Effects of Effort Attributional Feedback on Children's Perceived Self-Efficacy and Achievement

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Abstract:

This experiment tested the hypothesis that effort attributional feedback concerning past accomplishments promotes percepts of self-efficacy and mathematical achievement. Children who lacked subtraction skills received didactic training in subtraction operations with effort attributional feedback concerning past achievement, with feedback concerning future achievement, or with no feedback. Results showed that attributional feedback for past achievement led to more rapid progress in mastering subtraction operations, greater skill development, and higher percepts of self-efficacy. Results of a multiple regression analysis showed that percepts of efficacy and training progress each accounted for a significant increment in the explained portion of variability in posttest skill. This study helps to clarify the role of effort attributional feedback in achievement contexts.

Article:

Attributional theories postulate that individuals use information to arrive at causal ascriptions for achievement outcomes in terms of ability, effort, task difficulty, and luck (Heider, 1958; Weiner, 1979; Weiner et al., 1971). The role of effort has received considerable attention, in part because unlike ability, task difficulty, or luck, effort is under volitional control and is amenable to change. For example, ascribing past failures to low effort is hypothesized to have motivational effects. When persons believe that increased effort will produce success they should persist longer at the task and thereby increase the level of their performance (Weiner, 1977, 1979; Weiner et al., 1971).

Along these lines, attribution retraining programs in the area of achievement behavior often concentrate on changing children's causal ascriptions of failure to a lack of effort (Andrews & Debus, 1978; Dweck, 1975). In Dweck's (1975) study, for example, children identified as learned helpless solved arithmetic problems over trials and either always succeeded or occasionally failed to solve the criterion number. Subjects who failed were given effort attributional feedback by being told that they should have tried harder. Following training, children who had received the attributional feedback maintained or improved their performances after failure, whereas the performances of children who had always succeeded became poorer.

The purpose of the present study was to determine the effects of effort attributional feedback given in the context of competency development on children's percepts of self-efficacy and achievement. The conceptual focus was Bandura's theory of self-efficacy (Bandura, 1977, 1981). According to this theory, different influences change behavior in part by strengthening perceived self-efficacy. Self-efficacy is concerned with judgments about how well one can organize and execute courses of action required in situations that may contain ambiguous, unpredictable, and stressful elements. Percepts of efficacy can affect choice of activities, effort expended, and perseverance in the face of difficulties. Efficacy information can be conveyed through enactive attainments, socially comparative vicarious measures, social persuasion, and inferences from physiological arousal.

Efficacy appraisal is an inferential process that involves weighting the relative contribution of ability and nonability factors. Many factors other than ability can affect performance, such as the difficulty of the task,

effort expended, amount of external aid received, situational circumstances under which the performance occurs, and temporal pattern of successes and failures. In cognitive appraisals of effort expended, success achieved with minimal effort fosters the perception of high ability, whereas the same performance achieved after expending great effort connotes lower ability and will have less of an impact on increases in perceived efficacy. Persons who periodically fail but show improvement over time are more likely to raise their percepts of efficacy than people who succeed but see their performance level off compared with their previous improvement (Bandura, 1981).

Research conducted within the attributional framework has investigated how the attributions people form to explain their behavior affect subsequent performance. In the self-efficacy analysis, attributional variables are viewed as conveyors of efficacy information. They influence performance mainly through their intervening effects on perceived efficacy, such as when persons infer their efficacy from effort expended and perceived task difficulty.

In this conception, effort attributional feedback constitutes a socially persuasive means of conveying efficacy information; that is, to be told that one can achieve results through hard work implies that one possesses the efficaciousness to do so. This connotation should especially affect young children, who tend to view outcomes as highly dependent on effort and often equate effort with ability (Harari & Covington, 1981; Kun, 1977; Nicholls, 1979).

However, the context in which the attributional feedback is provided can convey markedly different efficacy information. Children can be told that their past achievement was due to effort or that their future achievement will occur if they work hard. In the present study, children who lacked subtraction skills worked on a training packet that provided instruction and practice opportunities. One group of children was periodically monitored and received effort attributional feedback for their past progress by being told that they had been working hard. A second group received feedback for their future achievement by being told that, they needed to work hard. A third group was monitored in the same fashion as the feedback groups but received no attributional feedback. A fourth group received the training but was not monitored. Although both forms of attributional feedback have been used in concert in previous research, their implications may differ (Chapin & Dyck, 1976; Schunk, 1981).

As children solve problems, they observe their progress and begin to develop a sense of efficacy. Telling them that effort was the reason for their progress should support their perceptions of their progress and should convey the idea that they can actualize their capabilities through effort. This approach promotes percepts of efficacy, task progress, and skill development. On the other hand, when they are told that they need to work hard, they may believe that they are not doing well—especially when they are given no normative information on how well other children did, which was the case in the present study. They may conclude that they are not as efficacious at the task despite their progress and may have little reason to believe that more effort is going to produce better results in the future.

In summary, it was hypothesized that providing effort attributional feedback for past achievement (past attribution) would be most effective in promoting children's percepts of self-efficacy and achievement. In contrast, providing effort attributional feedback for future accomplishment (future attribution) was not expected to promote these outcomes over that expected as a function of merely providing training.

Method

Subjects

Subjects were 40 children of predominantly middle-class backgrounds ranging in age from 7 years 5 months to 10 years 7 months (M = 9.1 years). The 26 males and 14 females were drawn from seven classes in two elementary schools. Teachers initially identified children who lacked subtraction skills. Those children were then individually administered the pretreatment assessment by one of two adult testers (one male and one female).

Pretreatment Assessment

Arithmetic skill test. This test consisted of 25 subtraction problems ranging from two to six columns Each problem tapped one of the following subtraction operations: no borrowing, borrowing once, borrowing from a one, borrowing twice, borrowing caused by a zero, and borrowing across zeros. Of these 25 problems, 8 were similar in form and operations required to some of the problems presented during treatment. The remaining 17 problems were more complex and were included to test for generalization effects. For example, during treatment children solved problems requiring double borrowing; a generalization test item required triple borrowing. The measure of skill was the number of' problems in which children correctly applied sub-traction operations.

The tester presented problems to children one at a time. Children were instructed to examine each problem and to place the page on a completed stack when they were through solving the problem or chose not to work it any longer. The tester recorded the time children spent on each problem. These persistence times were summed and averaged within two levels of difficulty. The 15 low-difficulty problems required at most one borrowing, whereas the 10 high-difficulty problems required at least double borrowing. These measures are more refined than an aggregate score, because as children develop skills they are apt to spend less time on easier problems and more time on difficult problems.

Self-efficacy judgment. Children's perceived self-efficacy for solving subtraction problems was measured immediately after the skill test to insure familiarity with the different types of problems. The procedure was similar to that followed in previous research (Bandura & Schunk, 1981; Schunk, 1981). The efficacy scale ranged from 10 to 100 in 10-unit intervals with the following verbal descriptors: 10—not sure, 40--maybe, 70—pretty sure, 100—real sure. Initially, children were given practice with this procedure by judging their certainty of being able to jump progressively longer distances. These distances ranged from a few inches to about 10 yards and familiarized children with the scale direction and the general meaning of each of the 10 points.

Following this practice, children were shown sample pairs of subtraction problems for about 2 sec each. This procedure allows children to assess difficulty but not to solve the problems. For each pair, children privately judged their certainty of being able to solve the type of problem depicted. Children were instructed to circle one of the 10 scale numbers, were told that this number should match how sure they were that they could correctly work problems like those shown, and were told that they should be honest and mark how they really felt.

Each problem pair corresponded in form and operations required to one problem on the skill test, but they were different problems. Children were judging their capability to solve types of problems, not whether they could solve any particular problem. Self-efficacy scores were summed across problems and averaged.

Training Procedures

Because the study focused on processes by which competencies can be developed, children who solved more than 20% of the problems on the skill test were excluded. Children were randomly assigned within sex to one of four treatment groups (n = 10): past attribution, future attribution, monitoring, or training control.

On three consecutive school days, children received 40-minute treatment sessions, during which they worked individually on an instructional packet consisting of seven sets of material. These sets were ordered in terms of least to most difficult (Friend & Burton, 1981) as follows: no borrowing, borrowing once in two-column problems, borrowing once in three-column problems, borrowing once caused by a zero, borrowing twice, borrowing from a one, and borrowing across zeros. The format of each set was identical. The first page contained a written explanation of the subtraction operation and two step-by-step worked examples. The next six pages each contained several problems to solve. Pilot work showed that if children worked diligently they could complete the entire packet during the sessions.[1]

Children were brought individually by an adult proctor at slightly staggered times and were seated at desks spread out over a large area. The desks faced away from one another to preclude visual contact and were sufficiently separated so that children could not overhear the proctor's comments to other children.

Initially, the proctor turned over the first explanatory page and informed children that whenever they came to a similar page they were to bring it to the proctor. The proctor then read the narrative on this page while pointing to the worked example. If children asked for further assistance, the proctor simply reread the relevant section of the explanatory page but did not supplement it in any way. The proctor stressed the importance of children working the problems on their own and then retired to a location that was out of sight of all children. Children marked their places at the end of each session and resumed there the following day.[2]

Treatment Conditions

Past attribution. The proctor monitored the progress of these children every 8 minutes during each treatment session by walking up to the child and asking, "What page are you working on?" After children re-plied with the page number, the proctor linked children's prior achievement with effort by remarking, "You've been working hard." This feedback was given matter-of-factly and without any accompanying social reinforcement. The proctor then departed.

Future attribution. This treatment was identical to the past-attribution treatment except that following the child's reply the proctor stressed the value of future effort by remarking, "You need to work hard." This remark linked future achievement with effort. It was also given matter-of-factly. The proctor then de-parted.

Monitoring. These children were monitored in the same fashion as the attribution treatment children except that after the child replied the proctor departed without comment. This group controlled for the effects of monitoring included in the attribution treatments.

Training control. This group served as a control for the training procedures since it was expected that training alone would promote achievement. Children were not monitored and had contact with the proctor only during reading of the explanatory pages.

Table 1
Pretest and Posttest Means and Standard Deviations

		Experimental condition							
		Past Attribution		Future attribution		Monitoring		Training control	
Measure	Phase	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Skill[a]	Pretest	1.9	1.9	2.0	2.4	1.5	1.3	1.2	1.8
	Posttest	17.3	5.0	6.4	7.4	5.1	6.2	2.7	2.4
Persistence (low difficulty)[b]	Pretest	23.2	12.4	25.8	11.9	27.0	13.9	33.1	16.6
	Posttest	20.2	7.6	23.7	10.6	25.4	10.2	20.8	8.0
Persistence (high difficulty)[b]	Pretest	22.2	10.8	23.2	13.1	23.1	15.6	25.6	17.9
	Posttest	30.6	11.1	24.0	11.8	25.1	14.6	20.5	13.2
Self-efficacy[c]	Pretest	44.3	13.2	47.4	12.6	48.8	12.6	49.8	12.8
	Posttest 1[d]	82.3	11.2	52.8	10.4	60.5	16.4	53.4	12.2
	Posttest 2[e]	85.5	10.5	55.4	13.4	55.8	22.6	55.4	17.4
Training progress[f]	—	33.9	10.6	20.8	12.3	24.2	11.1	19.3	12.5

Note. $N = 40$; ns = 10.
[a] Number of accurate solutions on 25 problems. [b] Average number of seconds per problem. [c] Average judgment: range of scale 10 (low) to 100. [d] Measured before the skill test. [e] Measured after the skill test. [f] Number of pages of problems completed.

Posttreatment Assessment

The, posttest was administered individually by an adult the day after the third treatment session. It was similar to the pretest except that a parallel form of the skill test was used and self-efficacy was assessed before and after the skill test. A parallel form of the skill test was used to eliminate possible familiarity with the problems. In a separate reliability assessment (Bandura & Schunk, 1981) these forms correlated .87. The self-efficacy scores

collected prior to the skill test yield a measure of treatment effects and can also be used to determine how well self-efficacy predicts subsequent performance. Self-efficacy scores collected after the skill test show whether self-efficacy is affected by test performance. For any given child, the same tester ad-ministered both the pre- and post-treatment assessments. The tester was blind to the child's experimental assignment and had not served as the child's proctor.

Results

There were no significant differences due to sex or experimenter on any of the pre- or posttreatment measures; the data were therefore pooled for subsequent analyses. Nor did treatment groups differ on any of the pretest measures. Pre- and posttreatment means and standard deviations are shown by experimental condition in Table 1. Within each condition, intrasubject changes on each measure were evaluated using the *t* test for correlated scores (Winer, 1971). These values are shown in Table 2. Analysis of variance procedures were applied to the posttest measures with the four experimental groups constituting the treatment factor. Significant *F* ratios were futher analyzed using the Newman-Keuls multiple comparison test (Kirk, 1968).

Skill

All groups except monitoring showed significant pre—post increases in arithmetic skill, as shown in Table 2. Analysis of variance yielded a significant treatment effect, $F(3, 36) = 13.40$, $p < .001$. Newman-Keuls comparisons showed that past attribution led to significantly ($p < .01$) greater sub-traction skill than each of the other conditions, which did not differ from one another.

Persistence

As children become more skillful they should spend less time on easier problems. Analysis of intrasubject changes found this prediction supported only for training control children. There were no significant between-group differences on this measure. Conversely, with skill increases children should spend more time on difficult problems. This prediction was not supported, nor was there a significant between-group difference on this measure. It is possible that persistence reflects in part work-rate preference; some children prefer to work slowly while others work rapidly.

Table 2
Significance of Intragroup Changes (t Values)

Measure	Past attribution	Future attribution	Monitoring	Training control
Skill	11.26**	2.37*	1.75	2.67*
Persistence (low difficulty)	−.69	−.47	−.51	−2.76*
Persistence (high difficulty)	1.82	.13	.31	−1.15
Self-efficacy				
Pretest vs. Posttest 1	6.16**	1.21	1.69	.89
Posttest 1 vs. Posttest 2	1.46	.73	−1.54	.61

Note. Measures are described in Table 1.
* $p < .05$. ** $p < .01$.

Self-Efficacy

To determine the effects of treatment on self-efficacy, pretest scores were compared to posttest scores collected prior to the skill test. As Table 2 depicts, only the past attribution condition showed a significant increase in self-efficacy. Analysis of variance of posttest scores collected prior to the skill test revealed a significant treatment effect, $F(3, 36) = 11.76$, $p < .001$. Past attribution children judged their arithmetic efficacy significantly ($p < .01$) higher than did children in each of the other treatment groups, which did not differ from one another. No significant intragroup changes in self-efficacy were found when posttest scores collected prior to the skill test were compared to those collected after it. Analysis of variance of the latter scores yielded a significant treatment effect, $F(3, 36) = 8.15$, $p < .001$, in favor of past attribution.

Training Progress

There were 42 pages of practice problems, and past-attribution children averaged 81% complete, with half completing the entire packet. Monitoring children averaged 58% complete, followed by 50% for future

attribution and 46% for training control. This difference was significant, $F(3, 36) = 3.16$, $p < .05$. Newman-Keuls comparisons showed that past-attribution children made significantly ($p < .05$) greater progress than did future attribution and training control children, but the progress of the past attribution and monitoring groups did not differ.

Correlational/Regression Analyses

Correlational analyses were conducted to gain further information on the relationship between theoretically relevant variables. In order to increase variability, the persistence scores from all 25 problems were combined and averaged. Pearson product-moment correlations were computed separately for each experimental condition. Since there were no significant between-group differences, correlations were averaged using an *r* to *z* transformation (Edwards, 1976).

Table 3
Regression Analysis of Predictors on Subtraction Skill

Source	R^2 cumulative	R^2 adjusted	R^2 change	*df*	*F*
Progress	.4824	.4649	.4824	1	56.98*
Self-efficacy	.6866	.6618	.2042	1	24.12*
Persistence	.6952	.6698	.0086	1	1.02
Residual	.3048	.3302	—	36	—

* $p < .01$.

Among the posttest variables, children's percepts of self-efficacy measured before the skill test were significantly related to subsequent persistence $r(38) = .48$, $p < .01$, and skillful performance, $r(38) = .73$, $p < .01$. Persistence was also significantly related to accurate problem solving, $r(38) = .42$, $p < .01$.

Correlations were also computed between the posttest variables and training progress, defined as the number of pages completed. Training progress was significantly related to percepts of efficacy, $r(38) = .48$, $p < .01$, and posttest skill, $r(38) = .70$, $p < .01$, but not to persistence.

Because self-efficacy, persistence, and training progress were all significantly related to skillful performance, I decided to conduct a regression analysis to determine what portion of the total variation in posttest skill was accounted for by these predictors. The predictors were entered as a group, and the results are shown in Table 3. Training progress accounted for 48% of the total variation, followed by self-efficacy (20%) and persistence (1%). The greater contribution of progress is partly artifactual because self-efficacy presumably influenced progress during training. The effects due to progress and self-efficacy were significant ($p < .01$). Together, the three predictors accounted for 70% of the total variation in subtraction ski11.[3]

Discussion

The present study provides evidence that attributional feedback linking past achievement with effort promotes task involvement, skill development, and perceived self-efficacy. Conversely, stressing the value of future effort to children does not promote achievement behaviors over what can be expected through merely providing training. These findings are consistent with predictions from self-efficacy theory (Bandura, 1981). Past performance provides authentic information for judging personal capabilities. In the present context, children experienced task success, which should have raised percepts of efficacy. Suggestions that expenditure of effort produced achievement further validate personal efficaciousness. Conversely, the impact of imploring a child to try harder not only relies on the credibility of the persuader but may actually undermine percepts of efficacy; since this type of feedback is more ambiguous it may imply that effort is necessary because the child lacks ability. The present findings are consistent with evidence showing that changes in children's academic achievements brought about by direct persuasion are small and ephemeral (Miller, Brickman, & Bolen, 1975).

Attribution retraining studies have shown that providing effort attributional feedback boosts children's personal attributions of effort as a causal factor (Andrews & Debus, 1978; Dweck, 1975). The present study not only extends this research by showing that effort attributional feedback promotes children's sense of personal

efficacy but also highlights some of the complexities of such feedback. The subjects were young children among whom the concept of ability is highly dependent on effort (Harari & Covington, 1981). Developmental evidence indicates that the concepts of ability and effort are differentiated progressively up to about age 12 (Nicholls, 1978) and that young children's causal belief structures are dominated by effort (Frieze & Snyder, 1980). As children become older, ability attributions become more important in explaining success, whereas effort as a causal factor becomes increasingly less related to task success (Nicholls, 1979).

This evidence also relates to considerations from the self-worth theory of achievement behavior (Beery, 1975; Covington & Beery, 1976). According to this theory, persons in our society attempt to maintain a high self-image of ability and competence because their self-worth depends on the ability to achieve. As such, high effort is shunned because it implies lower ability, especially if accompanied by failure. To avoid failure, students use a variety of techniques such as cheating and setting low goals (Beery, 1975). When failure is inevitable, students use techniques such as setting impossible goals to avoid the implication of low ability. However, effort that leads to success should not be avoided since it constitutes little personal threat and may be a source of pride. Using college student subjects, Covington and Omelich (1979b) found that success associated with high effort led to lower self-attributions of ability but to greater pride and satisfaction as compared with low effort. Although students preferred that their successes be attributed to both high ability and high effort, they would rather be viewed as having high ability rather than having expended great effort. Thus, while achieving success implies ability, success achieved with hard work may not promote one's sense of personal efficacy. Even though effort promotes pride and satisfaction, it is not the preferred means of achieving.

A second complexity concerns task difficulty. Effort attribution is most effective with intermediate-difficulty tasks (Kukla, 1972; Weiner, Heckhausen, Meyer, & Cook, 1972). This idea relates to Kelley's (1971) notion of multiple necessary schema: As tasks become more difficult a combination of effort and ability is necessary for success. Research has substantiated this proposition (Kun & Weiner, 1973). Persons would not develop a sense of efficacy if they had to expend great effort to succeed at a task they thought would be easy. The present procedures were designed to foster in children the perception that the task was of average difficulty. Subjects were not skillful in subtraction. While the problems became progessively more difficult, children received instruction and with diligent work could complete the entire packet. To the extent that past-attribution children perceived the task as moderately difficult, this perception would have enhanced the validity of the attributional feedback. However, feedback concerning future achievement may have promoted the perception of great task difficulty. Since task difficulty is a prominent attribution when persons do not succeed (Frieze & Weiner, 1971), some future-attribution children might have concluded that more effort might not necessarily help.

A third complexity is that effort attributional feedback contains an element of social reinforcement. Children who are told they have been working hard may infer approval, whereas those told they need to work hard may infer that they are not doing as well as they should. Although proctors gave feedback objectively, social reinforcement was an inherent aspect of attributional feedback in this study and others (Andrews & Debus, 1978; Chapin & Dyck, 1976; Dweck, 1975). But it seems unlikely that the impact of attributional feedback derives solely from social reinforcement. A direct social reinforcement treatment, such as telling children, "Good work," would be strong and explicit. In contrast, the social reinforcement in attributional feedback is mild and implied. These two types of social reinforcement are qualitatively different. Future research utilizing effort attributional feedback could attempt to disentangle the relative contributions of causal labeling and evaluative implication.

The present results are consistent with previous findings that judgments of self-efficacy are not mere reflections of past performance (Bandura & Schunk, 1981; Schunk, 1981). Capability inferences derived from one's performances vary depending on the weight placed on personal and situational factors that affect how one performs. In the present study, for example, past-attribution and monitoring children did not differ in their training progress, but past-attribution subjects judged their efficacy significantly higher.

These considerations are supported by self-worth theory. Students who perceive themselves low in ability may demonstrate self-serving biases in judging their capabilities (Beery, 1975; Covington & Beery, 1976). To lessen the sense of failure, students may judge their capabilities unrealistically high so that failure does not implicate low ability. Conversely, they may judge them unrealistically low, thereby guaranteeing success. Such self-protective tendencies were probably less pronounced among past-attribution children, who were probably more certain of their subtraction capabilities.

The present research supports the idea that children's perceptions of their capabilities have important effects on their subsequent achievement. Similar results have been obtained by Covington and Omelich (1979a). With adult subjects, personal expectations of successful performance were one of the best predictors of later performance. This result was replicated by Schunk (1981) using children in the context of competency development. Personal expectations for success are also viewed as important influences on behavior by theories of achievement behavior other than self-efficacy theory (Covington & Beery, 1976; Kukla, 1972; Moulton, 1974).

The present study has practical significance as well. Parents and teachers commonly verbalize attributional feedback to children to promote their learning and performance. How this feedback is stated has differential effects on personal efficacy and behavior. Future research should examine the effects of other common educational practices, such as providing rewards and punishments, to determine whether they promote a sense of competence or undermine it.

Notes:

1 Since the effectiveness of the attributional feedback depended on children experiencing success at the task, the training materials and procedures were designed to satisfy this criterion. Each explanatory page fully covered the operations that children would be required to apply on the following six pages of problems. At the end of each of the first two sessions, proctors examined children's papers privately. These examinations showed that children were properly applying subtraction operations, and except for an occasional computational error, were solving the problems correctly.

2 If children subsequently experienced difficulty in solving the problems, they returned to the proctor, who reread the relevant section of the explanatory page but did not supplement this in any way. Since the importance of individual work was stressed, only three children—one from each condition except monitoring—sought the proctor's attention once during the treatment sessions.

3 A word of caution is in order. When multiple *regression* is used with a small sample, the regression coefficients tend to be unstable from one sample to another (Kerlinger & Pedhazur, 1973), especially when the predictor variables are intercorrelated. While the present use of multiple regression seems justified to explore the influences on achievement, replication with a larger sample is needed.

References

Andrews, G. R., & Debus, R. L. Persistence and the causal perception of failure: Modifying cognitive attributions. *Journal of Educational Psychology,* 1978, *70,* 154-166.

Bandura, A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review,* 1977, *84,191-215.*

Bandura, A. Self-referent thought: A developmental analysis of self-efficacy. In J. H. Flavell & L. Ross (Eds.), *Social cognitive development: Frontiers and possible futures.* Cambridge: Cambridge University Press, 1981.

Bandura, A., & Schunk, D. H. Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology,* 1981, *41,* 586-598.

Beery, R. G. Fear of failure in the student experience. *Personnel and Guidance Journal,* 1975, *54,* 190-203.

Chapin, M., & Dyck, D. G. Persistence in children's reading behavior as a function of N length and attribution retraining. *Journal of Abnormal Psychology,* 1976, *85,* 511-515.

Covington, M. V., & Beery, R. G. *Self-worth and school learning.* New York: Holt, Rinehart & Winston, 1976.

Covington, M. V., & Omelich, C. L. Are causal attributions causal? A path analysis of the cognitive model of achievement motivation. *Journal of Personality and Social Psychology,* 1979, 37, 1487-1504. (a)

Covington, M. V., & Omelich, C. L. It's best to be able and virtuous too: Student and teacher evaluative responses to successful effort. *Journal of Educational Psychology,* 1979, *71,* 688-700. (b)
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.
Edwards, A. L. *An introduction to linear regression and correlation.* San Francisco: Freeman, 1976.
Friend, J., & Burton, R. *Teacher's Guide: Diagnostic testing in arithmetic: Subtraction.* Palo Alto, Calif.: Xerox Palo Alto Research Center, 1981.
Frieze, I. H., & Snyder, H. N. Children's beliefs about the causes of success and failure in school settings. *Journal of Educational Psychology,* 1980, 72, 186-196.
Frieze, I. H., & Weiner, B. Cue utilization and attributional judgments for success and failure. *Journal of Personality,* 1971, *39,* 591-605.
Harari, O., & Covington, M. V. Reactions to achievement behavior from a teacher and student perspective: A developmental analysis. *American Educational Research Journal,* 1981, *18,* 15-28.
Heider, F. *The psychology of interpersonal relations.* New York: Wiley, 1958.
Kelley, H. H. Causal schemata and the attribution process. In E. E. Jones et al. (Eds.), *Attribution: Perceiving the causes of behavior.* Morristown, N.J.: General Learning Press, 1971.
Kerlinger, F. N., & Pedhazur, E. *J. Multiple regression in behavioral research.* New York: Holt, Rinehart & Winston, 1973.
Kirk, R. E. *Experimental design: Procedures for the behavioral sciences.* Belmont, Calif.: Brooks/Cole, 1968.
Kukla, A. Foundations of an attributional theory of performance. *Psychological Review,* 1972, *79,* 454-470.
Kun, A. Development of the magnitude-covariation and compensation schemata in ability and effort attributions of performance. *Child Development,* 1977, *48,* 862-873.
Kun, A., & Weiner, B. Necessary versus sufficient causal schemata for success and failure. *Journal of Research in Personality ,* 1973, 7, 197-207.
Miller, R. L., Brickman, P., & Bolen, D. Attribution versus persuasion as a means for modifying behavior. *Journal of Personality and Social Psychology,* 1975, *31,* 430-441.
Moulton, R. W. Motivational implications of individual differences in competence. In J. W. Atkinson & J. O. Raynor (Eds.), *Motivation and achievement.* Washington, D.C.: Winston, 1974.
Nicholls, J. G. The development of the concepts of effort and ability, perception of academic attainment, and the understanding that difficult tasks require more ability. *Child Development,* 1978, *49,* 800-814.
Nicholls, J. G. Development of perception of own attainment and causal attribution for success and failure in reading. *Journal of Educational Psychology,* 1979, *71,* 94-99.
Schunk, D. H. Modeling and attributional effects on children's achievement: A self-efficacy analysis. *Journal of Educational Psychology,* 1981, 73, 93-105.
Weiner, B. An attributional approach for educational psychology. In I,. Shulman (Ed.), *Review of research in education* (Vol. 4). Itasca, Ill.: Peacock, 1977. Weiner, B. A theory of motivation for some classroom experiences. *Journal of Educational Psychology,* 1979, *71,* 3-25.
Weiner, B., et al. Perceiving the causes of success and failure. In E. E. Jones et al. (Eds.), *Attribution: Perceiving the causes of behavior.* Morristown, N.J.: General Learning Press, 1971.
Weiner, B., Heckhausen, H., Meyer, W., & Cook, 11: E. Causal ascriptions and achievement behavior: A conceptual analysis of effort and reanalysis of locus of control. *Journal of Personality and Social Psychology,* 1972, *21,* 239-248.
Winer, B. *J. Statistical principles in experimental design* (2nd ed.). New York: McGraw-Hill, 1971.