral researchers, though limited, has yielded some promising findings. This area is examined next.

Behavioral Perspectives on Creativity

The behavioral perspective on creativity departs radically from the aforementioned conventional approach. The differences lie both in the approach to assessment and training of creativity.

Behavioral Assessment of Creativity

The behavioral approach toward assessment of creativity departs radically from the traditional methods in that the focus is on the behaviors which are to be altered rather than on an underlying trait (i.e., creative traits). The person operating from a behavioral perspective seeks to clarify the term "creativity" by observing the behavior that requires change and the events which precede and follow the behavior.

Two components of assessment are usually used in the research area: (1) assessment of the creative behavior itself, and (2) assessment of the events which precede and follow the behavior. Assessment of the behavior to be changed is typically labeled the target behavior. Observed behaviors are of direct interest in their own right, rather than as reflections of some underlying constructs or traits. Assessment also is made of the factors which precede and follow behavior. Such factors may be useful in altering (increasing or decreasing) the target behavior. Events which precede behavior may include the presence of a person, instructions, and certain cues in various environments that affect the frequency with which a response is performed. Events which follow behavior include positive events such as attention, praise, or rewards which increase behavior as well as negative events, which may be used in reducing behavior.

In terms of behavioral research, four major characteristics have been identified (Kazdin, 1975). These include (a) a focus on observable behavior, (b) careful assessment of the behavior which is to be altered, (c) evaluation of the effect of the program in altering

behavior, and (d) concern for socially significant changes in the target behavior. It is these four characteristics that guides the present research on creativity.

The first characteristic of the behavioral approach is the focus on observable behavior. In the case of creative behaviors, specific operational definitions can be provided of the creative responses. In the area of children's paintings for example, visual configurations can be identified as components of creative behavior. A number of people can evaluate paintings according to these criteria as to the presence or absence of creativity. Individuals may disagree on what is creative which in the behavioral approach will appear as a disagreement over the operational definition. The most important feature of behavioral research, especially needed in the arts, is that it allows replication to occur and advances to be made in a research area.

A second characteristic of behavioral research, related to the emphasis on observable behavior, is assessment of the behavior to be altered, (i.e., the target behavior of creative responding). Thus, rather than assessing the child's responses to psychological tests (e.g., Torrance's test), assessment is made of the creative behavior itself. The number of times a creative response occurs on particular tasks(easel painting) may be assessed. The positive features of this approach are that one can directly focus on changing the creative behavior and determine how the child improves relative to past performance.

A third feature of the behavioral research approach is a specific evaluation of the effect of a program designed to change

creative behavior. Emphasis is placed on demonstrating the effect of the program empirically. As Kazdin (1975) has noted, with behavioral approaches implemented in applied settings the effects of the program on a behavior usually is assessed while the program is going on as well as after the program is terminated. Data are gathered constantly (e.g., over each day) to ensure that the program is having its intended effect. This use of repeated measurements is one of the most outstanding features of this behavioral research strategy (Hersen and Barlow, 1976). Typically, single case ($N=1$) designs are employed which allow the program to be altered if it is not working. Assessment and treatment are interwoven so there is constant feedback to the person conducting the applied research.

A fourth characteristic of the behavioral research approach is a concern for effecting behavior change that is socially significant. The behavior change resulting from the program should make a difference which is noticeable to the individuals in the person's environment (Kazdin, 1977). Kazdin (1977) has labeled this approach social validation. Social validation consists of two procedures. First, a subject is compared to his/her peers who are not considered deviant on the variable measured. For example, one would compare the target child's art to art work produced by an average art student and/or one considered extremely talented in art. Second, subjective evaluations of the subject's performance are solicited from individuals in the natural environment. Selection of certain behaviors also suggests that the treatment program is also of social significance (e.g., increasing creative performance in painting). Achieving behavior change of social

significance presupposes a criterion toward which interventions can develop and against which program outcomes can be evaluated.

Behavioral Interventions to Facilitate Creativity

The behavioral researcher seeking to expand creative behaviors places a great deal of emphasis on external events in the environment which can be used to increase creativity. This emphasis on overt behaviors and on external situational determinants permits the behavioral researcher to alter specific determinants which influence behaviors.

In the introduction, a number of studies were reviewed which manipulated environmental events to facilitate creativity. A number of studies established the possibility of teaching individuals systematically to produce behavior that these people had not displayed before (Holman et al., 1977). The technique has typically involved the straightforward application of reinforcement logic. Reinforcement for creativity has been programmed contingent on any response which is different in some identifiable way from any previous responses of the individual. The purpose of the present research was to further demonstrate the application of the behavioral technology to the development of creative responses in children's art work.

CHAPTER 2

METHODS AND PROCEDURE

Setting

The study took place in an art classroom in an elementary school. Each subject was invited to paint at a classroom easel by the art teacher-experimenter. These invitations were made before each painting session over the duration of the experiment. The painting session took place during a time of the day when the art room was free of all other children (i.e., children were engaged in other classes or curricular activities). The session continued until the child completed two paintings.

Subjects

The subjects were four kindergarten children (two boys and two girls) from four classes in a Tucson Public School who demonstrated the absence of diverse forms in their art paintings. All children were five years of age and all were in the upper middle socioeconomic level. Each child's academic performance was average to above average for his/her grade. Each child demonstrated a noticeable absence of diverse forms in their art paintings before beginning the experiment. This deficit was remarked on informally by the regular classroom teacher. Each child was formally measured prior to the intervention, with results of this baseline measurement documenting the deficits. Two art

teachers also judged the four subjects to be among the lowest in overall creativity.

Behavior Definitions and Recording

Child Behaviors

The basic child behaviors of easel painting were defined according to 25 painting forms identified by Goetz and Salmonson (1972) (see Table 1, e.g., curve, mass, spatter, zig-zag, triangle, etc.).

Scoring

A form diversity score was defined as the number of forms appearing at least once in any session's paintings.

A new forms score was defined as the number of any of the 25 identified forms appearing in any given session's painting that have not appeared in any prior painting by that child (in previous sessions of easel painting) recorded within the study. It must be noted that the new forms measure was not scored for the child's first painting in the first session of the study, in that all forms appearing in that session will have to be considered new. As in the Goetz and Baer (1973) study, the number of forms appearing in the first session of the study was taken as the child's baseline of forms. New forms would then be considered forms other than those determining the baseline and would be scored from the second session's construction(s) on.

Two observers independently examined each series of paintings, counting the number of forms appearing at least once in the series representing the sessions paintings. Both observers were carefully

Table 1. Operational Definitions of Painting Forms

-
-
1. BLENDED COLOR--any hue formed by mixing two or more pure or available colors onto the paper.
 2. CIRCULAR--any nearly enclosed curve such as circles, ovals, ellipses, etc.
 3. CURVE--a line or any part of a line, at least 3" long, continuously bent so that no portion of it is straight.
 4. DIAGONAL LINE--a relatively straight line, at least 3" long, forming a 10° - 80° angle.
 5. DUPLICATE FORM--a relatively exact pair of any abstract form, clearly seen as a design, or any of the starred forms: The size and color may vary but not the structure. It should be basically the same. Simple forms, such as circles, require more exactness than more complex forms, such as an irregular enclosure or simulation. A staccato grouping itself is not a duplicate. The same grouping must be repeated in another area of the paper.
 6. HORIZONTAL LINE--a relatively straight line, at least 3" long, forming a 0° - 10° angle.
 7. IRREGULAR ENCLOSURE--any closed or nearly closed unsymmetrical line formation.
 8. LAYERED--three or more repeated lines, using two or more different colors, one inch or less in width, which lie side by side. Each line should be a different color than the one(s) directly beside it.
 9. MASS--any nearly solid painted area at least 2" long and 2" wide.
 10. OVERLAPPING SAME FORMS--a duplicate with one form extending over and covering a part of the other.
 11. PATTERN--same as a duplicate, only requires three or more copies.
 12. RECTANGULAR--any nearly enclosed form with four relatively straight sides and four 90° angles, approximate within 10° . Opposite sides must be relatively parallel.
 13. SIMULATION--a construction which resembles a real life object. Symbols, such as letters and numbers, are not simulations.
 14. SPATTER--three or more scattered or dashed small particles or drops resulting from one swing of the brush.

Table 1. Continued

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15. SPIRAL--a winding or coiled line; whether consisting of a continuous curve or straight lines. There must be at least two complete revolutions.
 16. STACCATO--three or more quick dabs that are not the results of a spatter and are clustered in the same area. They may or may not be overlapping.
 17. SYMBOL--something other than a simulation which stands for something else, such as signs, letters and numbers.
 18. TINKER TOY LINE--circular forms with one or more straight lines connecting them.
 19. TRAIN OF COLORS--a series (three or more) of two or more colors forming a line or procession.
 20. TRIANGULAR--any closed or nearly enclosed form with only three sides and three angles. The INSIDE lengths of at least two (2) sides must be at least 1-1/2".
 21. TRICKLE--a flowing or falling drop in a small, broken or gentle stream.
 22. UNDULATING LINE--a line with three or more curves approximately 1" or greater in depth.
 23. VERTICAL LINE--a relatively straight line, at least 3" long, forming an 80° - 100° angle.
 24. X-SHAPE OR CROSS--two interesting straight lines of linear proportions not greater than two-to-one (2:1). The two portion of an intersected line must be in proportions no greater than two-to-one (2:1) also.
 1. If the lines are of relatively EQUAL LENGTH, the angle of intersection is arbitrary, but the lines must intersect at relatively the same point on each line.
 2. If the lines are not of equal length, the angle of intersection must be relatively close to 90° (+ or - 10°).
 25. ZIG-ZAG LINE--a line or any part of a line with three or more angles formed by turning first to one side and then to the other.
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Note: The horizontal, vertical, and diagonal lines are defined by angles relative to the bottom of the paper, using the smallest angle as a measurement (after Goetz and Salmonson, 1972)

trained by the experimenter on paintings not used in the study. Both observers were trained on the sample paintings until they reached a 100 percent agreement criterion. A measure of interobserver agreement was calculated by dividing the lower number of forms by the higher number of forms from each observer and multiplying by 100 to obtain a percentage score. Their agreement in this counting of form diversity was compared and is reported in Table 2. It can be observed that the agreement scores are quite high over each subject and over baseline and treatment sessions.

Table 2. Form Diversity Reliability Scores on Frequency Data for Each Subject by Experimental Phase

Subject	Total	Reliability Scores	
		Baseline	Treatment
Wendy	98%	95%	97%
Regine	100%	100%	100%
Bobby	99%	99%	100%
Joey*	100%	--	--

*Note: No reliability scores are reported for baseline and treatment because this subject served as a control

The new forms score was similarly computed and is reported in Table 3. Generally high reliabilities on the frequency data were found on this measure as well. The relatively lower measure of reliability found for the baseline session for Wendy was due to low number of scores on the new forms measure since she received the treatment first.

Table 3. New Forms Reliability Scores on Frequency Data for Each Subject by Experimental Phase

Subject	Total	Reliability Scores	
		Baseline	Treatment
Wendy	86%	50%	100%
Regine	100%	100%	100%
Bobby	96%	100%	92%
Joey*	100%	--	--

*Note: No reliability scores are reported for baseline and treatment because this subject served as a control

Duration

The duration of each session was recorded by the art teacher with a stopwatch. The session was defined as beginning when the first brush stroke was established, and ending either when the child was finished with the two paintings or when the child replied affirmatively to the art teacher's question about completion of the two paintings.

Teacher Behaviors

Some monitoring of the independent variable was established. An observer periodically viewed the easel painting and recorded teacher behavior and its contingency with the child's production of art forms. The observer recorded each successive new form constructed by the child in that day's painting(s). The observer also recorded each successive new form painted, whether the teacher attended to that form production or not, whether the alteration be enthusiastic and approving, and the duration of the session. These records were used primarily as a check on the art teacher's efficiency in carrying out the reinforcement contingencies required by the experimental procedure, rather than as a direct measure of the child's behaviors in producing forms. The art teacher herself maintained similar records as the easel painting proceeded. Comparison of the art teacher's records and the observer's showed agreement on 100% of the events recorded, over the study, and also showed that 100% of the art teacher's attention supplied in the contingencies required by the experimental procedures across the study was implemental.

Procedures

Experimental Design

A combination multiple baseline design across subjects and no treatment control design (Hersen and Barlow, 1976; Kratochwill, 1978) was employed. A multiple baseline across three subjects is commonly accepted as a sufficient number to demonstrate experimental control. In the multiple baseline design the researcher exposes each subject to the treatment sequentially so that intervention two is introduced following a clear effect for intervention one, and so forth. The no-treatment control subject was monitored to add credibility to the intervention effect.

Baseline: No Reinforcement

During the first eight to sixteen sessions (varying with each subject), the art teacher sat by the child as (s)he painted, watching closely but quietly, displaying no positive or negative comments about any particular form. The experimenter never specified the object or content of the painting to be made. At the end of each baseline session, the art teacher expressed her appreciation of the child's total effort (e.g., "you did a nice job today") and conducted the child back to the other children. Baseline sessions were continued until inspection of the child's daily form diversity scores showed a stable enough level to justify introduction of the experimental procedures (Note: the new forms score was not considered here).

Reinforcement of Different Forms

Following stability across the four baselines, the art teacher began a program of social reinforcement of new forms for the first child. In these sessions, the art teacher remarked with interest, enthusiasm, and delight every time that the child painted so as to create a form that had not appeared previously in that session's paintings. Note that the form might well have appeared in any previous session's painting(s), but it would be reinforced in this session nevertheless. Thus, the art teacher reinforced every first appearance of any form within that session. The content of the art teacher's remarks were designed to accomplish descriptive reinforcement: that is, it indicated the dimension to be reinforced, such as "that's a very nice circle you have drawn" or "very good vertical line here". These procedures were continued for enough sessions to provide clear evidence of increasing form diversity, at which point the intervention was applied on the next child, and so forth, until three children received the experimental condition. (Note that the new forms score was not considered).

Materials

Six different color cups of tempera paint (red, blue, purple, orange, green and yellow) with a 1/2 inch brush were available to each child over the duration of the experiment. Also, the same size paper (18" x 24") was always employed.

Social Validation

To obtain some social validation (Kazdin, 1977) on the creativity program, the childrens' paintings were subjected to a rating of two art teachers. The art teachers independently rated four paintings from the baseline and four from the intervention program on a 4-point rating scale from 4 (extremely creative) to 1 (no creativity) in terms of the existence of creativity (see Appendix A). In addition, the two teachers also used the 4-point rating scale to compare the art productions of three "good" art peers to the three experimental subjects.

Follow-up

Six weeks following the completion of the formal program each subject was again asked to paint. These response measures served as the follow-up phase and were used to assess transfer across time.

CHAPTER 3

RESULTS

Results are discussed in terms of the child's form diversity and new forms score.

Form Diversity

Each child's form diversity score, for each experimental session is shown in Figure 1. It can be observed that the social reinforcement contingencies effectively influenced the development of form diversity. Each experimental child (Subject 1, 2, and 3) demonstrated appreciable increases from baseline (no reinforcement) to the varying periods of treatment (reinforcement). Thus, Subject 1 demonstrated an average of 5.25 forms during baseline and 16.6 forms during treatment; Subject 2 had 4.6 and 18.2 forms for baseline and treatment, respectively; Subject 3 had 4.7 and 14.8 forms for baseline and treatment, respectively. In contrast to these experimental subjects, the control (Subject 4) maintained a relatively constant number of forms over a baseline series (average equal to 4.9).

New Forms

Each child's new forms score for all sessions after the first (which was used to define old forms for all later sessions), is shown in Figure 2, cumulatively. Thus, each bar represents the number of new forms displayed by the child so far in his/her session, since the first

Figure 1. The Form Diversity Scores of Four Children in the Course of Easel Painting. Baseline Scores Were Produced when No Reinforcement Was Programmed for Different (Non-repetitive) Forms. Treatment Scores Were Produced when Reinforcement Was Programmed for Different (Non-repetitive) Forms.

Figure 2. The Cumulative Number of New Forms (Forms never Used before) Produced by Four Children in the Course of Easel Painting under Baseline and Treatment Conditions. All Scores Represent Cumulative Increments above the Score Produced in the First Session. Thus, the Increment Each Bar Shows over the Preceding Bar Is the Number of New Forms Produced in that Session.

Social Validation

Social validation data were gathered from two art teachers who were unaware of the specific aspects of the present experiment. Comparisons were made across four baseline and four treatment sessions for each within subject paintings. Results of this social validation data suggested that both teachers rated the subjects' performance more creative during treatment phases than during baseline phases. Specific results were as follows: Subject 1 received an average rating of 0 (no creativity) during baseline and of 4 (exceptional creativity) during treatment; Subject 2 received an average rating of .50 and 4 for baseline and treatment, respectively; Subject 3 received an average rating of .75 and 3.75 for baseline and treatment, respectively.

Subjects were also compared to three peers who were considered to be "good" art students by the same teachers. The average rating for the good art peers was 3.50. The average rating for the three experimental subjects across the treatment phases was 3.91. Therefore, the three children who served as experimental subjects in the present study obtained as good (and slightly better) ratings on their art work when compared to peers who were originally regarded as better art students.

Follow-up

Follow-up data on form diversity were gathered on the three experimental subjects after six weeks. Paintings were scored in the same manner as those scored in the previous part of the study. These data displayed in Figure 1 suggest that the subjects' form diversity scores remained durable across time (i.e., transferred).

CHAPTER 4

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

This study investigated the easel painting behavior of four kindergarten children (two boys and two girls) in a multiple baseline design. The data were analyzed in terms of the various forms manifest in completed tempera painting, and which were found to contain few different forms in baseline sessions. Descriptive social reinforcement (e.g., "that's a very good straight line"), was given contingent on the production of any form not previously constructed within any current session (i.e., every first appearance of any form within a session was reinforced, but no subsequent appearances of that form within that session were), increased the number of different forms built per session. It was also found that new forms (forms never observed before in the child's total prior sequence of painting sessions) emerged at generally higher rates during periods of reinforcement of different forms (first appearances) than during the baseline sessions. Social validation data collected on the children's art work suggested that expert judges rated the children's paintings more creative following the reinforcement procedures (as compared to baseline paintings), and about equal in creative forms compared to certain peers who were considered good art students. Finally, follow-up data collected on the

three experimental subjects suggested that the children's creative painting generalized across time.

Conclusions and Implications

The results of this study suggest that diversity of response within the easel painting activities of the children involved in this study were readily increased by descriptive reinforcement procedures. This finding is in agreement with previous research conducted in the area of improving children's creative responses through behavioral reinforcement techniques (e.g., Holman et al., 1977). It should also be noted that the treatment procedures were applied to form diversity directly, and only to form diversity. Thus, change in the new forms score (and to a limited degree, the sessions durations) represents collateral changes, rather than direct results of the descriptive reinforcement contingencies applied to each new (or each same) form. These findings support the results of Goetz and Baer (1973) which suggest that children receiving descriptive reinforcement merely for art form diversity within a specific session display an emergence of new forms across sessions, and take a little more time in their painting when they do so. It should be emphasized that the experimenter did not instruct the children how to construct any forms, or tell them to make more and new forms. Based on these findings, the total pattern of performance of the three experimental children could be labeled creative.

The fact that the children were not told what to paint coupled with their creative performance found in the present study addresses a point found in the art education literature. A concern frequently

named is that adult judgments may have adverse effects on the progress of art in children (see Zurmuchlen, 1977 for a review of the issues). Kellogg (1969) expressed one of the strongest concerns about the undesirable effects of adult judgments on children's art. She argued that much damage results from the emphasis many adults place on pictorialism at the expense of aesthetic values in children's art. Kellogg (1969) pointed out that the majority of teachers value art mainly as a vehicle for communicating facts or emotions with pictorial art most satisfactorily displaying these aims. Kellogg viewed the value placed on this rather narrow pictorialism as a significant cause for children giving up art or doing poorly in art.

Children soon learn to please teachers by using certain symbol combinations in art which promote adult concepts of realistic pictorialism . . . Teachers occasionally do accept the child's unrealistic schemes for objects, and even enjoy them, provided they look clean cut (Kellogg, 1969, p. 151).

In the present study form diversity was reinforced, and so one might say that the children learned to produce more diversity in their art. Children were reinforced for their productions, in the absence of teacher instructions on what to produce. The strategies used in the present research allow a child's production of art forms independent of the teacher's conception of what (s)he should be painting.

The behavioral research investigating the development of creativity has applied relatively straightforward reinforcement procedures. In the present study the reinforcement was of a descriptive nature, as has been true of other studies in this area (e.g., Goetz and Baer, 1973; Goetz and Salmonson, 1972). The reinforcement procedures described the dimensions at issue, i.e., diversity of forms. While it is possible to

compare the separate components of reinforcement and description, it is likely that any differences would be only of theoretical interest, as opposed to applied interests. As Goetz and Baer (1973) indicated, it is possible that the functions of description without praise and of praise without description are different in different children. However, a package of the two is likely the best "mix" to encourage certain creative responses, as the past and present research documents. In fact, it appears desirable to add various components to such a package, increasing the likelihood that a change in behavior would occur. Such components could include instructions to the child on what is to be done and feedback regarding the responses being produced.

Piaget (1964) has suggested that the basic goal of education is to produce individuals who are capable of creativity, invention, and discovery. For these reasons many researchers have attempted to find ways of fostering creativity among students. Nevertheless, it has not been easy to define creativity (e.g., Crutchfield, 1966; Ghiselin, 1952, 1963; Guilford, 1959; Holman et al., 1977; Stein, 1953, Stein and Heinze, 1960). One approach offered by behavioral researchers and employed in the present study lends itself to objective measurement and specific environmental programming. This definition equates creativity to novel or original behavior (Holman et al., 1977). Thus, behavior that the child of study has not displayed before in a particular setting is labeled creative (Goetz and Baer, 1973; Goetz and Salmonson, 1972). Of course, one must ask whether the creative responses generalize.

In the present study "generalization" was examined on two dimensions, i.e., across time and to new forms. Results suggested that the creative responses did transfer on this dimension and generally, new forms developed. In other studies where generalization was examined, some positive results were also observed. In the Holman et al. (1977) research, a generalized result was seen in the emergence of new forms. Generalization was also seen to untreated tasks, and when this occurred, it was more readily seen in activities topographically similar to the treated task than in topographically dissimilar ones. Nevertheless, generalization across tasks, while observable, was quite variable, inconsistent, and usually of limited magnitude. It appears that a future task of research is to develop procedures which will not only yield the correlated changes in form diversity and new forms derived, but will also produce the necessary generalization to new tasks. Stokes and Baer (1977), in their review of generalization research, have presented a technology to establish generalization, and the procedures they review could usefully be employed in future research on creativity in children's art work.

APPENDIX A

SOCIAL VALIDITY RATING FORMS

Social validation of within subject paintings (Baseline and Treatment comparisons)

Instructions: Please rate the eight paintings on the following scale. You should rate each painting for existence of creative forms (responses). Please circle your responses.

SUBJECT: _____

PAINTING: BASELINE TREATMENT

RATING: 0 Demonstrates no creativity
 1 Demonstrates only limited creativity
 2 Demonstrates average creativity
 3 Demonstrates above average creativity
 4 Demonstrates exceptional creativity

0 1 2 3 4

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