

JOURNAL OF
Personality
AND
Social Psychology

Volume 36

May 1978

Number 5

An Analysis of Learned Helplessness: Continuous Changes
in Performance, Strategy, and Achievement
Cognitions Following Failure

Carol I. Diener and Carol S. Dweck
University of Illinois at Urbana-Champaign

Helpless children show marked performance decrements under failure, whereas mastery-oriented children often show enhanced performance. Current theories emphasize differences in the nature of the attributions following failure as determinants of response to failure. The present studies explored helpless versus mastery-oriented differences in the nature, timing, and relative frequency of a variety of achievement-related cognitions by continuously monitoring verbalizations following failure. The results revealed that helpless children made the expected attributions for failure to lack of ability; mastery-oriented children made surprisingly few attributions but instead engaged in self-monitoring and self-instructions. That is, helpless children focused on the cause of failure, whereas the mastery-oriented children focused on remedies for failure. These differences were accompanied by striking differences in strategy change under failure. The results suggest that in addition to the nature of the attribution one makes, the timing or even occurrence of attributions may be a critical individual difference.

Past research has linked deterioration in performance following failure to learned helplessness—the perceived inability to surmount failure (Dweck, 1975; Dweck & Bush, 1976;

Dweck & Reppucci, 1973; cf. also Seligman, Maier, & Geer, 1968). This perception is associated with attributions of failure to uncontrollable, invariant factors such as lack of ability, rather than to controllable factors such as effort. Despite equivalent performance prior to failure, children who attribute failure to lack of ability display marked performance decrements when they experience failure. Children who attribute their failure to lack of effort do not show deterioration in performance and often show improvement. Indeed, helpless children who are trained to make attributions that stress motivation

This study is based on a master's thesis submitted by the first author to the Department of Psychology, University of Illinois. The research was supported in part by U. S. Public Health Service Grant HD 00244. The authors would like to thank Robert Wyer and Edward Diener for their helpful comments.

Requests for reprints should be sent to Carol S. Dweck, Department of Psychology, University of Illinois, Champaign, Illinois 61820.

Copyright 1978 by the American Psychological Association, Inc. 0022-3514/78/3605-0451\$00.75

rather than ability as determinants of failure show striking improvement in their response to failure (Dweck, 1975).

While past research gives clear indications of individual differences in attributional patterns, there may well be important differences in other achievement-related beliefs and behaviors (e.g., expectancy of success, self-instructions), in the relative importance of particular achievement-related cognitions, and in the time at which particular cognitions come into play. The two studies reported here were designed to explore differences between helpless and mastery-oriented (nonhelpless) children in their performance following failure and its cognitive-motivational concomitants.

In order to examine performance change under failure and the accompanying cognitive components, children were trained on a discrimination learning task that allowed monitoring of their hypothesis-testing strategies and classification of the sophistication of the strategies before and after failure (cf. Weisz, 1975). In one study, the children were requested to verbalize "what they were thinking about" while performing the task. In contrast to the usual procedure of soliciting statements of particular achievement cognitions at prespecified times, the continuous verbalization procedure permitted children to report what cognitions were salient to them as they became salient. Thus, it was possible to analyze differences in the nature, relative frequency, and timing of achievement-related cognitions reported by helpless and mastery-oriented children.

This study, then, addressed the cognitive-motivational differences between helpless and mastery-oriented children by examining whether their verbalizations differ in a systematic fashion. For example, do both groups of children make attributions following the same amount of failure feedback, or do helpless children perceive failure and make attributions sooner? Do the mastery-oriented children maintain a less "personal" view of failure feedback, use the feedback more constructively, and provide themselves with cues for improving their performance? Do the helpless children instead dwell on the negative affect associated with failure and per-

haps withdraw from the situation by making task-irrelevant verbalizations?

In view of the possibility that the verbalization procedure would change the nature of the situation and affect performance in unforeseen ways (see Dweck & Gilliard, 1975), another study was conducted in which changes in hypothesis-testing strategy were monitored without verbalizations. In addition to providing a check on the obtrusiveness of the verbalization procedure, this study enabled us to examine the precise nature of the performance decrement following failure and addressed the following questions: Does the helpless child try alternative, sophisticated strategies but abandon them sooner than the mastery-oriented child? Do helpless children simply revert to somewhat more immature (i.e., easier, but less efficient) strategies when they begin to fail and thus show performance deterioration; or do they begin to use feedback less effectively, perseverating on responses that are incorrect? Does the helpless child cease to search actively for a solution and begin to respond randomly? Does the deterioration in performance during a series of failures generally occur in a gradual fashion or does it tend to occur immediately?

In summary, past research had documented differences in the attributions and in the general performance of helpless and mastery-oriented children following failure. The present research was aimed at (a) determining the nature and timing of a variety of cognitive-motivational variables by continuously monitoring verbalizations during failure and (b) specifying the precise nature of the performance change by examining the course of hypothesis-testing strategies during failure.

Method

Overview

Children, classified as either helpless or mastery-oriented, worked on a discrimination task, and the level of their hypothesis-testing strategy was monitored. After eight training trials, a failure procedure was instituted, and changes in hypothesis-testing strategy were assessed. In a second study, the same procedure was followed but, in addition, children were asked to verbalize what they were thinking about while performing the task.

Participants

In Study 1, the participants were 70 fifth graders (35 males and 35 females) from a semirural community. One male and one female were excluded for not meeting the training criterion, and the data from one additional female were eliminated because of procedural error. In Study 2, the participants were 30 male and 30 female fifth graders, also from a semirural community. None of the children had participated in the first study.

Measure of Helplessness

Since past research (Dweck, 1975; Dweck & Repucci, 1973; Floor & Rosen, 1975) has indicated that a major difference between helpless and mastery-oriented subjects lies in their respective tendency to neglect or emphasize the role of effort in determining their failures, this relative emphasis was used as the criterion for dividing children into helpless and mastery-oriented groups. The Intellectual Achievement Responsibility (IAR) Scale (Crandall, Katkovsky, & Crandall, 1965), a questionnaire consisting of 34 forced-choice attributions, was used. Each item on the scale describes either a positive or negative achievement experience that occurs frequently in the daily lives of children. This is then followed by two alternatives, one attributing the cause of the event to someone else in the child's environment (external responsibility) and the other to his or her own behavior (internal responsibility). A subset (10 items) of the questions on the IAR specifically taps the child's attributions of failure to lack of effort.

Subjects were divided at the median (which was the same for both studies) into two groups: Those scoring 7 and below on the effort items were placed in the helpless group, and subjects scoring 8 and above were designated as mastery-oriented. The mean effort-attribution scores of the children in the two studies were very similar (Study 1: helpless children = 5.20, mastery-oriented children = 8.80; Study 2: helpless children = 5.35, mastery-oriented children = 8.70). The IAR was administered in written form to all subjects at least 2 weeks prior to the experimental session.

Task and Materials

The task consisted of a three-dimension, two-choice discrimination problem in which the child searched for the one solution that was correct. Each child was presented with eight training problems and four test problems. A problem consisted of a set of stimulus cards (see Figure 1) with each card containing two figures that varied on three dimensions: color (e.g., red or blue), form (e.g., square or triangle), and a symbol in the center of the form (e.g., dot or star).

The stimuli were varied in a systematic fashion so that the child's hypothesis about the correct solu-

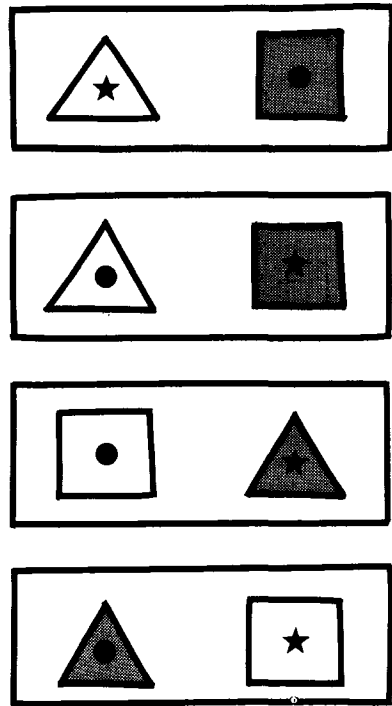


Figure 1. Example of four consecutive stimulus cards that allow the tracking of a hypothesis over the no-feedback trials.

tion could be inferred unambiguously from his or her choices. For example, a child who is testing the hypothesis, "triangle," would choose cards in the sequence of left, left, right, left, as can be seen in Figure 1. In order to monitor hypothesis-testing, a "blank trial" procedure was used in which the children did not receive feedback about the correctness of their responses on the first three of every four trials (Levine, 1966). A hypothesis was defined as the consistent selection of a particular stimulus property, such as the color red, over four trials prior to feedback. The instructions explicitly pointed out that when the experimenter gave no responses this meant neither right nor wrong. It has been demonstrated that when subjects receive no feedback, they maintain the same response for the next trial (Frankel, Levine, & Karpf, 1970; Gumer & Levine, 1971; Levine, 1966, 1969; Levine, Miller, & Steinmeyer, 1967).

Previous research (Fellows, 1968; White, 1965; Zeeman & House, 1963) has shown that children frequently display response sets such as position alternation and position perseveration. To eliminate the possibility that one of these response sets could be mistaken for a solution-relevant hypothesis, the stimuli were ordered within a single block of four trials such that all useful hypotheses could be separated from position responses. The instructions also

explicitly stated that the only possible solution was one of the colors, shapes, or interior symbols.

Procedure

Training problems. Since the goal of the study was to examine the effects of failure feedback on problem-solving strategies during testing, rather than to test sophistication of hypothesis use per se, each child was given extensive training prior to the test problems. Hypothesis use during training was monitored, and measures of ease of training were taken across all problems. During training, the child was gradually introduced to the no-feedback trials and told that he or she was to try to be correct on every response. At the beginning of each new deck of cards, all stimulus dimensions (color, form, and interior symbol) were reiterated, all stimulus values were named by the experimenter, and the child was told there was only one correct answer for the entire deck of cards.

On the first training problem, veridical feedback ("right" or "wrong") was given after every response. Upon completion of a deck of 16 cards, the child was asked to verbalize the correct solution. If the child was correct, he or she was told, "Very good," and was given the second training problem. If the child was wrong, the same problem was repeated with a hint provided by the experimenter: "The correct answer is one of the two shapes, either the triangle or the square. See if you can figure out the right answer. The same answer is right for this whole deck of cards. Try to be right every time." For those children who were still unable to reach the criterion of six successive correct responses, the deck was again repeated along with the hint. All subjects were able to reach criterion after the third repetition. The second training problem was presented in the same manner as the first.

On the third training problem, the child was introduced to the no-feedback procedure, that is, trials on which no information about correctness was given following the child's response. The child was told, "I have been saying 'right' or 'wrong' each time you pointed to one of the cards. From now on I will not always tell you if you are right or wrong. After some cards I will say nothing. Don't let this bother you. Keep trying to be right all of the time. Remember, you are still trying to figure out which of the colors, shapes, or little symbols in the middle is the correct answer for this whole deck of cards." During the third and fourth problems, feedback was given after every second response. If the child was unable to arrive at the correct answer after going through the deck once, a hint was provided, and the same deck was repeated.

On the fifth and sixth training problems the child was given feedback after every third response. Hints were provided as needed if the child was unable to arrive at the correct solution after going through the deck twice. On the seventh and eighth training problems, feedback was given after every fourth re-

sponse. Each child demonstrated the consistent use of strategies in the seventh and eighth training problems before the test problems were begun.

Test problems. The four test problems were similar to the seventh and eighth training problems (i.e., the child received feedback after every fourth response) except that the deck contained 20 cards and was gone through only once. This change allowed the children sufficient opportunity to search for the solution but ensured that, given their strategy level, they would not have tested all possible solutions. The feedback always consisted of "wrong," thus permitting the monitoring of strategy change following continued failure feedback.

In Study 1, after the last problem in the test series, each child was asked for an attribution for his/her performance: "Why do you think you had trouble with these problems?" The responses generated by the child were later categorized by two independent raters who were blind to the particular group to which the child belonged.

In order to ensure that all children left feeling proud of their performance, they were told, "This was a very difficult task, and you caught on so quickly that I gave you four harder decks that were intended for older children, just to see how you would do. You did very well on the decks intended for your age group." After being asked not to talk to his/her classmates about the tasks until the other children had had their turn, the child was thanked and returned to the classroom.

Study 2. In Study 2, one procedural modification was made. Prior to the seventh training problem, the children were asked to begin "thinking out loud." They were told that we were interested in what kinds of things children their age think about while doing tasks of this nature. In order to dispel inhibitions about making task-irrelevant statements, it was stressed that children think about many different kinds of things, such as lunch, what they are doing after school, solving the problem, and that the child should feel free to say out loud anything he/she was thinking. All verbalizations were noted verbatim. While some children were hesitant to verbalize on the first problem following the introduction of the procedure, all children made some type of verbalization. By the second problem, the children seemed at ease with the procedure. The four test problems were administered in the same fashion as in the first study, with feedback always consisting of "wrong." The child was reminded at the beginning of each problem "to think out loud." Verbalizations were monitored on both training and test problems so that changes following failure could be assessed.

Training measures. To ensure that deterioration following failure was not simply a function of lack of proficiency at the task, training measures were taken. In addition to monitoring feedback utilization and sophistication and extent of hypothesis use during training, the number of hints required during training was recorded. The hints were given when the child was unable to solve the training problems within the specified number of trials. Three training

measures were derived for each child from these hints: the total number of hints needed for all eight training problems; the number of hints needed on Training Problems 7 and 8 on which feedback was given every fourth trial as in testing; and the number of times more than one set of hints was required to solve a given problem.

Scoring Procedures

Classification of hypotheses: Strategies versus stereotypes. Useful strategies are sequences of hypotheses that, when followed perfectly, will eventually lead to problem solution. Stereotypes (ineffectual strategies) are sequences of hypotheses that can never lead to problem solution because they involve the repeated use of a disconfirmed hypothesis or the failure to use an allowable hypothesis.

In order to assess the child's use of strategies and stereotypes, the scoring system used by Gholson, Levine, & Phillips (1972) was adapted. In the Gholson et al. study, designed to investigate hypothesis-testing behavior of children at various ages, subjects were given 25 blocks of trials per problem, and the criterion of 3 consecutive blocks of trials was used to identify strategy and stereotype use. Since the present study was designed to examine performance decrements following consistent failure, there were only 5 blocks of trials per problem, and the scoring criterion was the use of a given strategy or stereotype on 3 of the 5 blocks.

Useful strategies. The useful strategies were classified into two types—dimension checking and hypothesis checking. (Gholson et al., 1972, discuss a third strategy, focusing, in which the child processes information perfectly and eliminates all dimensions that have been logically disconfirmed on each feedback trial. It was not included in this analysis because only a few children showed evidence of using it.) In dimension checking, the child proceeds through all three dimensions (color, form, interior symbol) in a systematic fashion. When the child tests one member of a dimension, he or she chooses the one that was consistent with the feedback on the previous trial. For example, suppose the child tested the shape dimension on the previous trial by choosing a yellow circle and was told "wrong." If the child is now testing the color dimension, he or she will choose red. In hypothesis checking, the child eliminates only one possible solution per feedback. For example, suppose the child tested the shape dimension by choosing a yellow circle and received "wrong" feedback; if the child then decided to test the color dimension, he or she would still try both yellow and red.

Stereotypes. Stereotypes—ineffectual task strategies—are response sets that can never lead to the solution of the problem. The three stereotypes are stimulus preference, position alternation, and position perseveration. Stimulus preference refers to the selection of a single stimulus characteristic (for example, the color red) independent of feedback. Position alterna-

tion occurs when the child alternately chooses the left and then the right stimulus regardless of what they are, and position perseveration occurs when the child chooses the stimulus in the same position each time. These ineffectual task strategies can be ordered on the basis of the ages of children who most frequently use them, with stimulus preference being used by older children and position perseveration by the youngest children.

Verbalization Categories

*Categories.*¹ At least 10 children had to make statements classified in a given category by independent raters for it to be included, since the chi-square analysis requires that there be an expected frequency of at least 5 per cell. The categories meeting this requirement are described below.

1. *Statements of useful-task strategy.* These were statements of a plan or system that under normal conditions would eventually lead to a solution. These statements corresponded to strategies.

2. *Statements of ineffectual approach to task.* These were statements that ignored the experimenter's feedback and would not lead to problem solution under normal conditions. These statements corresponded to stereotypes rather than strategies.

3. *Attributions.* Only one attributional category received at least 10 statements—attribution made to a lack of ability (e.g., not having a good memory) or loss of ability (e.g., confusion or inability to think). No other attributional category received more than 5 statements.

4. *Self-instructions.* These statements referred to instructions the child gave to him/herself that, if followed, would improve performance, such as a direction to slow down or to concentrate more.

5. *Self-monitoring.* Verbalizations in this category were statements that described the child's solution-oriented behavior other than the child's task strategy, such as monitoring his or her own effort expenditure or concentration.

6. *Statements of positive affect.* These were statements indicating that the task was enjoyable or a challenge and statements indicating that the child wished to continue doing the problems.

7. *Statements of negative affect.* This category included statements that indicated boredom, anxiety, or a desire to terminate the task or to escape from the situation.

8. *Positive prognostic statements.* These were statements expressing a child's high expectancy of success or indicating a belief that he or she would solve the problem if given sufficient opportunity.

9. *Solution-irrelevant statements.* Statements in this category were completely irrelevant to solution attainment and were often, although not necessarily, irrelevant to the task.

¹ The category system was derived from the data by the authors, who were blind to the group membership of the children making the verbalizations.

Raters. At the conclusion of the study, all verbalizations were categorized by two independent raters. These raters were trained in the use of the categories but were blind to the nature of the study and to the particular group to which each child belonged. Interrater reliabilities were computed using the conservative method of evaluating percentage agreements for each category separately. The mean interrater agreement for the nine categories was 89%, with a range from 79% to 100%. Only verbalizations on which there was agreement were used in the analyses. Accordingly, 11% of the verbalizations were discarded. Of these, only 2% were in the opposite direction from the reported findings, and 9% were in line with the obtained differences.

Results

Self-Generated Attributions (Study 1)

The categorization of the children as helpless or mastery-oriented on the basis of their IAR scores was corroborated by the children's responses to the question that followed the failure problems in Study 1: "Why do you think you had trouble with these problems?" (Interrater reliability for categorizing the attributions was 91%.) As shown in Table 1, over 50% of the helpless children responded that they were unable to do the problems because they were not smart enough. In contrast, none of the mastery-oriented children gave this response. The mastery-oriented children divided their explanations for their failure among lack of effort, bad luck, the fairness of the experimenter, and the increased difficulty of the task. Thus, helpless children blamed their abilities for failure, even though both the helpless and mastery-oriented

Table 1
Percentage of Helpless and Mastery-Oriented Children Generating Attributions in Each Category, Study 1

Attributional category	Group	
	Helpless	Mastery-oriented
Ability	52	0
Effort	3.4	23.7
Luck	3.4	21.05
Experimenter not fair	6.8	23.7
Task harder	27.6	21.05
No reason	6.8	10.5

children had learned the task equally well, had equal degrees of success during training, and had received equal amounts of failure feedback.

Training Measures: Performance Prior to Failure

None of the measures of difficulty in training—total number of hints needed on all eight training problems; number of hints on Training Problems 7 and 8; number of times more than one set of hints was needed to solve the problem; or total number of training trials required—pointed to any differences between the groups in ease of training. Both the helpless and mastery-oriented groups utilized feedback appropriately during the training procedure, retaining their hypothesis following the feedback "correct" and changing hypotheses following the feedback "wrong." Chi-square analyses on the number of times children used dimension checking versus hypothesis checking during training also yielded no significant differences between groups. Helpless children used dimension checking 47% of the time and hypothesis checking 53% of the time as compared with the mastery-oriented children, who used dimension checking 43% of the time and hypothesis checking 57% of the time in Study 1. Sophistication of strategy during training in Study 2 was consistent with the results of the first study. Helpless children used dimension checking 44% of the time and hypothesis checking 56% of the time, while mastery-oriented children used dimension checking 40% of the time and hypothesis checking 60% of the time.

Testing Measures: Strategy Change Following Failure

In order to provide a general picture of change in performance following failure feedback, a 2×2 (Helpless vs. Mastery-Oriented \times Male vs. Female) analysis of variance was performed on the number of times that each child used ineffectual and disconfirmed hypotheses on the test problems. There were no significant differences between the

males and females in the analysis of variance, so data from males and females were combined. (When there were differences in the performances of males and females, as were found on the specific pattern of deterioration, these differences are noted.) The results of Study 1 show that helpless children used ineffectual hypotheses significantly more often than mastery-oriented children ($M_s = 8.97$ and 6.08 , respectively), $F(1, 63) = 11.7$, $p < .001$. This general finding is further supported by the significant negative correlation between the use of ineffectual hypotheses and the effort attribution scores, ($r = -.326$, $p < .01$, two-tailed). That is, helpless children, who do not attribute their failure to lack of effort, use ineffectual hypotheses to a significantly greater extent than mastery-oriented children, who do attribute their failure to lack of effort. A similar pattern of results was obtained in Study 2, in which helpless children, following failure, used illegitimate and disconfirmed hypotheses significantly more than mastery-oriented children ($M_s = 7.03$ and 2.00 , respectively), $F(1, 56) = 70.06$, $p < .001$. The significant negative correlation between the effort attribution scores and use of ineffectual hypotheses found in Study 1 was again obtained ($r = -.427$, $p < .005$, two-tailed).

Of greater interest, however, is the change in strategy use across failure trials. Table 2 shows the number of children in each group whose strategies deteriorated, remained the same, or increased in sophistication over test problems. A chi-square analysis of the data shown in Table 2 (combining the Same and Improved categories) yielded a highly significant difference between helpless and mastery-oriented groups, $\chi^2(1) = 27.37$, $p < .001$, for Study 1; $\chi^2(1) = 19.89$, $p < .001$, for Study 2.

The analysis of variance, the correlation, and the chi-square analysis have all shown large and significant differences in the performance of helpless and mastery-oriented children following failure. However, to appreciate the specific pattern of performance following failure, one must examine the problem-by-problem change. Table 3 shows the percent of helpless and mastery-oriented chil-

Table 2
Number of Helpless and Mastery-Oriented Children Whose Hypothesis-Testing Strategy Improved, Remained the Same, or Deteriorated Following Failure

Group	Improved		Same		Deteriorated	
	Study		Study		Study	
	1	2	1	2	1	2
Helpless	0	0	5	9	24	21
Mastery-oriented	10	11	21	15	7	4

dren exhibiting each type of strategy or stereotype on each of the four test problems. As can be seen from Table 3, helpless subjects in both studies showed a progressive decrease in the use of legitimate strategies with an attendant increase in ineffectual responses. On the first test problem in Study 1, most helpless subjects were showing strategy use, but by the fourth test problem less than one third of the subjects were able to maintain strategy use. In fact, by the end of the second test problem, 37.9% of the helpless children had abandoned useful strategies. While some helpless females lapsed into stereotypic responses quite early, most helpless children showed a progressive decline in performance across the four test problems, suggesting that the effects of failure are cumulative in nature. None of them showed an increase in strategy sophistication.

In contrast, most mastery-oriented subjects did not show a permanent decline in use of strategies over test problems. In fact, some mastery-oriented subjects showed a clear tendency to become *more* sophisticated in their strategy use as they received failure feedback—a change that may have been prompted by the procedural change to only one exposure per deck during the test problems. As can be seen in Table 3, the strategy changes in Study 1 were essentially replicated in Study 2 despite the verbalization-monitoring procedure. The one difference was that in the second study *all* mastery-oriented children exhibited consistent use of strategies across all four test problems. Thus, the strat-

Table 3
Percentage of Helpless and Mastery-Oriented Children Exhibiting Each Type of Strategy on the Four Failure Problems

Group	Study 1				Study 2			
	Problem				Problem			
	1	2	3	4	1	2	3	4
Helpless								
Useful strategies								
Dimension checking	20.7	17.3	3.4	3.4	30.0	20.0	3.3	0
Hypothesis checking	72.4	44.8	48.3	27.6	70.0	53.3	60.0	36.7
Ineffectual strategies								
Stimulus preference	6.9	31.0	34.5	44.8	0	23.3	26.7	30.0
Position alternation	0	6.9	10.4	24.1	0	3.3	3.3	26.7
Position perseveration	0	0	3.4	0	0	0	6.7	6.7
Mastery-oriented								
Useful strategies								
Dimension checking	13.2	18.4	7.9	39.5	26.7	36.7	26.7	50.0
Hypothesis checking	78.9	55.3	60.5	44.7	73.3	63.3	73.3	50.0
Ineffectual strategies								
Stimulus preference	7.9	26.3	28.9	10.5	0	0	0	0
Position alternation	0	0	2.6	5.3	0	0	0	0
Position perseveration	0	0	0	0	0	0	0	0

egy-change data demonstrated that behavior following failure is dramatically different for helpless and mastery-oriented children. However, the full extent of these differences is clear only when the cognitive concomitants of the performance changes are also examined.

Verbalizations (Study 2)

Training. Since verbalizations were monitored on Training Trials 7 and 8, comparisons between training and testing could be made. During training, the only category to which at least 10 children contributed was the useful-task-strategy category: 33 helpless children and 32 mastery-oriented children made statements of this type. Therefore, the two groups were quite similar in both performance and verbalizations prior to the failure experience.

Testing. A chi-square analysis was performed on the 2×9 (Helpless vs. Mastery-Oriented \times Verbalization categories) contingency table containing the number of children in each group who made verbalizations in each category during the test problems. The analysis revealed a significant difference in

the use of the verbalizations by the helpless and mastery-oriented children, $\chi^2(8) = 120.5$, $p < .001$. Individual chi squares were then computed for each category separately and are summarized in Table 4. To maintain a conservative experimentwise significance level (since nine analyses were performed), .01 was adopted as the alpha level necessary for significance. Seven of the nine categories showed dramatic and significant differences.

As can be seen in Table 4, there is very little overlap in the types of statements made by the two groups of children except for the useful-task-strategy statements. Although equal numbers of helpless and mastery-oriented children made useful-task-strategy statements, almost all of these statements were made on the first failure problem. However, as soon as the children began to experience failure, differences in their verbalizations began to appear. As early as the second test problem, the helpless children began to make ineffectual task-strategy statements and attributions for their failure. These attributional statements reflected a perceived lack or loss of ability, such as "I'm getting confused" and "I never did have a good memory." In contrast, none

of the mastery-oriented children responded in this fashion. In fact, the mastery-oriented children made surprisingly few attributions, and these were scattered among several categories.

Instead of searching for a cause for their failure and making attributions, mastery-oriented children seemed to search for a remedy by engaging in self-instructions and self-monitoring. As Table 4 shows, almost half of the mastery-oriented children made self-instructional statements that could improve their performance. For example, they made statements such as "I should slow down and try to figure this out" and "The harder it gets the harder I need to try." About 84% of the mastery-oriented children engaged in active self-monitoring. These statements reflected attention to the degree of effort or concentration they were exerting and appeared to provide the mastery-oriented children with a check on their task-related behavior.

The attitudes of the two groups of children toward the task following failure were also quite different, particularly by the last two failure problems. A third of the mastery-oriented children continued to express positive affect, whereas two thirds of the helpless children voiced a good deal of negative affect. For example, mastery-oriented children made statements like "I love a challenge," whereas helpless children made statements such as "This isn't fun anymore." In addition, almost two thirds of the mastery-oriented children made statements that reflected a posi-

tive prognosis such as "I've almost got it now." Although negative prognostic statements were not sufficiently numerous to constitute a category, five helpless children did offer statements like "I give up."

Marked differences are also evident in the solution-irrelevant category as shown in Table 4. A typical example of statements in this category is the following commentary made by a helpless female as she chose stimuli: "There is a talent show this weekend, and I am going to be Shirley Temple." It might be noted that this child's stimulus choices showed a position alternation. In fact, virtually all the solution-irrelevant verbalizations corresponded to stereotypic rather than strategic hypothesis testing. For example, despite the experimenter's consistent feedback of "wrong," one helpless male repeatedly chose the brown color, saying "chocolate cake." Although this was one of the most frequent types of statements made by helpless children (22 children), none of the mastery-oriented children made statements that fell into this category.

In summary, Study 2 revealed important quantitative and qualitative differences in the verbalizations of helpless and mastery-oriented children as failure occurred. The statements of helpless children were characterized by attributions for their failure, by a large number of solution-irrelevant statements, and by statements of negative affect. In contrast, mastery-oriented children were less concerned about the cause of their failures than they were with a remedy for the failure.

Table 4

Number of Helpless and Mastery-Oriented Children with Verbalizations in Each Category, Study 2

Category of verbalizations	Group		χ^2 ($df = 1$)	p
	Helpless	Mastery-oriented		
Useful task strategy	26	26	0	—
Ineffectual task strategy	14	2	12.27	.001
Attributions to loss of ability	11	0	13.46	.001
Self-instructions	0	12	15.0	.001
Self-monitoring	0	25	42.86	.001
Statements of positive affect	2	10	6.0	.025
Statements of negative affect	20	1	26.46	.001
Positive prognosis statements	0	19	27.8	.001
Solution-irrelevant statements	22	0	34.74	.001

Their statements revealed a marked absence of attributions and the presence of self-monitoring and self-instructions. Moreover, following failure, the mastery-oriented children maintained their positive affect towards the task and a positive prognosis about the eventual outcome.

Discussion

The results revealed striking differences both in the pattern of performance and in the nature of the verbalizations made by helpless and mastery-oriented children following failure. It was particularly noteworthy that while the helpless children made the expected attributions to uncontrollable factors, the mastery-oriented children did not offer explanations for their failures. Instead the mastery-oriented children engaged in solution-directed behavior such as self-instructions and self-monitoring. While most current attribution theories emphasize individual differences in the *nature* of the attributions, the present findings suggest that when or whether attributions occur spontaneously may of itself be a critical difference.

Although the mastery-oriented children did not tend to make explicit attributions, one might argue that attributions to effort were implicit in the self-instructions and self-monitoring, since these verbalizations emphasized effort. Several factors make this possibility unlikely. First, the few attributions that the mastery-oriented children did make were scattered among categories. Second, attributions may be considered irrelevant to the mastery-oriented child on this task, because the remedy would be the same regardless of the cause of failure. Whether the cause is thought to be greater task difficulty, insufficient effort, bad luck, or lower ability than originally suspected, the remedy would still consist of sustained concentration and the use of sophisticated strategies. Third, it did not appear that the mastery-oriented children perceived themselves as having failed. The positive affective and positive prognostic statements suggest that the mastery-oriented children responded to the "wrong" feedback chiefly as information leading to problem

solution, not as a failure or as a prediction of future failure.

If mastery-oriented children do not tend to perceive themselves as having failed and therefore do not make attributions, then the question arises as to why the IAR, an attribution scale, is a good predictor of their behavior and why one finds differences in attributions generated by helpless and mastery-oriented children as in Study 1. The answer may lie in the usual procedure for eliciting attributions: The failure is defined for the child and he/she is then asked to explain its cause. This external definition of failure would probably be premature for mastery-oriented children and would occur when they still viewed increased effort expenditure as the means of achieving success. They would thus tend to cite insufficient effort as the cause of failure. In addition, although mastery-oriented children did not tend to make attributions in the present study, it is likely that had the failure continued, attributions would have begun to appear. Thus, the helpless versus mastery-oriented difference may be one of timing rather than the presence or absence of attributions.

In short, then, there appears to be a striking difference between the helpless and mastery-oriented groups in their emphasis on the cause of, versus remedy for, failure. Helpless children ruminate about the cause of their failure and, given their attributions to uncontrollable factors, spend little time searching for ways to overcome failure. Mastery-oriented children, on the other hand, seem to be directed towards the attainment of a solution. They are less concerned with explaining past errors and more concerned with producing future successes. Consequently, their verbalizations tend to be ones that will enable them to improve their performance, such as self-monitoring and self-instructions. These findings imply that in addition to attribution retraining (Dweck, 1975), helpless children might benefit from being trained to control task-irrelevant cognitions and to focus on self-instructions and self-monitoring as do the mastery-oriented children. Such procedures have proved highly effective in treating impulsivity and hyperactivity in children as

well as anxiety and intense fear in adults (Meichenbaum, 1975).

The continued task involvement of the mastery-oriented children clearly appears to be more adaptive than the withdrawal of the helpless children—there was no alternative to the task and no real cost for continuing to try. Had a solution been possible, the mastery-oriented children would have been far more likely to find it (Dweck & Reppucci, 1973). However, as Bulman and Brickman (Note 1) suggest, persistence can be maladaptive as well. For example, it is possible that among the persisters there exists a subgroup of children who are similar to helpless children in that they view failure as a condemnation of their abilities. They would differ from helpless children in that, instead of withdrawing, they may persist in order to forestall the admission of failure. However, they might persist despite prolonged lack of success and despite the availability of potentially more fruitful alternatives. This possibility, that a subgroup of the mastery-oriented children may be similar to helpless children in their perception of failure, warrants further investigation. It is also possible that there are mastery-oriented children who, not unlike impulsive children, are overly action oriented. That is, they will seek immediate, premature remedies and will not engage in systematic consideration of alternative causes even on those tasks for which diagnosis of cause may be necessary to formulate a remedy. Thus, we might ask whether mastery-oriented children will make earlier attributions for failure when identification of the cause is necessary for achieving the solution.

In summary, past research has involved the implicit assumption that individuals tend to employ the same classes of cognitive mediators and that they bring them into play at similar times. For example, following a discrete event such as evaluative feedback, one is assumed to formulate an attribution. Individuals have been considered to differ only in the *particular* attribution they make. The present research, however, suggests that the timing or the very occurrence of attributions may be a critical individual difference.

Reference Note

1. Bulman, R. J., & Brickman, P. *When not all problems are soluble, does it still help to expect success?* Unpublished manuscript, Northwestern University, 1976.

References

- Crandall, V. C., Katkovsky, W., & Crandall, V. J. Children's belief in their own control of reinforcements in intellectual academic achievement situations. *Child Development*, 1965, 36, 91-109.
- Dweck, C. S. The role of expectations and attributions in the alleviation of learned helplessness. *Journal of Personality and Social Psychology*, 1975, 31, 674-685.
- Dweck, C. S., & Bush, E. S. Sex differences in learned helplessness: I. Differential debilitation with peer and adult evaluators. *Developmental Psychology*, 1976, 12, 147-156.
- Dweck, C. S., & Gilliard, D. Expectancy statements as determinants of reactions to failure: Sex differences in persistence and expectancy change. *Journal of Personality and Social Psychology*, 1975, 32, 1077-1084.
- Dweck, C. S., & Reppucci, N. D. Learned helplessness and reinforcement responsibility in children. *Journal of Personality and Social Psychology*, 1973, 25, 109-116.
- Fellows, B. J. *The discrimination process and development*. New York: Pergamon Press, 1968.
- Floor, L., & Rosen, M. Investigating the phenomenon of helplessness in mentally retarded adults. *American Journal of Mental Deficiency*, 1975, 79, 565-572.
- Frankel, F., Levine, M., & Karpf, D. Human discrimination learning: A test of the blank-trials assumption. *Journal of Experimental Psychology*, 1970, 83, 342-348.
- Gholson, B., Levine, M., & Phillips, S. Hypotheses, strategies, and stereotypes in discrimination learning. *Journal of Experimental Child Psychology*, 1972, 13, 423-446.
- Gumer, E., & Levine, M. The missing dimension in concept learning: Dimensionality or local consistency. *Journal of Experimental Psychology*, 1971, 90, 39-44.
- Levine, M. Hypothesis behavior by humans during discrimination learning. *Journal of Experimental Psychology*, 1966, 71, 331-338.
- Levine, M. Neo-noncontinuity theory. In G. Bower & J. T. Spence (Eds.), *The psychology of learning and motivation* (Vol. 3). New York: Academic Press, 1969.
- Levine, M., Miller, P., & Steinmeyer, C. H. The none-to-all theorem of human discrimination learning. *Journal of Experimental Psychology*, 1967, 73, 568-573.
- Meichenbaum, D. Self-instructional methods. In F. H. Kanfer & A. P. Goldstein (Eds.), *Helping people change*. New York: Pergamon Press, 1975.

- Seligman, M. E. P., Maier, S. F., & Geer, J. H. Alleviation of learned helplessness in the dog. *Journal of Abnormal Psychology*, 1968, 73, 256-272.
- Weisz, J. R. *A developmental analysis of relations among hypothesis behavior, helplessness, and I.Q.* Unpublished doctoral dissertation, Yale University, 1975.
- White, S. H. Evidence for a hierarchical arrangement of learning processes. In L. P. Lippitt & C. C. Spiker (Eds.), *Advances in child behavior and development* (Vol. 2). New York: Academic Press, 1965.
- Zeeman, D., & House, B. J. The role of attention in retardate discrimination learning. In N. R. Ellis (Ed.), *Handbook of mental deficiency: Psychological theory and research*. New York: McGraw-Hill, 1963.

Received August 26, 1977 ■

Erratum to Rodin and Langer

In the article "Long-Term Effects of a Control-Relevant Intervention With the Institutionalized Aged," by Judith Rodin and Ellen J. Langer (*Journal of Personality and Social Psychology*, 1977, Vol. 35, No. 12, pp. 897-902), the z score reported on page 900 should be changed from $z = 3.14$, $p < .01$, to $z = 1.73$, $p < .10$ (two-tailed). The outcome is therefore only marginally significant, and a more cautious interpretation of the mortality findings than originally given is necessary. The authors and the journal's editors are grateful to an observant reader for detecting the error in the statistic originally reported.