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The Role of Expectations and Attributions in the Alleviation of Learned Helplessness

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The purpose of the investigation was to determine whether altering attributions for failure would enable learned helpless children to deal more effectively with failure in an experimental problem-solving situation. Twelve children with extreme reactions to failure were identified and were given intensive, relatively long-term experience with one of two training procedures. It was hypothesized that a procedure which taught the helpless children to take responsibility for failure and to attribute it to lack of effort would result in unimpaired performance following failure in the criterion situation, but that a procedure which provided success experiences only (as in many programmed learning and behavior modification programs) would lead to changes of a lesser magnitude. The results revealed that following training, the subjects in the Success Only Treatment continued to evidence a severe deterioration in performance after failure, while subjects in the Attribution Retraining Treatment maintained or improved their performance. In addition, the subjects in the latter condition showed an increase in the degree to which they emphasized insufficient motivation versus ability as a determinant of failure.

The present study of the alleviation of learned helplessness in children has grown out of several relatively independent lines of investigation: contingency learning in experimental animal psychology, attribution theory in personality-social psychology, and cognitive therapy in clinical psychology.

The phenomenon of learned helplessness, conceptually related to the earlier notion of "hopelessness" advanced by Mowrer (1960), was first studied systematically by Seligman and Maier (1967). The latter found that animals pretreated with unavoidable and inescapable shock later failed to avoid and escape traumatic shock in another situation in which shock was avoidable and escapable by performing a simple response. In describing the phenomenon, the investigators used the term "learned helplessness" to refer to the learning or perception of independence between one's behavior and the presentation and/or withdrawal of aversive events.

In a study linking this phenomenon to reinforcement responsibility (i.e., internal vs. external attributions for outcomes), Dweck and Reppucci (1973) demonstrated that following failure, a certain group of children do not perform the response required to succeed, even though they are motivated to and are fully capable of doing so. An analysis of the reinforcement responsibility profiles of the subjects revealed that those children most likely to give up in the face of failure when compared to the more persevering subjects (a) took less personal responsibility for the successes and failures they met with and (b) to the extent that they did take responsibility, tended to attribute the outcomes of their behavior to ability rather than to effort. Overall, the more helpless subjects placed significantly less emphasis on the amount of effort exerted as a determinant of success and failure than did the more persevering subjects. These results imply that since helpless children see themselves as less instrumental in determining outcomes, they would be less likely to view adverse circumstances as surmountable;

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since they tend to attribute failure to lack of ability, they would be less likely to respond to failure with increased effort or perseverance.[1] A number of studies investigating the relationship between reinforcement responsibility and achievement motivation (e.g., Rotter, 1966; Weiner & Kukla, 1970; Odell, Note 1) or facilitating anxiety (Butterfield, 1964) have yielded results consistent with these findings.

In learned helplessness the important variable is not the occurrence of the aversive event, but the perception of the relationship between one's behavior and the occurrence of that event. As shown in the Dweck and Reppucci study, two children may receive exactly the same number and sequence of success and failure trials yet react quite differently as a function of whether they interpret the failure to mean that the situation is beyond or within their control. Many recent studies have shown that an individual's reaction to events is largely determined by his attribution of the causes of that event. Nisbett and Schachter (1966), Ross, Rodin, and Zimbardo (1969), Storms and Nisbett (1970), and Valins and Nisbett (1971) have discussed the possibility of "attribution therapy," a procedure whereby the teaching of a new attribution for certain symptoms might lead to the lessening of the debilitating or undesirable effects of those symptoms. Moreover, several clinicians (Davison, 1966; Ellis, 1962; Meichenbaum, Note 1) have reported favorable results with patients treated by "cognitive restructuring," "rational-emotive therapy," or by modification of "what they say to themselves about events."

[1] It is interesting to note that these patterns of reinforcement responsibility need not correspond to differences in actual ability. In the Dweck and Reppucci (1973) study those children who gave up in the face of failure performed just as well on the task presented as those who persisted. In fact, for the female subjects, the helpless children showed superior initial performance. It should also be noted that an attribution of failure to lack of ability has different implications depending on whether that lack is perceived as a temporary deficit in obtainable skills or as a more general intellectual deficit (although both might indicate that persistence in the immediate situation would be fruitless). Helpless children tend to key on the latter as an explanation for failure, but it might prove beneficial to encourage a distinction between the two.

Given the fact that the performance of the helpless child tends to deteriorate in the face of failure, the purpose of the present study was to determine whether altering the helpless child's perception of the relationship between his behavior and the occurrence of failure (i.e., his attributions for failure) would result in a change in his maladaptive response to failure in the experimental situation. If the helpless child tends to perceive independence between his responses and failure, then one step would involve demonstrating the dependence of failure upon his responses and another would involve explaining to which aspects of the situation failure should be attributed.

It was therefore hypothesized that a long-term training procedure which taught the child (a) to take responsibility for failure and (b) to attribute it to insufficient effort would lead to increased persistence on the experimental task in the face of failure. For those children receiving this retraining of attributions, it was expected that failure on the task would no longer serve as a cue for continued failure (but as a cue to do something different or something additional) and that it would therefore no longer have deleterious effects on the child's performance.

Since the literature suggests that higher expectations of success lead to greater persistence in the face of difficulty (Battle, 1965; Feather, 1966; Tombaugh & Tombaugh, 1963; Tyler, 1958), it was hypothesized that a procedure which provided only success experiences would lead to some positive changes in the helpless child's reactions to failure. However, to the extent that failure retained its meaning as a cue for continued failure, the subjects in this group were not expected to show as much improvement as those subjects who were given attribution retraining. A success only procedure is one recommended by many behavior modifiers (e.g., Bigelow, 1972; Hart & Risley, 1968; Meacham & Wiesen, 1969) and advocates of programmed learning (e.g., Holland, 1960; Skinner, 1968), especially for children who have difficulty dealing with failure. These investigators recommend the elimination of errors in the belief that errors serve only to elicit negative

emotions on the part of the child and to make the materials and/or the situation aversive, while they do little or nothing to enhance learning. Although there is ample evidence that errors per se do indeed have adverse effects on the performance of these children and that success works to motivate them, the question is whether the most effective way of overcoming such reactions to failure is to eliminate it from the situation or to teach the child how to deal with it.

In summary, the purpose of the study was to determine whether a treatment that altered attributions for failure would alter responses to failure to a greater degree than a commonly advocated procedure that did not alter attributions. The Success Only Treatment was expected to raise the child's expectation of success, thereby enabling him to sustain his performance despite failure. It was expected, however, that the Attribution Retraining Treatment would prove superior since it provided a new interpretation for failure by teaching the child to attribute it to insufficient effort.

METHOD

Overview

Twelve extremely helpless children were identified and compared to persistent children, of the same age and sex and in the same classroom, on several measures. Baselines for speed and accuracy of performance on math problems were obtained for each of the helpless subjects and the effects of failure on performance following failure were assessed. Following this initial baseline and interpolation of failure, the helpless subjects were given one of two treatments in a different situation with different problems for 25 sessions. In the Success Only Treatment, trials were programmed such that the subject could successfully complete the number of problems required well within the time limit on every trial. In this treatment, while success was attributed to subject's responses, failure was avoided or glossed over when it occurred. In the Attribution Retraining Treatment, the procedure differed in two respects: the programmed occurrence of failure and the attribution of failure.[2] The success trials were identical to those of the Success Only Treatment. However, on approximately 20% of the trials, the requirement slightly exceeded the number the subject was currently able to solve within the time limit. On these trials, failure was clearly attributed to insufficient effort (i.e., experimenter verbalized the attribution to subject). The effects of failure on performance in the original situation were again assessed at the middle and end of training.

Subjects

There were 12 subjects,[3] 5 females and 7 males, between the ages of 8 and 13 years. The females ranged in age from 10 to 13 years (10, 11, 11, 11, and 13); 3 were white and 2 were black. The males ranged in age from 8 to 13 years (8, 10, 10, 11, 12, 12, and 13); 4 were white and 3 were black. Two of the females and 6 of the males were in special classes for children performing below grade level, while the remaining children were in regular classes. The subjects attended two public elementary schools in a lower-middle-class town outside of New Haven, Connecticut.

The subjects were identified as "helpless" (i.e., characterized by expectation of failure and deterioration of performance in the face of failure) by their school psychologist, their principal, and their classroom teacher, independently. They were chosen as the most extreme cases out of the 750 children in the two schools. To ensure that the teachers' criteria matched those of the investigator, teachers were given a helplessness rating scale for each of the children designated. The scale described various reactions to a stressful academic situation in which failure was possible or present. The teacher was asked to rate, on a scale of 1 to 5, the degree to which each child evidenced these reactions in similar situations.

In an attempt to avoid any possible stigma associated with being singled out for participation in the study, subjects were told that the investigators were studying how children do math problems and that they had been specially selected to help out on this project.

To determine how and how much the helpless children differed from persistent children, 10 persistent comparison subjects of the same age and sex, and from the same classrooms as the helpless subjects were selected. Teachers were asked to choose children they believed to be of equal ability to the helpless children but who were characterized by their persistence in the face of failure or difficulty. Teacher selection, rather than IQ tests, was used as

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[2] While the simultaneous manipulation of these two variables is entirely compatible with the purpose of the study (i.e., to assess the effects of a procedure that altered attributions vs. a commonly advocated procedure that did not), the differences between the two treatments should be kept in mind in comparing their effects.

[3] Three other children, originally selected as helpless, were not used. Two of them did not perform consistently enough to establish stable baselines against which the effect of failure on their performance could be assessed. One was eliminated because he did not meet the criteria for helplessness on the premeasures and interpolated failure; it appeared that he did not perform well in school because the rewards of the classroom meant little to him and not because he found the threat of failure, or failure itself, debilitating.

a means of matching subjects on intelligence, since for various reasons (e.g., the fact that IQ tests inevitably involve failure at some point, the fact that the groups may differ in test anxiety, etc.) IQ tests do not accurately reflect the abilities of the helpless child. These comparison subjects were given three of the same measures that were administered to the helpless children (but not the training or testing procedures). Because of the small size of the classes from which the subjects were drawn, one of these persistent subjects served as the comparison for three helpless subjects.

Experimenters

The two experimenters were women, 24 years of age, who had no knowledge of the experimental hypothesis.[4] Lest they infer that the subjects receiving one treatment were "supposed" to perform better, or that one treatment was thought to be superior to the other, they were told that it was not a matter of "better–poorer" but that a different pattern of results might follow from each treatment. The two experimenters administered all the measures that were given prior to training as well as all subsequent training and testing, with each experimenter working with the same subjects every day. The experimenters were given extensive training in the procedure by the author and their performances were monitored daily.

Questionnaire measures given after the completion of training were administered by two teacher's aides, employed by the schools, who were trained in the administration of these measures by the author. This was done to ensure that possible changes in these measures from before to after training were not due to familiarity with the experimenter.

Comparison Measures

Measures on which the helpless subjects were compared to their persistent classmates consisted of the Intellectual Achievement Responsibility Scale, two subscales of the Test Anxiety Scale for Children, and a Repetition Choice task. They were all individually and orally administered.

The Intellectual Achievement Responsibility (IAR) Scale (Crandall, Katkovsky, & Crandall, 1965) was given to all the helpless and persistent subjects. The IAR is designed to determine the degree to which a child believes that the intellectual failures and successes he encounters are a result of his own behavior versus the behavior of important others in his environment (e.g., teachers, parents, friends). It consists of 34 forced-choice items, each depicting a positive or negative achievement situation and presenting two alternative attributions: (a) an internal attribution, in which responsibility for the outcome is assumed by subject, and (b) an external attribution, in which responsibility for the outcome is relegated to some property of the situation or the other person. The I+ score represents the number of positive items for which subject takes responsibility; the I− score represents the number of negative items for which he takes responsibility; and the total I score represents the sum of the subscores. The internal alternatives can be further categorized into those which attribute the outcome to the ability of the subject versus those which attribute the outcome to his motivation. Thus the I+ score can be subdivided into $I+_{E}$ (effort) and $I+_{A}$ (ability); the I− score can be subdivided into $I-_{E}$ (effort) and $I-_{A}$ (ability).

Two subscales of the Test Anxiety Scale for Children (TASC) (Sarason, Davidson, Lighthall, Waite, & Ruebush, 1960) were administered. The scale has been factor analyzed and divided into four subscales by Feld and Lewis (1969), of which the test anxiety subscale and the poor self-evaluation subscale were used in the present study. Since the TASC has been used as an indirect measure of the motive to avoid failure (e.g., Atkinson & Feather, 1966), it was thought to be a measure which might distinguish between the helpless and persistent subjects.

Finally, a repetition-choice task, similar to that of Bialer and Cromwell (1960) was administered to all subjects to test for the relative strength of the tendency to avoid failure versus the tendency to strive for success. Two 24-piece jigsaw puzzles, $11\frac{1}{4}$ in. $\times$ $14\frac{1}{2}$ in. (.29 $\times$ .37 m), were used. They were of approximately the same difficulty and interest value and were cut from the same die. All subjects were allowed to complete the first puzzle, but were stopped 9 pieces short of completion on the second. They were then given the choice of reconstructing either puzzle at their leisure. The decision to reconstruct the already successfully completed one was taken as an indication of the tendency to avoid failure, while the decision to reconstruct the failed one was taken as an indication of the tendency to strive for success.

In addition to these measures, an Effort versus Ability Failure Attribution Scale was developed and administered to the helpless subjects only. Since the IAR fails to give the child a choice between two internal alternatives, that is, one attributing failure to insufficient effort and the other attributing failure to insufficient ability, it is difficult to assess the relative emphasis which an individual child places upon these two factors. Therefore, the present investigator devised a simple 5-question scale which presents 5 failure situations involving arithmetic and asks subject to choose between the ability and effort alternatives.

All of the measures above were readministered to the helpless subjects following the completion of training, largely for exploratory purposes. The Effort versus Ability Failure Attribution Scale was expected to yield the greatest changes as a result of attribution retraining, since it was most closely related to what this procedure endeavored to teach these children.

[4] The author wishes to thank Karen Gould and Suella Wallace for their extremely competent work as experimenters.

Establishment of Baselines and Interpolation of Failure

After the administration of the premeasures and prior to the experimental treatment, the experimental subjects were given sheets of arithmetic problems to do. They were given three or four sheets per session each containing 25 or 30 problems. The sheets were adapted from the children's workbooks and were chosen for each subject to reflect the range of his arithmetic abilities from moderately easy to moderately difficult. The problems were done in groups of five and a star was placed after every fifth problem so that the subject would know he had reached the end of the group. After every group of 5 problems, the experimenter recorded the time and graded them. If the subject got at least 4 of the 5 correct he was given a token. At the end of the session he was permitted to trade in his tokens for a small prize or save them for a larger one.

The subject was given the same sheets every day, but in a different order for 10 days. Then to test for the effects of failure on rate and accuracy of performance, special sheets were made. They were identical to the moderately difficult arithmetic sheets on which the subjects had been working, except that in the second and fourth group of five problems, two problems were replaced with ones that were beyond subject's abilities. Thus, he would fail on that group of problems and could not earn a token. The interpolated failure sheet was placed second or third among the other sheets. When subject came to a star on a failure set of five problems, experimenter corrected them, marking the two (or more) wrong, and said, "You got too many wrong that time. You don't get a token." If subject simply sat there and stared at the problems without attempting to do them and without indicating that he was finished with that set, the experimenter waited 3 minutes and said, "Time's up." She then corrected them, marking the incorrect and unattempted problems wrong and said, "You got too many wrong that time. You don't get a token." If, during a failure set, subject asked how to do the problems, experimenter said, "Just do the best you can."

Division into Treatment Groups

The subjects were matched as closely as possible on the degree to which the interpolation of failure disrupted their performance. This was done by calculating the percentage of decrease in the number of correct problems per minute from the day before interpolated failure to the day of interpolated failure on the same problems (i.e., those which followed failure). The subjects were randomly assigned to the Attribution Retraining (AR) Treatment or the Success Only (SO) Treatment, the second member of the pair being automatically assigned to the other group. There were three females and three males in the AR Treatment and two females and four males in the SO Treatment. Each experimenter worked with three subjects in each treatment group, with approximately the same range of subjects from the most disrupted by failure to the least.

Experimental Training

Two pieces of equipment especially designed for the training were used. The casing was made of wood and measured $23 \times 6\frac{1}{2} \times 7\frac{1}{4}$ in. ($.58 \times .17 \times .18$ m). The front face contained two horizontal parallel rows of 20 small lights, the top row consisting of green lights, the bottom row of red lights. There were numbers from 1 to 20 across the face to correspond to each of the lights. The back of the apparatus contained an on–off switch and a dial which could be set to any number between 1 and 20 (according to the criterian number of problems on a given trial). The lights in the top row could be illuminated one at a time via a handswitch operated by the experimenter. When the number of lights illuminated in the top row matched the criterion number, the same number of lights in the bottom row was illuminated automatically. However, the experimenter could illuminate the criterion number of lights in the bottom row by means of a handswitch before that number was reached in the top row.

Training was carried out for 25 daily sessions. During these sessions, the subject did problems one at a time from a stack of 3×2 in. ($.08 \times .05$ m) papers each containing one problem. For each subject, 48 problems were taken from sheets of problems that had been easy for him and were presented in random order. On each trial, the experimenter preset the criterion number of problems for that trial by means of the dial on the back of the apparatus. When experimenter told subject to begin, experimenter started the stopwatch and the subject took one problem from the top of the stack and completed it. If he did it correctly, experimenter said, "Correct," and illuminated the first light in the top row of lights. If he did the problem incorrectly, experimenter said, "No, go on to the next one," and did not illuminate a light. The subject continued working the problems in this manner until either he had reached the criterion number of problems, whereupon the bottom row of lights illuminated to match the number of lights in the top row, or until experimenter stopped him and told him his time had ended.

Each subject was given 15 such trials in every session. For the Success Only Treatment, the criterion number of problems on each trial was set at or below the number he was able to complete within the time limit; thus the members of this treatment group could succeed on every trial. The procedure was the same for the Attribution Retraining Treatment on 12 or 13 of the 15 trials. However, on the remaining 2 or 3 trials the criterion number was set one above the number he was generally able to complete within the time limit. On these trials, he was stopped one or two problems short of criterion, his performance was compared to the criterion number required, and experimenter verbally attributed the failure to insufficient effort. Thus the

members of this treatment group received 2 or 3 failure trials in the course of each session.

On the first day of training, subjects were given the following instructions. Instructions in parentheses were given to subjects in the AR Treatment only and were omitted for subjects in the SO Treatment.

> Today, and from now on, we're going to do something a little different. See the problems on these papers? You will do one at a time and you will work for 1 minute. [The experimenter showed subject how long it takes to time 1 minute on the stopwatch.]
> Every time you finish a problem and it is correct, one of these lights will light up [the experimenter indicated lights in the top row]. If you work hard, get enough problems right, and light up enough lights, you will get a token.
> Here's how you'll know if you did enough for a token. If you finish in time, these lights will light up and tell you [the experimenter indicated lights in the bottom row]. If you do not finish in time, I will stop you (and these lights will tell you how hard you should have tried to earn a token that time [the experimenter indicated lights in the bottom row]).
> OK, let's try one and see how it works. [The experimenter set criterion to 2.] Begin. [The subject took the first paper and did the problem.] Correct. [The experimenter illuminated the first light. The subject took the second paper and did the problem.] Correct. [The experimenter illuminated the second light and the two lights in the bottom row lit up.] That was very good. You finished in time. See, those lights mean you had to get 2 right [Experimenter pointed to the bottom row] and you did [the experimenter pointed to the top row]. Here's your token.
> Now let's see what happens when you don't finish in time. Suppose you did 1 problem and it took the whole minute. You got it right so the light lit up [the experimenter illuminated the first light]. But then I said, "Stop, time is up! You didn't finish in time." (Then these lights will tell you [experimenter lit two lights of the bottom row] you had to do 2 problems to earn a token that time. You did only one. That means you should have tried harder.)

The experimenter then began the actual trials. It was determined in advance that if any subject in either group took longer than 1½ minutes to complete the criterion number of problems, he was to fail on that trial. In summary, experimenter responded to the success or failure trials of the two groups in the following manner:

1. On success trials (Treatments AR and SO): "You finished in time. You needed _____, and you got _____. You get a token."

2. On programmed failure trials (Treatment AR only): "Stop, time's up. You didn't finish in time. Let's see how many you needed to earn a token. [The experimenter illuminated the criterion number of lights in the bottom row by means of the hand-switch.] You needed _____, and you got only _____. That means you should have tried harder."

3. On unscheduled failure trials (Treatments AR and SO): "Stop, time's up. You didn't finish in time. Let's go on to the next."

The criterion numbers for the success trials were specified in advance and consisted of the three numbers at the upper limit of what a given subject was generally able to complete within 1 minute. The experimenter recorded the time and errors on each trial; every day the mean number of problems per minute was calculated for each subject and the criterion numbers for the following day were adjusted accordingly. Thus, the subjects were always working to capacity. The criterion number on the programmed failure trials for Treatment AR was one number above the highest criterion number on the success trials. (The two or three failure trials for Treatment AR in every session were randomly dispersed among the trials with the constraint that there be no more than two consecutive failures and that neither the first nor the last trial be a failure.) On the last trial of every session, the subjects in both treatments were allowed to reach that number (i.e., one above the highest criterion number on the other success trials).

Midtraining and Posttraining Interpolated Failure Tests

For both groups, training was interrupted after the thirteenth day for the midtraining interpolated failure test. Baselines on the sheets of math problems were reestablished for 3 days, an interpolated failure sheet corresponding to the difficult problems was inserted on the fourth day and baselines were reestablished for the following 3 days. Training was then resumed for 12 additional sessions after which the interpolated failure procedure was repeated.

RESULTS

Helpless versus Persistent Subjects

The helpless subjects differed from the persistent subjects on all of the comparison measures, thus verifying the selection procedure. The results from the IAR are in agreement with those of Dweck and Reppucci (1973) in that the helpless children took less personal responsibility for the outcomes of their behavior and tended to place less emphasis on the role of effort in determining success and failure than did the persistent children. The Total I scores of the helpless subjects were significantly lower than those of the persistent subjects, $\bar{X} = 19.5$ and 24.5, respectively, $t(20) = 3.11$, $p < .005$.[5] While they did not differ reliably in the degree to which they attributed outcomes to ability,

[5] All probability values are for one-tailed tests.

TABLE 1

PRE- AND POSTFAILURE PERFORMANCE ON THE PRETRAINING, MIDTRAINING, AND POSTTRAINING TESTS FOR SUBJECTS IN THE ATTRIBUTION RETRAINING AND SUCCESS ONLY TREATMENTS

Test	Attribution Retraining Treatment							Success Only Treatment						
	AN	HA	ID	LA	TE	TO	$\bar{X}$	AL	CI	OD	OS	JO	RO	$\bar{X}$
Pretraining														
Prefailure														
Total time (sec.)	180	285	110	125	170	208	179.67	273	117	231	225	210	161	202.83
Number correct	10	12	15	15	12	15	13.17	12	10	15	10	15	15	12.83
Postfailure														
Total time (sec.)	255	515	136	172	346	363	297.83	477	281	356	357	283	227	330.17
Number correct	9	3	15	14	3	14	9.67	9	0	14	10	15	12	10.0
Midtraining														
Prefailure														
Total time (sec.)	73	155	74	148	95	145	115.00	248	88	136	249	150	124	165.83
Number correct	10	15	15	14	13	15	13.67	9	10	15	10	15	15	12.33
Postfailure														
Total time (sec.)	96	212	81	172	111	159	138.50	340	179	197	279	166	127	214.67
Number correct	9	14	15	15	12	15	13.33	3	5	14	10	12	9	8.83
Posttraining														
Prefailure														
Total time (sec.)	50	148	85	107	99	178	111.17	149	77	95	151	142	128	123.67
Number correct	10	14	15	14	13	15	13.50	14	10	15	10	15	15	13.17
Postfailure														
Total time (sec.)	48	155	81	108	91	131	102.33	254	105	154	136	202	193	174.0
Number correct	10	14	15	15	13	15	13.67	9	0	15	10	11	14	9.83

Note. The number of problems for each subject were as follows: AN = 10, HA = 15, ID = 15, LA = 15, TE = 15, TO = 15 ($\bar{X}$ = 14.17); AL = 15, CI = 10, OD = 15, OS = 10, JO = 15, RO = 15 ($\bar{X}$ = 13.33). Subjects working at different levels of difficulty received sheets containing different numbers of problems. Prefailure and postfailure problems were identical and administered on consecutive days.

that is, $(I+_A) + (I-_A)$, $\bar{X} = 8.6$ and 10.3, respectively, $t(20) = 1.3$, $p < .10$, the difference in the degree to which they attributed outcomes to effort, that is, $(I+_E) + (I-_E)$, was highly reliable, $\bar{X} = 10.9$ and 14.1, respectively, $t(20) = 3.20$, $p < .005$.

On both of the TASC subscales administered (test anxiety and poor self-evaluation),[6] the helpless subjects proved to be more anxious than the comparison subjects. For the test anxiety subscale, the means for the helpless and persistent subjects were 5.3 and 4.2, respectively, $t(18) = 2.80$, $p < .01$, and for the poor self-evaluation subscale, the means were 3.9 and 3.1, respectively, $t(18) = 2.47$, $p < .025$.

On the Repetition Choice task, 9 of the 12 helpless subjects, when given the choice, chose to reconstruct the puzzle they had already successfully completed rather than the one on which they had been interrupted, while only 1 of the persistent subjects chose to do so, $\chi^2(1) = 6.86$, $p < .01$. Thus, on this measure, the helpless subjects evidenced a clear tendency to avoid failure, while the persistent children showed a tendency to strive for success.

[6] These data were missing for two of the persistent comparison subjects.

Effects of Training

Table 1 contains the absolute levels of prefailure and postfailure performance (time to completion and number correct) for each subject on the pretraining, midtraining, and posttraining tests. To obtain a measure that would take account of the effects of failure on both speed and accuracy of performance, the number of correct problems per minute was calculated. The percentage decrease in this measure was used to compare prefailure (baseline) to postfailure performance on the identical problems.

Figures 1 and 2 show the percentage decrease in correct problems per minute following failure on the pretraining, midtraining, and posttraining interpolated failure tests for the individual subjects in the AR and SO treatments, respectively. Inspection of the individual graphs reveals that the perform-

ances of all subjects underwent marked deterioration on the interpolated failure day in the pretreatment period. That this decrease in rate is not a result of being more careful is reflected by the increase in the number of errors on the part of the subjects and by the observation of other behavior in the period following failure, such as deterioration of handwriting, staring into space, etc. By midtraining, all the subjects in the AR Treatment showed some improvement, although all still decreased their score over the previous day. By the end of training, however, *all* of the subjects in this treatment showed either negligible impairment following failure or *improvement* in the number of correct problems per minute compared with their performance on the day prior to interpolated failure. In the SO treatment, on the other hand, all but one of the subjects (OS) continued to show substantial decrements in performance at both the midtraining and posttraining tests, with two of the subjects showing increased impairment from pretraining to posttraining. Thus, even though most

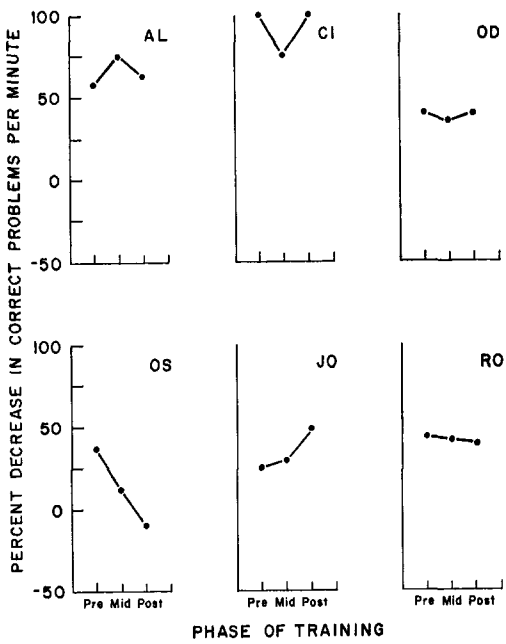

FIGURE 2. Percentage decrease in correct problems per minute at pretraining, midtraining, and posttraining for the subjects in the Success Only Treatment.

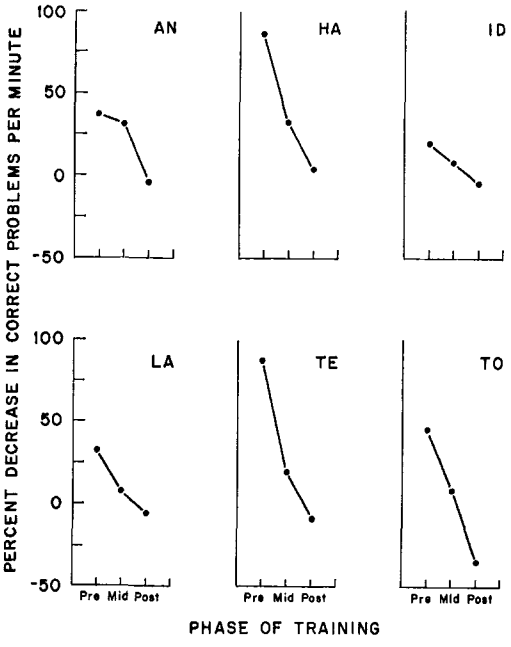

FIGURE 1. Percentage decrease in correct problems per minute at pretraining, midtraining, and posttraining for the subjects in the Attribution Retraining Treatment.

of the subjects in both treatments improved in their general performance on these problems on nonfailure days, only the subjects in the AR Treatment showed consistent and substantial decreases in their maladaptive reaction to failure.

Figure 3 shows the mean percentage decrease in correct problems per minute for the two treatment groups at pretraining, midtraining, and posttraining. The t tests on the changes from pretraining to midtraining and from midtraining to posttraining for the subjects in the AR Treatment showed a significant difference in percentage decrease in correct problems per minute from pretraining to midtraining, $\bar{X} = 51.4$ and 18.2, $t(5) = 3.32$, $p < .025$, and from midtraining to posttraining, $\bar{X} = 18.2$ and -9.2, $t(5) = 5.51$, $p < .005$. A t test comparing the change scores from pretraining to posttraining of the subjects in the AR Treatment to those of the subjects in the SO Treatment revealed a significantly greater improvement for the AR Treatment, $\bar{X}_{AR} = 51.4$ and -9.2, $\bar{X}_{SO} = 50.4$ and 46.0, $t(10) = 3.64$, $p < .005$. Thus, it is

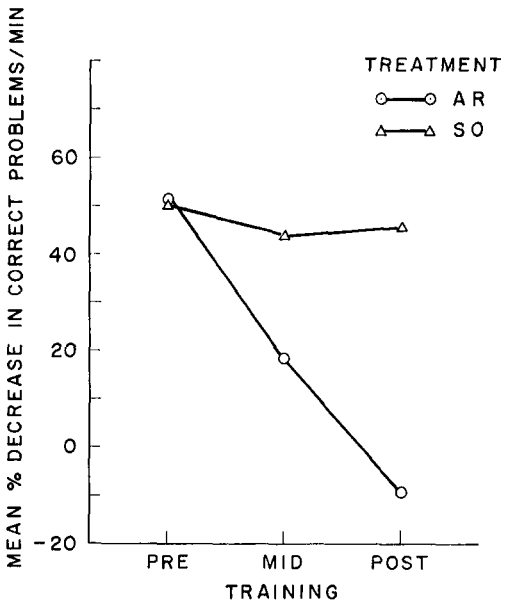

FIGURE 3. Mean percentage decrease in correct problems per minute at pretraining, midtraining, and posttraining for the Attribution Retraining Treatment and the Success Only Treatment.

clear that while the subjects in the Attribution Retraining Treatment were able to handle failure more adaptively in the test situation following treatment, some of the subjects in the Success Only Treatment seem to have become more sensitive to failure in the test situation following exclusive success during training.

Readministered Measures

On the Effort versus Ability Failure Attribution scale, all of the subjects in the AR Treatment showed an increase in the choice of the effort alternatives from pretraining to posttraining, $\bar{X} = 1.3$ and 3.0, $t(5) = 3.39$, $p < .01$. The subjects in the SO Treatment showed no such increase ($\bar{X} = 1.3$ and 1.5). A comparison of the posttraining scores of the subjects in the two treatments shows a reliably greater tendency for the subjects in the AR treatment to emphasize the role of effort in determining failure, $t(10) = 3.0$, $p < .01$. The change in this measure provides evidence that the subjects in the AR Treatment, in addition to changing their reactions to failure in the experimental situation, altered their attributions for failure in situations involving mathematics in general.

There were no consistent changes in the scores of either treatment group on the IAR scale as of the time this scale was readministered. For the subjects in the AR Treatment the means before and after training were 19.0 and 19.5; for those in the SO Treatment the means were 20.0 and 20.8.

On the Test Anxiety Subscale of the TASC, the subjects in the AR Treatment showed a decrease in test anxiety ($\bar{X}_{PRE} = 5.7$ and $\bar{X}_{POST} = 3.7$), although the change did not reach significance, $t(5) = 1.89$, $p < .10$, while the subjects in the SO Treatment showed a slight increase ($\bar{X}_{PRE} = 5.0$ and $\bar{X}_{POST} = 5.5$). The difference between the changes in test anxiety for the two treatments, however, was not significant, $t(10) = 1.58$, $p < .10$. On the Poor Self-Evaluation Subscale of the TASC, the subjects in both treatments showed decreases, but these decreases were not reliable. For the AR Treatment, $\bar{X}_{PRE} = 4.5$ and $\bar{X}_{POST} = 2.2$, $t(5) = 1.71$, $p < .10$; for the SO Treatment, $\bar{X}_{PRE} = 4.0$ and $\bar{X}_{POST} = 3.0$, $t(5) = 1.59$, $p < .10$.

Initially, on the Repetition Choice task, one subject in the AR Treatment and two subjects in the SO Treatment had chosen to reconstruct the failed puzzle rather than the one which they had successfully completed. After training, two additional subjects in the AR Treatment chose to do the puzzle on which they had previously failed, while none of the subjects in the SO Treatment altered their choices. However, this change was not statistically reliable.

In summary, the subjects in the AR Treatment showed large changes in their recognition of effort as a determinant of failure as reflected in their change scores on the Effort versus Ability Failure Attribution scale, the measure most closely related to the attribution retraining treatment, but failed to show reliable changes on the other, more global measures. The subjects in the Success Only Treatment, on the other hand, did not show significant changes on any of the measures which were readministered after training.

DISCUSSION

The investigation began with the assumption that the manner in which a child views an aversive event, such as failure, determines, in large part, the way in which he reacts to

that event. Specifically, if a child believes failure to be a result of his lack of ability or a result of external factors beyond his control, he is unlikely to persist in his efforts. On the other hand, if a child believes failure to be a result of his lack of motivation, he is likely to escalate his effort in an attempt to obtain the goal. It was further assumed (see Dweck & Reppucci, 1973) that those children who are characterized as learned helpless tend to regard failure in the former way, while those who are characterized as persistent tend toward the latter view.

It was then hypothesized that by changing the helpless child's attribution of failure in the training situation (from fixed to variable factors; see Weiner, 1972) one could thereby change his reaction to failure in the test situation (from surrender to persistence). Training and testing differed in a number of respects. During training, relatively easy problems were completed by the subject and corrected by the experimenter one at a time; during testing, more difficult problems were completed by the subject and corrected by the experimenter in groups of five. In training, responses were monitored on the apparatus; in testing, no apparatus was used. In training, failure meant that the child did not complete enough problems within the allotted time; in testing, failure meant that the child got the problems wrong. Despite these differences, it was expected that the new attribution would generalize to the test situation and enable the child to persist following failure. The results of the investigation lend strong support to the hypothesis.

Prior to training, all subjects showed severely deteriorated performance following failure; problems they had been solving daily became sources of great difficulty as evidenced by a decrease in rate of problem solving, an increase in errors, and behavioral indicants of withdrawal. The children who were taught to attribute failure during training to insufficient effort were able to persist after failure in the test situation. That failure became a cue to escalate effort is supported by the finding that five of the six subjects receiving the Attribution Retraining Treatment, in fact, showed superior performance following failure (as compared to the day preceding failure). Interestingly, three of the subjects in the AR Treatment actually verbalized the attribution during testing.

Contrary to initial expectation, however, the subjects in the Success Only Treatment did not show any consistent improvement in their response to failure, but rather continued to display a marked impairment of performance following failure. This occurred despite the fact that their performance during training and on nonfailure days during testing steadily improved. While the successes might well have resulted in higher expectations of success and might have kept the situation from becoming aversive, this was not sufficient to prevent the adverse reaction to failure. Two of the subjects in this group even appeared to be slightly more sensitive to failure after prolonged experience with continued success. If their successes led them to form a new image of themselves, that of a succeeder, failure would indeed have a serious impact.

Investigators who advocate errorless learning for children often cite Terrace's (1963a) work on errorless discrimination in the pigeon. Terrace demonstrated that pigeons making unreinforced responses to the negative stimulus (i.e., errors) during discrimination training showed gross emotional responses to that stimulus. In other words, it acquired aversive properties. When discriminations were trained without responding to the negative stimulus (i.e., were errorless), it remained a neutral stimulus. Skinner (1968) says of the pigeon, "It is, so to speak, 'not afraid of making a mistake.'" It is rarely pointed out, although it is explicitly stated by Terrace (1969), that in some cases "errorless discrimination is not an unmixed blessing." For example, Terrace (1963b) found that when an errorless discrimination was followed by a different discrimination trained with errors, the original perfect discrimination was disrupted: Similarly, Terrace (1969) reported that when a continuously reinforced errorless discrimination was followed by extinction, the previously errorless performance was interfered with. It would seem that although errorless learning led to superior performance, it rendered the subjects less able to deal with subsequent errors.

While a success only procedure for children is an effective approach for teaching a given

body of material, the present findings suggest that it might be a short-sighted approach. The implications for strategies of behavior change or behavior building are rather straightforward. An instructional program for children who have difficulty dealing with failure would do well not to skirt the issue by trying to ensure success or by glossing over failure. Instead it should include procedures for dealing with this problem directly. This is not to suggest that failure should be included in great amounts or that failure per se is desirable, but rather, that errors should be capitalized upon as vehicles for teaching the child how to handle failure.

The training procedure in the present study addressed itself to a relatively narrow aspect of the student's achievement behavior—his performance in the experimental situation. The results for the children receiving attribution retraining provide evidence for a change in behavior in that situation and for a greater emphasis on the role of motivation in determining failure in arithmetic. It is not surprising that the less related, more global cognitive measures failed to show significant changes, since (a) so little time elapsed between the completion of training and the readministration of these measures and (b) training was conducted in a limited context. It is possible that additional time would have allowed the child to "test out" the new attribution in other settings and to begin to use it more generally. Unfortunately, the present study was conducted at the end of the school year (March through June) and there was therefore no opportunity to test this possibility. A safer assumption, however, is that explicit generalization training is required to assure changes in the global cognitive measures. Such training would involve guided experience in applying the new attribution to a variety of situations.

Although direct measures of transfer of the effects of training to the classroom were not taken, verbal reports from the teachers (who did not know which subject received each treatment) indicated that the subjects in the Attribution Retraining Treatment had begun to work harder and to develop a different attitude toward failure. This was evidenced by their increased persistence with new material and their seeking help rather than withdrawing when unable to complete a task.

Cognitive-personality variables, such as the manner in which a person perceives the relationship between his behavior and the occurrence of certain events, indeed appear to be important determinants of the way in which people react to events. Many clinicians (e.g., Rogers, 1951) have hoped for changes in these variables to come about as byproducts of therapy, for example, increased responsibility for one's behavior or increased self-esteem. This may be akin to the Success Only Treatment in the present experiment. Others (e.g., Ellis, 1962; Meichenbaum, Note 1) have begun to try to modify *directly* "what clients say to themselves" about events. The present investigation emphasizes the usefulness of considering such cognitive-personality variables in planning strategies of behavior change.

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