Motivational Processes Affecting Learning

Carol S. Dweck *University of Illinois*

ABSTRACT: Motivational processes influence a child's acquisition, transfer, and use of knowledge and skills, yet educationally relevant conceptions of motivation have been elusive. Using recent research within the social–cognitive framework, Dweck describes adaptive and maladaptive motivational patterns and presents a research-based model of motivational processes. This model shows how the particular goals children pursue on cognitive tasks shape their reactions to success and failure and influence the quality of their cognitive performance. Dweck argues that this approach has important implications for practice and the design of interventions to change maladaptive motivational processes. She presents a compelling proposal for explaining motivational influences on gender differences in mathematics achievement and observes that empirically based interventions may prevent current achievement discrepancies.—The Editors

Most research on effective learning and performance of cognitive tasks analyzes the particular cognitive skills required to succeed at those tasks. In contrast, the focus here is on motivational processes that affect success on cognitive tasks. That is, the focus is on psychological factors, other than ability, that determine how effectively the individual acquires and uses skills.

It has long been known that factors other than ability influence whether children seek or avoid challenges, whether they persist or withdraw in the face of difficulty, and whether they use and develop their skills effectively. However, the components and bases of adaptive motivational patterns have been poorly understood. As a result, commonsense analyses have been limited and have not provided a basis for effective practices. Indeed, many "commonsense" beliefs have been called into question or seriously qualified by recent research—for example, the belief that large amounts of praise and success will establish, maintain, or reinstate adaptive patterns, or that "brighter" children have more adaptive patterns and thus are more likely to choose personally challenging tasks or to persist in the face of difficulty.

In the past 10 to 15 years a dramatic change has taken place in the study of motivation. This change has resulted in a coherent, replicable, and educationally relevant body of findings—and in a clearer understanding of motivational phenomena. During this time, the emphasis has shifted to a social–cognitive approach—away from external contingencies, on the one hand, and global, internal states on the other. It has shifted to an emphasis on cognitive mediators, that is, to how children construe the situation, interpret events in the situation, and process information about the situation. Although external contingencies and internal affective states are by no means ignored, they are seen as part of a process whose workings are best penetrated by focusing on organizing cognitive variables.

Specifically, the social–cognitive approach has allowed us to (a) characterize adaptive and maladaptive patterns, (b) explain them in terms of specific underlying processes, and thus (c) begin to provide a rigorous conceptual and empirical basis for intervention and practice.

Adaptive and Maladaptive Motivational Patterns

The study of motivation deals with the causes of goal-oriented activity (Atkinson, 1964; Beck, 1983; Dollard & Miller, 1950; Hull, 1943; Veroff, 1969). Achievement motivation involves a particular class of goals—those involving competence—and these goals appear to fall into two classes: (a) *learning goals,* in which individuals seek to increase their competence, to understand or master something new, and (b) *performance goals,* in which individuals seek to gain favorable judgments of their competence or avoid negative judgments of their competence (Dweck & Elliott, 1983; Nicholls, 1984; Nicholls & Dweck, 1979).[1]

Adaptive motivational patterns are those that promote the establishment, maintenance, and attainment of personally challenging and personally valued achievement goals. Maladaptive patterns, then, are associated with a failure to establish reasonable, valued goals, to maintain effective striving toward those goals, or, ultimately, to attain valued goals that are potentially within one's reach.

Research has clearly documented adaptive and maladaptive patterns of achievement behavior. The adaptive ("mastery-oriented") pattern is characterized by challenge seeking and high, effective persistence in the face of obstacles. Children displaying this pattern appear to enjoy exerting effort in the pursuit of task mastery. In contrast, the maladaptive ("helpless") pattern is characterized by challenge avoidance and low persistence in the face of difficulty. Children displaying this pattern tend to evidence negative affect (such as anxiety) and negative self-cogni-

Correspondence concerning this article should be addressed to Carol S. Dweck, Department of Psychology, University of Illinois, 603 E. Daniel, Champaign, IL 61820.

[1] The word *performance* will be used in several ways, not only in connection with performance goals. It will also be used to refer to the child's task activity (performance of a task) and to the product of that activity (level of performance). The meaning should be clear from the context.

 0003-066X/86/$00.75
Vol. 41, No. 10, 1040-1048

Table 1
Achievement Goals and Achievement Behavior

Theory of intelligence	Goal orientation	Confidence in present ability	Behavior pattern
Entity theory (Intelligence is fixed)	**Performance goal** (Goal is to gain positive judgments/avoid negative judgments of competence)	**If high**	**Mastery-oriented** Seek challenge High persistence
		but	
		If low	**Helpless** Avoid challenge Low persistence
Incremental theory (Intelligence is malleable)	**Learning goal** (Goal is to increase competence)	**If high** or **low**	**Mastery-oriented** Seek challenge (that fosters learning) High persistence

tions when they confront obstacles (e.g., Ames, 1984; C. Diener & Dweck, 1978, 1980; Dweck & Reppucci, 1973; Nicholls, 1975).

Although children displaying the different patterns do not differ in intellectual ability, these patterns can have profound effects on cognitive performance. In experiments conducted in both laboratory and classroom settings, it has been shown that children with the maladaptive pattern are seriously hampered in the acquisition and display of cognitive skills when they meet obstacles. Children with the adaptive pattern, by contrast, seem undaunted or even seem to have their performance facilitated by the increased challenge.

If not ability, then what are the bases of these patterns? Most recently, research has suggested that children's goals in achievement situations differentially foster the two patterns. That is, achievement situations afford a choice of goals, and the one the child preferentially adopts predicts the achievement pattern that child will display.

Table 1 summarizes the conceptualization that is emerging from the research. Basically, children's theories of intelligence appear to orient them toward different goals: Children who believe intelligence is a fixed trait tend to orient toward gaining favorable judgments of that trait (performance goals), whereas children who believe intelligence is a malleable quality tend to orient toward developing that quality (learning goals). The goals then appear to set up the different behavior patterns.[2]

Learning and Performance Goals Contrasted

How and why do the different goals foster the different patterns? How do they shape task choice and task pursuit to facilitate or impede cognitive performance? The research reviewed below indicates that with performance goals, the entire task choice and pursuit process is built around children's concerns about their ability level. In contrast, with learning goals the choice and pursuit processes involve a focus on progress and mastery through effort. Further, this research shows how a focus on ability judgments can result in a tendency to avoid and withdraw from challenge, whereas a focus on progress through effort creates a tendency to seek and be energized by challenge.

Although relatively few studies as yet have explicitly induced and compared (or measured and compared) learning versus performance goals (see M. Bandura & Dweck, 1985; Elliott & Dweck, 1985; Farrell & Dweck, 1985; Leggett, 1985, 1986), many have manipulated the salience and value of performance goals, and hence the relative value of the two types of goals. This has been done, for example, by instituting a competitive versus individual reward structure (e.g., Ames, 1984; Ames, Ames, & Felker, 1977), by varying the alleged diagnosticity of the task vis à vis important abilities (e.g., Nicholls, 1975), by introducing an audience or evaluator versus allowing the individual to perform privately or focusing his or her attention on the task (e.g., Brockner & Hulton, 1978; Carver & Scheier, 1981; E. Diener & Srull, 1979), and by presenting the task with "test" instructions versus "game" or neutral instructions (e.g., Entin & Raynor, 1973; Lekarczyk & Hill, 1969; McCoy, 1965; Sarason, 1972).

Taken together, the results suggest that highlighting performance goals relative to learning goals can have the following effects on achievement behavior.

Goals and Task Choice

Appropriately challenging tasks are often the ones that are best for utilizing and increasing one's abilities. Recent research has shown that performance goals work against the pursuit of challenge by requiring that children's perceptions of their ability be high (and remain high) before the children will desire a challenging task (M. Bandura & Dweck, 1985; Elliott & Dweck, 1985). That is, if the goal is to obtain a favorable judgment of ability, then children need to be certain their ability is high before displaying it for judgment. Otherwise, they will choose tasks that conceal their ability or protect it from negative evaluation. For example, when oriented toward performance goals, individuals with low assessments of their ability are often found to choose personally easy tasks on which success is ensured or excessively difficult ones on

[2] See M. Bandura and Dweck (1985), Dweck and Elliott (1983), and Leggett (1985) for a more extensive treatment of children's theories of intelligence. The present article will focus on achievement goals and their allied behavior patterns.

which failure does not signify low ability (M. Bandura & Dweck, 1985; Elliott & Dweck, 1985; see also deCharms & Carpenter, 1968; Moulton, 1965; Nicholls, 1984; Raynor & Smith, 1966). Even individuals with high assessments of their ability may sacrifice learning opportunities (that involve risk of errors) for opportunities to look smart (Elliott & Dweck, 1985; see Covington, 1983). Thus, performance goals appear to promote defensive strategies that can interfere with challenge seeking.

With learning goals, however, even if children's assessment of their present ability is low, they will tend to choose challenging tasks that foster learning (M. Bandura & Dweck, 1985; Elliott & Dweck, 1985). Specifically, in studies by Elliott and Dweck (1985), in which learning and performance goals were experimentally manipulated, and by M. Bandura and Dweck (1985), in which learning and performance goals were assessed, children with learning goals chose challenging tasks regardless of whether they believed themselves to have high or low ability (see also Meyer, Folkes, & Weiner, 1976; Nicholls, 1984). Thus with a learning goal, children are willing to risk displays of ignorance in order to acquire skills and knowledge. Instead of calculating their exact ability level and how it will be judged, they can think more about the value of the skill to be developed or their interest in the task to be undertaken.

Goals and Task Pursuit

Outcome interpretation and impact. Although within a performance goal children's confidence in their ability needs to remain high to sustain task involvement, that confidence is difficult to maintain. Research shows that children with performance goals are more likely to interpret negative outcomes in terms of their ability. That is, they attribute errors or failures to a lack of ability (Ames, 1984; Ames et al., 1977; Elliott & Dweck, 1985) and view them as predictive of continued failure (Anderson & Jennings, 1980). This in turn tends to result in defensive withdrawal of effort or debilitation in the face of obstacles (Covington & Omelich, 1979; Elliott & Dweck, 1985; Frankl & Snyder, 1978; Nicholls, 1976, 1984; see also Berglas & Jones, 1970; Weiner, 1972, 1974).

In contrast, children with learning goals tend to use obstacles as a cue to increase their effort or to analyze and vary their strategies (Ames, 1984; Ames et al., 1977; Elliott & Dweck, 1985; Leggett, 1986; Nicholls, 1984), which often results in *improved* performance in the face of obstacles. That is, the more children focus on learning or progress, the greater the likelihood of maintaining effective strategies (or improving their strategies) under difficulty or failure (A. Bandura & Schunk, 1981; Elliott & Dweck, 1985; Farrell & Dweck, 1985; see also Anderson & Jennings, 1980; C. Diener & Dweck, 1978).

Satisfaction with outcomes. Once again, within the performance goal versus learning goal framework, the focus is on ability versus effort. For performance-goal children, satisfaction with outcomes is based on the ability they believe they have displayed, whereas for learning-goal children, satisfaction with outcomes is based on the effort they have exerted in pursuit of the goal. Ames et al. (1977), for example, found that with an autonomous reward structure (learning goal), children's pride in their performance in both the success and the failure conditions was related to the degree of effort they perceived themselves to have exerted. However, within the competitive reward structure (performance goal), pride in performance was related to the degree of ability (and luck) they believed themselves to have. Thus, failure within a performance goal, because it signifies low ability, yields little basis for personal pride or satisfaction.

Indeed, within a performance goal, high effort may be *negatively* related to satisfaction: Leggett (1986) showed that children with performance goals are significantly more likely than children with learning goals to view effort per se as indicative of low ability (see also Jagacinski & Nicholls, 1982; Surber, 1984).

Findings by M. Bandura and Dweck (1985) also support the differential emphasis on effort versus ability as the basis for satisfaction within learning and performance goals. When asked to indicate their affective reactions to low-effort mastery, children with learning goals were more likely than children with performance goals to choose "bored" or "disappointed" as opposed to "proud" or "relieved."

Finally, within a performance framework, childrens' own outcome satisfaction and that of their peers may be in conflict. Results from the Ames et al. (1977) study are consonant with this view. Children's own satisfaction and perceived other's satisfaction with performance were negatively correlated under the competitive reward structure (−.70) but not in the autonomous reward structure (.06), even though their relative outcomes were identical in the two conditions. In addition, in rating how deserving of rewards (stars) both persons were, given their level of performance, children were more magnanimous toward the poorer performer (whether it was self or other) in the noncompetitive condition than they were in the competitive one. Indeed, in the noncompetitive condition, they even awarded the losing other slightly more stars than they awarded themselves.

Intrinsic motivation. It has been noted that persistence in the face of obstacles is made more difficult within a performance goal because obstacles tend to cast doubt on the child's ability and hence to call into question goal attainment (favorable ability judgments). Persistence is also made more difficult by the fact that "intrinsic" motivational factors—such as task interest or the enjoyment of effort—may be more difficult to access within a performance goal. That is, effort in the face of uncertainty appears to be experienced as aversive for children with performance goals, and worry about goal attainment may well overwhelm any intrinsic interest the task may hold for the child (Ames et al., 1977; M. Bandura & Dweck, 1985; Elliott & Dweck, 1985). Indeed, performance goals may well create the very conditions that have been found to undermine intrinsic interest (Deci & Ryan, 1980; Lepper, 1980; Lepper & Greene, 1978; Maehr & Stallings, 1972; Ryan, Mims, & Koestner, 1983).

In concluding this section on goal orientation and task pursuit, we might ask: Do children's goal orientations play a role in what and how they actually learn in classroom settings? One of the hallmarks of effective learning (and of intelligent thinking) is the tendency to apply or transfer what one has learned to novel tasks that embody similar underlying principles.

In a recent study, Farrell and Dweck (1985) examined the relationship between children's goal orientations and transfer of learning. As a week-long unit in their regular science classes, eighth-grade children were taught one of three scientific principles by means of self-instructional booklets. They were then tested for their generalization of this learning to tasks involving the two (conceptually related) principles that had not been taught. The results showed that children who had learning goals for the unit, compared to those who had performance goals, (a) attained significantly higher scores on the transfer test (and this was true for children who had high *and* low pretest scores); (b) produced about 50% more work on their transfer tests, suggesting that they were more active in the transfer process; and (c) produced more rule-generated answers on the test even when they failed to reach the transfer criterion, again suggesting more active attempts to apply what they had learned to the solution of novel problems.

To summarize, a performance goal focuses children on issues of ability. Within this goal, children's confidence in their current ability must be high and must remain high if they are to choose appropriately challenging tasks and pursue them in effective ways. Yet the same focus on ability makes their confidence in their ability fragile—even the mere exertion of effort calls ability into question. A strong orientation toward this goal can thus create a tendency to avoid challenge, to withdraw from challenge, or to show impaired performance in the face of challenge. Ironically, then, an overconcern with ability may lead children to shun the very tasks that foster its growth.

In contrast, a learning goal focuses children on effort—effort as a means of utilizing or activating their ability, of surmounting obstacles, and of increasing their ability. Not only is effort perceived as the means to accomplishment, it is also the factor that engenders pride and satisfaction with performance. The adoption of learning goals thus encourages children to explore, initiate, and pursue tasks that promote intellectual growth.

The Relation of Ability and Motivation

Does Ability Predict Motivational Patterns?

One might suppose that children who had the highest IQ scores, achievement test scores, and grades would be the ones who had by far the highest expectancies for future test scores and grades, as well as for performance on novel experimental tasks. Surprisingly often, this is not the case. In fact, one of the things that makes the study of motivation particularly intriguing is that measures of children's actual competence do not strongly predict their confidence of future attainment (M. Bandura & Dweck, 1985; Crandall, 1969; Stipek & Hoffman, 1980; see also Phillips, 1984). Indeed, M. Bandura and Dweck found that their low-confidence children tended to have somewhat higher achievement test scores than their high-confidence group. Interestingly, the low-confidence children did not have poorer opinions of their past attainment or abilities but faced the upcoming task with low expectancies of absolute and relative performance.

One might also suppose that high-achieving children would be much less likely than low achievers, when encountering an obstacle, to attribute their difficulty to a lack of ability and to show deteriorated performance. But this supposition, too, is often contradicted by the evidence (e.g., Licht & Dweck, 1984; Stipek & Hoffman, 1980; see also C. Diener & Dweck, 1978, 1980).

A tendency toward unduly low expectancies (Crandall, 1969; Stipek & Hoffman, 1980), challenge avoidance (Licht, Linden, Brown, & Sexton, 1984; see also Leggett, 1985), ability attributions for failure (Licht & Shapiro, 1982; Nicholls, 1979), and debilitation under failure (Licht et al., 1984; Licht & Dweck, 1984) has been especially noted in girls, particularly bright girls.[3] Indeed, some researchers have found a negative correlation for girls between their actual ability and these maladaptive patterns (Crandall, 1969; Licht et al., 1984; Licht & Dweck, 1984; Licht & Shapiro, 1982; Stipek & Hoffman, 1980).

An extensive study of sex differences in achievement cognitions and responses to failure recently completed by Licht et al. (1984) yields illustrative evidence. On the basis of their grades, Licht divided her subjects into A, B, C, and D students and, among other measures, administered a novel concept formation task. A significant sex difference was found among the A students (and only among the A students) in their response to failure, with the A girls showing the greatest debilitation of the eight groups and the A boys being the only group to show any facilitation. In addition, Licht found a strong sex difference in task preferences between A girls and A boys: The A girls much preferred tasks they knew they were good at, whereas A boys preferred ones they would have to work harder to master.

It is also interesting to note that in Leggett's (1985) study of bright junior high school students, there was a greater tendency for girls than boys to subscribe to an "entity" theory of intelligence (smartness as a fixed trait, a static entity) and for those who did to choose a performance goal that avoided challenge.

Again, it is not the case that these girls are unaware of their attainments (Licht & Dweck, 1984; Nicholls, 1979; Parsons, Meece, Adler, & Kaczala, 1982), but knowledge of past successes does not appear to arm them for confrontations with future challenges. For example, in a study by Licht and Dweck (1984) that examined the

[3] It is important to note that sex differences, like most individual differences, are by no means found in every study. However, when sex differences are found, the same ones are typically found. Thus, the pattern described is a recurrent one that has been found in many studies from many different laboratories.

impact of initial confusion (vs. no confusion) on subsequent learning, high-achieving girls rated themselves as being bright but still showed greater debilitation than low-achieving girls. Whereas in the no-confusion condition, the brighter the girl (by her own self-rating and by IQ score), the more likely she was to master the new material ($r = .47$), in the confusion condition, the brighter the girl, the less likely she was to reach the mastery criterion ($r = -.38$, $p_{diff} < .02$). (For boys in this study the correlation between self-rated ability and task performance tended to increase from the no-confusion to the confusion condition: $rs = .15$ and .34, respectively.)

In short, being a high achiever and knowing one has done well in the past does not appear to translate directly into high confidence in one's abilities when faced with future challenges or current difficulties. Nor does it clearly predict the maintenance of one's ability to perform or learn under these conditions. It is apparent, then, that a maladaptive motivational pattern is not the sole province of the low-achieving, "failure-prone" child.

Does Motivational Pattern Predict Ability Over Time?

If there is a sizable proportion of high achievers with maladaptive motivational patterns (see Phillips, 1984), and if these patterns are important to achievement, then why are these children still high achievers? Drops in achievement can result from performance debilitation or task avoidance. That is, both the presence of failure or the opportunity to avoid challenging subject areas may lead to cumulative skill deficits in children with maladaptive patterns. For good students, grade school may not provide either of these. It may present neither tasks that are difficult enough to create failure and debilitation nor the choice of not pursuing a given subject area. For these reasons, maladaptive patterns may not yet typically come into play. Licht and Dweck (1984) showed, however, in an experiment conducted in classrooms, that when confusion does accompany the initial attempt to learn new material, mastery of the material is seriously impaired for these children.

It may be that only in subsequent school years will these maladaptive tendencies have their impact on achievement, when children with these patterns may elect to avoid challenging courses of study, drop out of courses that pose a threat of failure, or show impairment of performance under real difficulty. Thus, our experimental studies may create conditions that good students will encounter fully only in later years but that reveal underlying patterns already in place in the grade school years.

In the following section, sex differences in motivational patterns and achievement are used as a means of exploring the ways in which motivational patterns can affect achievement, and ability, over time.

The Case of Sex Differences in Mathematical Versus Verbal Achievement

Discrepancies between males and females in mathematical and verbal achievement have long been a source of puzzlement and concern. Although in the grade school years girls equal boys in mathematical achievement (and surpass them in verbal achievement), during the junior high and high school years, boys pull ahead and remain ahead in mathematical achievement (Donlon, Ekstrom & Lockheed, 1976; Fennema & Sherman, 1977; Hilton & Berglund, 1974; Maccoby & Jacklin, 1974). A wide assortment of explanations has been advanced, ranging from claims about the nature of the genetic equipment (Benbow & Stanley, 1980) to arguments about the impact of sex role stereotypes (Sherman & Fennema, 1977). Without ruling out other explanations, one can add a motivational explanation based on the research findings reviewed above. Specifically, the fact that the two sexes often display different motivational patterns and the fact that the academic subject areas in question differ in major ways aside from the skills they require suggest that perhaps motivational patterns contribute to these achievement discrepancies.

This suggestion is made even more plausible when one considers that (a) sex differences in mathematical achievement are greatest among the brightest students (Astin, 1974; Fox, 1976) and (b) sex differences in motivational patterns and associated behavior appear to be greatest among the brightest students. As noted above, bright girls compared to bright boys (and compared to less bright girls) seem to display shakier expectancies, lower preference for novel or challenging tasks, more frequent failure attributions to lack of ability, and more frequent debilitation in the face of failure or confusion (Licht et al., 1984; Licht & Dweck, 1984; Stipek & Hoffman, 1980). Moreover, some characteristics of mathematical versus verbal areas are precisely those that would work against individuals with this pattern but that would favor individuals with the more confident, challenge-seeking pattern (see Licht & Dweck, 1984, for a more detailed discussion of these characteristics).

Specifically, new units and courses in mathematics, particularly after the grade school years, tend to involve new skills, new concepts, or even entirely new conceptual frameworks (for example, algebra, geometry, calculus). These new skills and concepts are not only different from but are often more difficult than those the child has mastered in the past. In the verbal areas, however, once the basic skills of reading and writing are mastered, one does not as typically encounter leaps to qualitatively different tasks, tasks requiring mastery of completely unfamiliar verbal skills. Increments in difficulty appear to be more gradual, and new units or courses often simply ask the student to bring existing skills to bear on new material.

This general difference between mathematical and verbal areas may have several important psychological consequences. For one thing, as children ponder future math courses, the greater novelty and difficulty of the future courses compared to present ones would be expected to precipitate declines in confidence for bright girls, but not for bright boys. Indeed, in the study cited above, Parsons et al. (1982) found significant sex differences in expectancies for future math courses even when females

and males were equivalent in their perceptions of their present mathematical ability and in their expectancies for their present math courses.

Task preference data as well suggest that a greater discrepancy between present and future tasks in mathematical versus verbal areas may render math less appealing to bright girls, but perhaps more appealing to bright boys. Bright girls, it will be recalled, tend to prefer tasks they are fairly certain they are good at and can do well on, whereas bright boys are more attracted to tasks that pose some challenge to mastery (Licht et al., 1984; see also Leggett, 1985).

Yet another consequence of this proposed math–verbal difference is that in math, children are more likely to experience failure or confusion at the beginning of a new unit or course. This might be expected to produce debilitation (or escape attempts, such as course-dropping) in bright girls but perseverance in bright boys. And, indeed, support for this prediction of differential debilitation comes from the Licht and Dweck (1984) study, described earlier, in which confusion (or no confusion) attended the introduction of new subject matter, and from the Licht et al. (1984) study in which obstacles were encountered in the acquisition of a new skill. In both cases, bright girls showed the most impairment and bright boys the most facilitation.

In short, mathematics appears to differ from verbal areas in ways that would make it more compatible with the motivational patterns of bright boys and less compatible with those of bright girls. Thus, given two children with equal mathematical aptitude and mathematical achievement in the grade school years, but with differing motivational patterns, we would predict precisely the sex differences in course taking and long-term achievement that are found to occur (Donlon et al., 1976; Fennema & Sherman, 1977; Hilton & Berglund, 1974).

With increasing age, children make increasingly consequential decisions, and maladaptive patterns may begin to impair their achievement and constrict their future choices. Maladaptive patterns such as those displayed by bright girls may even fail to foster intellectual growth in general. In a 38-year longitudinal study of IQ change (measured at mean ages of 4.1, 13.8, 29.7, and 41.6), Kangas and Bradway (1971) found that for males the higher the preadult level, the more they gained in later years, whereas for females the higher the preadult level, the less they gained in later years. In fact, of the six groups in the study (males and females with high, medium, and low preadult IQs), all showed surprisingly large gains over the years (between 15 and 30 points) except the high-IQ females, who showed little gain (about 5 points). Although there are many possible interpretations of these results, the general picture suggests that bright females, compared to bright males, are not thriving. Our analysis suggests that appropriate motivational interventions may help prevent some of the achievement discrepancies between the sexes. Let us turn, then, to the experiences or interventions that appear to foster adaptive motivational patterns.

Experiences That Foster Adaptive Patterns

The question for motivational interventions is: What are we aiming for and how do we get there? When one considers the necessity for, but the vulnerability of, confidence within a performance goal framework, one is led to the position that challenge seeking and persistence are better facilitated by attempts to foster a learning goal orientation than by attempts to instill confidence within a performance framework.

Nonetheless, much current educational practice aims at creating high-confidence performers and attempts to do so by programming frequent success and praise. (See Brown, Palincsar, & Purcell, 1984, for a discussion of this issue.) How did this situation arise? I propose that misreadings of two popular phenomena may have merged to produce this approach. First was the growing belief in "positive reinforcement" (interpreted as frequent praise for small units of behavior) as the way to promote desirable behavior. Yet a deeper understanding of the principles of reinforcement would not lead one to expect that frequent praise for short, easy tasks would create a desire for long, challenging ones or promote persistence in the face of failure. On the contrary, continuous reinforcement schedules are associated with poor resistance to extinction, and errorless learning, as evidenced by Terrace's (1969) renowned pigeons, has been found to produce bizarre emotional responses following nonreinforcement.

Second was a growing awareness of teacher expectancy effects. As is well known, the teacher expectancy effect refers to the phenomenon whereby teachers' impressions about students' ability (e.g., manipulated via test information) actually affect students' performance, such that the students' performance falls more in line with the teachers' expectancies (Rosenthal & Jacobson, 1968). The research on this "self-fulfilling prophecy" raised serious concerns that teachers were hampering the intellectual achievement of children they labeled as having low ability. One remedy was thought to lie in making low-ability children feel like high-ability children by means of a high success rate.

In light of the implications that were drawn from teacher expectancy effects, it is interesting to contrast them with the views of the original researchers (see, e.g., Rosenthal, 1971, 1974; Rosenthal & Jacobson, 1968). Unlike many of their followers, they appeared to frame their work within (and provide teachers with) an incremental theory of intelligence. Specifically, in the Rosenthal and Jacobson (1968) study, teachers were told that the "test for intellectual blooming" indicated that the target children would show remarkable gains in intellectual competence during the school year. Moreover, when hypothesizing possible mechanisms through which gains were produced, the original researchers thought in terms of teachers' having stimulated intellectual growth through challenge. And, in reviewing work on undesirable expectancy effects, they lamented that "lows" seemed to be given too little work, and work that was too easy, to spur cognitive gains (Rosenthal, 1971). (See also, Brown et al.,

1984, who argued cogently that it is not ill treatment, but a failure to teach the necessary high-level skills, that accounts for much of the achievement deficit of low-reading groups.) Thus, these original researchers were oriented toward producing intellectual growth in children rather than simply giving children an illusion of intelligence.

The motivational research is clear in indicating that continued success on personally easy tasks (or even on difficult tasks within a performance framework) is ineffective in producing stable confidence, challenge seeking, and persistence (Dweck, 1975; Relich, 1983). Indeed, such procedures have sometimes been found to backfire by producing lower confidence in ability (Meyer, 1982; Meyer et al., 1979). Rather, the procedures that bring about more adaptive motivational patterns are the ones that incorporate challenge, and even failure, within a learning-oriented context and that explicitly address underlying motivational mediators (Andrews & Debus, 1978; A. Bandura & Schunk, 1981; Covington, 1983; Dweck, 1975; Fowler & Peterson, 1981; Relich, 1983; Rhodes, 1977; Schunk, 1982). For example, retraining children's attributions for failure (teaching them to attribute their failures to effort or strategy instead of ability) has been shown to produce sizable changes in persistence in the face of failure, changes that persist over time and generalize across tasks (Andrews & Debus, 1978; Dweck, 1975; Fowler & Peterson, 1981; Relich, 1983; Rhodes, 1977).

Thus far, only short-term experimental manipulations of children's goal orientations have been attempted (Ames, 1984; Ames et al., 1977; Elliott & Dweck, 1985). Although these goal manipulations have been successful in producing the associated motivational patterns, much research remains to be conducted on how best to produce lasting changes in goal orientation.

To date, motivational interventions, such as attribution retraining, have been conducted primarily with less successful students (those who display both a lag in skill level *and* a maladaptive response to difficulty). Yet, the earlier discussion suggests that some of the brightest students, who in grade school as yet show little or no obvious impairment in the school environment, may be prime candidates for such motivational interventions. Among these are children (e.g., bright girls) who have had early, consistent, and abundant success yet, despite this (or perhaps even because of this), do not relish the presence or the prospect of challenge.

Summary and Conclusion

Motivational processes have been shown to affect (a) how well children can deploy their existing skills and knowledge, (b) how well they acquire new skills and knowledge, and (c) how well they transfer these new skills and knowledge to novel situations. This approach does not deny individual differences in present skills and knowledge or in "native" ability or aptitude. It does suggest, however, that the use and growth of that ability can be appreciably influenced by motivational factors.

The social–cognitive approach, with its emphasis on specific mediating processes, has generated important implications for practice and ameliorative interventions. Indeed, ways of appropriately incorporating issues of "self-concept" into education have long been sought. The social–cognitive approach, by identifying particular self-conceptions (e.g., children's theories of their intelligence) and by detailing their relationship to behavior, may well provide the means.

In addition, there is growing evidence that the conceptualization presented here is relevant not only to effectiveness on cognitive tasks but also to effectiveness in social arenas. For example, children's attributions for social outcomes predict whether they respond adaptively to rejection (Goetz & Dweck, 1980), and children's social goals are related to their popularity among their classmates (Taylor & Asher, 1985). Thus the present approach may illuminate adaptive and maladaptive patterns in diverse areas of children's lives and may thereby provide a basis for increasingly effective socialization and instructional practices across these areas.

REFERENCES

Ames, C. (1984). Achievement attributions and self-instructions under competitive and individualistic goal structures. *Journal of Educational Psychology, 76,* 478–487.

Ames, C., Ames, R., & Felker, D. W. (1977). Effects of competitive reward structure and valence of outcome on children's achievement attributions. *Journal of Educational Psychology, 69,* 1–8.

Anderson, C. A., & Jennings, D. L. (1980). When experiences of failure promote expectations of success: The impact of attributing failure to ineffective strategies. *Journal of Personality, 48,* 393–407.

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

Astin, H. (1974). Sex differences in scientific and mathematical precocity. In J. C. Stanley, D. P. Keating, & L. H. Fox (Eds.), *Mathematical talent: Discovery, description and development.* Baltimore, MD: Johns Hopkins University Press.

Atkinson, J. W. (1964). *An introduction to motivation.* Princeton, NJ: Van Nostrand.

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

Bandura, M., & Dweck, C. S. (1985). *Self-conceptions and motivation: Conceptions of intelligence, choice of achievement goals, and patterns of cognition, affect, and behavior.* Manuscript submitted for publication.

Beck, R. C. (1983). *Motivation: Theories and principles.* Englewood Cliffs, NJ: Prentice-Hall.

Benbow, C. P., & Stanley, J. C. (1980). Sex differences in mathematics ability: Fact or artifact. *Science, 10,* 1262–1264.

Berglas, S., & Jones, E. E. (1970). Drug choice as a self-handicapping strategy in response to noncontingent success. *Journal of Personality and Social Psychology, 36,* 405–417.

Brockner, J., & Hulton, A. J. B. (1978). How to reverse the vicious cycle of low self-esteem: The importance of attentional focus. *Journal of Experimental Psychology 14,* 564–578.

Brown, A. L., Palincsar, A. S., & Purcell, L. (1984). Poor readers: Teach don't label. In U. Neisser (Ed.), *The academic performance of minority children: A new perspective.* Hillsdale, NJ: Erlbaum.

Carver, C. S., & Scheier, M. F. (1981). *Attention and self-regulation: A control-theory approach to human behavior.* New York: Springer-Verlag.

Covington, M. V. (1983). Strategic thinking and the fear of failure. In S. F. Chipman, J. Segal, & R. Glaser (Eds.), *Thinking and learning skills: Current research and open questions* (Vol. 2). Hillsdale, NJ: Erlbaum.

Covington, M. V., & Omelich, C. L. (1979). Effort: The double-edged

sword in school achievement. *Journal of Educational Psychology, 71,* 169–182.

Crandall, V. C. (1969). Sex differences in expectancy of intellectual and academic reinforcement. In C. P. Smith (Ed.), *Achievement-related motives in children.* New York: Russell Sage.

deCharms, R., & Carpenter, V. (1968). Measuring motivation in culturally disadvantaged school children. In H. J. Klausmeier, & G. T. O'Hearn (Eds.), *Research and development toward the improvement of education.* Madison, WI: Dembar Educational Services.

Deci, E. L., & Ryan, R. M. (1980). The empirical exploration of intrinsic motivational processes. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 13). New York: Academic Press.

Diener, C. I., & Dweck, C. S. (1978). An analysis of learned helplessness: Continuous changes in performance, strategy, and achievement cognitions following failure. *Journal of Personality and Social Psychology, 36,* 451–462.

Diener, C. I., & Dweck, C. S. (1980). An analysis of learned helplessness: II. The processing of success. *Journal of Personality and Social Psychology, 39,* 940–952.

Diener, E., & Srull, T. K. (1979). Self-awareness, psychological perspective, and self-reinforcement in relation to personal and social standards. *Journal of Personality and Social Psychology, 37,* 413–423.

Dollard, J., & Miller, N. E. (1950). *Personality and psychotherapy.* New York: McGraw-Hill.

Donlon, T., Ekstrom, R., & Lockheed, M. (1976, September). *Comparing the sexes on achievement items of varying content.* Paper presented at the meeting of the American Psychological Association, Washington, DC.

Dweck, C. S. (1975). The role of expectations and attributions in the alleviation of learned helplessness. *Journal of Personality and Social Psychology, 31,* 674–685.

Dweck, C. S., & Elliott, E. S. (1983). Achievement motivation. In E. M. Hetherington (Ed.), *Socialization, personality, and social development.* New York: Wiley.

Dweck, C. S., & Reppucci, N. D. (1973). Learned helplessness and reinforcement responsibility in children. *Journal of Personality and Social Psychology, 25,* 109–116.

Elliott, E., & Dweck, C. S. (1985). *Goals: An approach to motivation and achievement.* Manuscript submitted for publication.

Entin, E. E., & Raynor, J. O. (1973). Effects of contingent future orientation and achievement motivation on performance in two kinds of tasks. *Journal of Experimental Research in Personality, 6,* 320–341.

Farrell, E., & Dweck, C. (1985). *The role of motivational processes in transfer of learning.* Manuscript submitted for publication.

Fennema, E., & Sherman, J. (1977). Sex-related differences in mathematics achievement, spatial visualization, and affective factors. *American Educational Research Journal, 14,* 51–71.

Fowler, J. W., & Peterson, P. L. (1981). Increasing reading persistence and altering attributional style of learned helpless children. *Journal of Educational Psychology, 73,* 251–260.

Fox, L. (1976). Sex differences in mathematical precocity: Bridging the gap. In D. P. Keating (Ed.), *Intellectual talent: Research and development.* Baltimore, MD: Johns Hopkins University Press.

Frankl, A., & Snyder, M. L. (1978). Poor performance following unsolvable problems: Learned helplessness or egotism? *Journal of Personality and Social Psychology, 36,* 1415–1423.

Goetz, T., & Dweck, C. (1980). Learned helplessness in social situations. *Journal of Personality and Social Psychology, 39,* 246–255.

Hilton, T., & Berglund, G. (1974). Sex differences in mathematics achievement—A longitudinal study. *Journal of Education Research, 67,* 231–237.

Hull, C. L. (1943). *Principles of behavior.* New York: Appleton-Century-Crofts.

Jagacinski, C. M., & Nicholls, J. G. (1982, March). *Concepts of ability.* Paper presented at the meeting of the American Educational Research Association, New York.

Kangas, J., & Bradway, K. (1971). Intelligence at middle age: A thirty-eight year follow-up. *Developmental Psychology, 5,* 333–337.

Leggett, E. (1985, March). *Children's entity and incremental theories of intelligence: Relationships to achievement behavior.* Paper presented at the meeting of the Eastern Psychological Association, Boston.

Leggett, E. (1986, April). *Individual differences in effort–ability inference rules: Implications for causal judgments.* Paper presented at the meeting of the Eastern Psychological Association, New York.

Lekarczyk, D. T., & Hill, K. T. (1969). Self-esteem, test anxiety, stress and verbal learning. *Developmental Psychology, 1,* 147–154.

Lepper, M. R. (1980). Intrinsic and extrinsic motivation in children: Detrimental effects of superfluous social controls. In W. A. Collins (Ed.), *Minnesota Symposium on Child Psychology* (Vol. 14). Hillsdale, NJ: Erlbaum.

Lepper, M. R., & Greene, D. (Eds.) (1978). *The hidden costs of reward: New perspectives on the psychology of human motivation.* Hillsdale, NJ: Erlbaum.

Licht, B. G., & Dweck, C. S. (1983). Sex differences in achievement orientations: Consequences for academic choices and attainments. In M. Marland (Ed.), *Sex differentiation and schooling.* London: Heinemann.

Licht, B. G., & Dweck, C. S. (1984). Determinants of academic achievement: The interaction of children's achievement orientations with skill area. *Developmental Psychology, 20,* 628–636.

Licht, B. G., Linden, T. A., Brown, D. A., & Sexton, M. A. (1984, August). *Sex differences in achievement orientation: An "A" student phenomenon?* Paper presented at the meeting of the American Psychological Association, Toronto, Canada.

Licht, B. G., & Shapiro, S. H. (1982, August). *Sex differences in attributions among high achievers.* Paper presented at the meeting of the American Psychological Association, Washington, DC.

Maccoby, E. E., & Jacklin, C. N. (1974). *The psychology of sex differences.* Stanford, CA: Stanford University Press.

Maehr, M. L., & Stallings, W. M. (1972). Freedom from external evaluation. *Child Development, 43,* 177–185.

McCoy, N. (1965). Effects of test anxiety on children's performance as a function of instructions and type of task. *Journal of Personality and Social Psychology, 2,* 634–641.

Meyer, W. U. (1982). Indirect communications about perceived ability estimates. *Journal of Educational Psychology, 74,* 888–897.

Meyer, W., Bachman, M., Biermann, U., Hempelmann, M., Ploger, F., & Spiller, H. (1979). The informational value of evaluative behavior: Influences of praise and blame on perceptions of ability. *Journal of Educational Psychology, 71,* 259–268.

Meyer, W. W., Folkes, V., & Weiner, B. (1976). The perceived informational value and affective consequences of choice behavior and intermediate difficulty task selection. *Journal of Research in Personality, 10,* 410–423.

Moulton, R. W. (1965). Effects of success and failure on level of aspiration as related to achievement motives. *Journal of Personality and Social Psychology, 1,* 399–406.

Nicholls, J. G. (1975). Causal attributions and other achievement related cognitions: Effects of task outcome, attainment value, and sex. *Journal of Personality and Social Psychology, 31,* 379–389.

Nicholls, J. G. (1976). Effort is virtuous but it's better to have ability: Evaluative responses to perceptions of effort and ability. *Journal of Research in Personality, 10,* 306–315.

Nicholls, J. G. (1979). Development of perception of own attainment and causal attributions for success and failure in reading. *Journal of Educational Psychology, 71,* 94–99.

Nicholls, J. G. (1984). Conceptions of ability and achievement motivation. In R. Ames & C. Ames (Eds.), *Research on motivation in education* (Vol. 1). New York: Academic Press.

Nicholls, J. G., & Dweck, C. S. (1979). *A definition of achievement motivation.* Unpublished manuscript, University of Illinois.

Parsons, J. E., Meece, J. L., Adler, T. F., & Kaczala, C. M. (1982). Sex differences in attributions and learned helplessness. *Sex Roles, 8,* 421–432.

Phillips, D. (1984). The illusion of incompetence among high-achieving children. *Child Development, 55,* 2000–2016.

Raynor, J. O., & Smith, C. P. (1966). Achievement related motives and risk-taking in games of skill and chance. *Journal of Personality, 34,* 176–198.

Relich, J. D. (1983). *Attribution and its relation to other affective variables in predicting and inducing arithmetic achievement.* Unpublished doctoral dissertation, University of Sydney, Sydney, Australia.

Rhodes, W. A. (1977). *Generalization of attribution retraining.* Unpublished doctoral dissertation, University of Illinois, Champaign, IL.

Rosenthal, R. (1971). Teacher expectations and their effects upon children. In G. S. Lesser (Ed.), *Psychology and educational practice.* Glenview, IL: Scott, Foresman.

Rosenthal, R. (1974). *On the social psychology of the self-fulfilling prophecy: Further evidence for Pygmalion effects and their mediating mechanisms.* New York: MSS Modular Publications.

Rosenthal, R., & Jacobson, L. (1968). *Pygmalion in the classroom.* New York: Holt, Rinehart & Winston.

Ryan, R. M., Mims, V., & Koestner, R. (1983). The relationship of reward contingency and interpersonal context to intrinsic motivation: A review and test using cognitive evaluation theory. *Journal of Personality and Social Psychology, 45,* 736–750.

Sarason, I. G. (1972). Experimental approaches to test anxiety: Attention and the uses of information. In C. D. Spielberger (Ed.), *Anxiety and behavior: Current trends in theory and research* (Vol. 2). New York: Academic Press.

Schunk, D. H. (1982). Effects of effort attributional feedback on children's perceived self-efficacy and achievement. *Journal of Educational Psychology, 74,* 548–556.

Sherman, J., & Fennema, F. (1977). The study of mathematics by high school girls and boys: Related variables? *American Educational Research Journal, 14,* 159–168.

Stipek, D. J., & Hoffman, J. (1980). Development of children's performance-related judgments. *Child Development, 51,* 912–914.

Surber, C. (1984). Inferences of ability and effort: Evidence for two different processes. *Journal of Personality and Social Psychology, 46*(2), 249–268.

Taylor, A., & Asher, S. (1985, April). *Goals, games and social competence: Effects of sex, grade level, and sociometric status.* Paper presented at the biennial meeting of the Society for Research in Child Development, Toronto, Canada.

Terrace, H. S. (1969). Extinction of a discriminative operant following discrimination learning with and without errors. *Journal of the Experimental Analysis of Behavior, 12,* 571–582.

Veroff, J. (1969). Social comparison and the development of achievement motivation. In C. P. Smith (Ed.), *Achievement-related motives in children.* New York: Russell Sage.

Weiner, B. (1972). *Theories of motivation: From mechanism to cognition.* Chicago: Markham.

Weiner, B. (Ed.). (1974). *Achievement motivation and attribution theory.* Morristown, NJ: General Learning Corporation.