SELF-EFFICACY: A THEORETICAL ANALYSIS OF ITS DETERMINANTS AND MALLEABILITY

MARILYN E. GIST
TERENCE R. MITCHELL
University of Washington

The construct of self-efficacy has received increasing empirical attention in the organizational behavior literature. People who think they can perform well on a task do better than those who think they will fail. Differences in self-efficacy are associated with bona fide differences in skill level; however, efficacy perceptions also may be influenced by differences in personality, motivation, and the task itself. This article reviews theoretically the antecedent processes and information cues involved in the formation of self-efficacy. A model of the determinants of self-efficacy is proposed that enhances understanding of both the complexity and malleability of the construct. Determinants that facilitate the most immediate change in self-efficacy are identified, and appropriate change strategies are highlighted. Implications and propositions pertaining to future research are discussed at the end of the article.

A recent addition to the organizational research agenda is self-efficacy, a person's estimate of his or her capacity to orchestrate performance on a specific task. Empirical studies of self-efficacy have yielded several consistent findings. For example, self-efficacy is associated with work-related performance: life insurance sales (Barling & Beattie, 1983), faculty research productivity (Taylor, Locke, Lee, & Gist, 1984), coping with difficult career-related tasks (Stumpf, Brief, & Hartman, 1987), career choice (Lent, Brown, & Larkin, 1987), learning and achievement (Campbell & Hackett, 1986; Wood & Locke, 1987), and adaptability to new technology (Hill, Smith, & Mann, 1987). Also, studies have indicated that some training methods can enhance self-efficacy in the areas of self-management (Frayne & Latham, 1987), cognitive modeling (Gist, 1989), and behavioral modeling (Gist, Schwoerer, & Rosen, 1989). Further, when self-efficacy is enhanced, attendant increases in performance are noted (Gist, 1989; Gist et al., 1989).

Although these findings demonstrate the importance of self-efficacy for predicting and improving work performance, much remains unclear about the construct itself. The purpose of this article is to explore two major theoretical issues that hold implications for future research on self-efficacy.

First, there is a need to know more about how individuals form judgments of efficacy. Though Bandura (1986) described four broad categories of experience that contribute to efficacy judgments, greater specification is needed to understand the information that is drawn from personal and work experiences and utilized in the formation of self-efficacy. For example, modeling is known to influence self-efficacy, and the symbolic coding process is recognized as the mechanism by which individuals interpret the behavior they observe in others (Decker, 1980). However, less is known about the types of information, generated through observing others, that ultimately determine self-efficacy. This article offers a classification schema for information cues that influence perceived efficacy.

The second theoretical issue concerns the malleability of self-efficacy. In part, the question of how self-efficacy can be changed (e.g., through training) may be a question about how beliefs about abilities or motivation may be changed. However, greater conceptualization is needed about the plasticity of the determinants of self-efficacy: the specific causal factors that are susceptible to change, the extent of probable change, and the practical issues involved in facilitating change.

Comprehension of these issues requires some grounding in knowledge of self-efficacy that is derived from allied disciplines of study. Even though space does not permit an exhaustive review of this literature, an abbreviated summary is provided of the construct of self-efficacy and its theoretical context. Following this summary are presentations of the theoretical issues central to this article: the determinants of self-efficacy and the process of change. Some propositions and implications for research are discussed at the end of the article.

PERSPECTIVE ON SELF-EFFICACY

Construct Definition Issues

Self-efficacy is a construct derived from social cognitive theory—a theory positing a triadic reciprocal causation model in which behavior, cognitions, and the environment all influence each other in a dynamic fashion (Bandura, 1977, 1986). Wood and Bandura (1989a: 408) stated that "self-efficacy refers to beliefs in one's capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands."

Other work has highlighted three aspects of this definition (cf. Bandura, 1988a; Bandura & Wood, 1989; Wood & Bandura, 1989b). First, self-efficacy is a comprehensive summary or judgment of perceived capability for performing a specific task. In an organizational context, information derived from the individual, the work task, and others in the work environment may contribute to the comprehensive assessment of capability. Second, self-efficacy is a dynamic construct. The efficacy judgment changes over time as new information and experience are acquired (sometimes during actual task performance). Third, efficacy beliefs involve a mobilization component;

self-efficacy reflects "a more complex and generative process involving the construction and orchestration of adaptive performance to fit changing circumstances" (Bandura, personal communication, 1989). Thus, people who have the same skills may perform differently based on their utilization, combination, and sequencing of these skills in an evolving context.

Related constructs. Conceptual differentiation between self-efficacy and similar constructs is important for further theoretical development on self-efficacy. One of two constructs most frequently confused with self-efficacy is self-esteem, although there are important differences between the two. *Self-esteem* usually is considered to be a trait reflecting an individual's characteristic, affective evaluation of the self (e.g., feelings of self-worth or self-liking). By contrast, self-efficacy is a judgment about task capability that is not inherently evaluative. For example, a rocket scientist may have very low self-efficacy pertaining to dancing, yet may decide on reflection that this is satisfactory and that it does not diminish his or her overall evaluation and feelings about the self.

Brockner (1988) provided a thorough discussion of the distinctions between self-efficacy, self-esteem, and other self-related constructs. He also discussed conceptualizations of global (i.e., evaluation of the total self) and specific (i.e., situational or task-specific) self-esteem. By contrast, self-efficacy always refers to task-specific capability. "Some researchers (for example, Shrauger, 1972) have studied task-specific self-esteem by assessing individuals' confidence about succeeding at a given task; this operational definition of task-specific self-esteem appears to be synonymous with self-efficacy. Self-esteem typically refers to a global construct that taps individuals' self-evaluations (and not merely their confidence judgments) across a wide variety of situations" (Brockner, 1988: 14).

Self-efficacy also has been likened to expectancy. Vroom's (1964) theory that expectations influence action refers to two types of probabilistic estimates: behavior-outcome relationships, such as effort to performance (Expectancy 1 or E_1), and outcome-outcome contingencies, such as performance to reward (Expectancy 2 or E_2). E_1 is considered more analogous to self-efficacy; in fact, both constructs flow from similar theoretical notions that expected performance outcomes depend heavily on the type of behaviors an individual chooses to execute.

However, several conceptual and measurement distinctions between self-efficacy and expectancy theory concepts have been articulated previously (cf. Bandura, 1984; Bandura, 1986; Gist, 1987; Locke, Frederick, Lee, & Bobko, 1984). In general, conceptual distinctions between self-efficacy and E_1 suggest that self-efficacy may represent a more comprehensive formulation of the rationale underlying the expectancy theory construct. For example, the most frequent conceptualization and empirical assessment of E_1 is in terms of the relationship between effort and performance (Mitchell, 1974). By contrast, Bandura asserted not only that self-efficacy subsumes variables typically not included in E_1 (such as mood), but also that "[s]elf percepts of efficacy are not simply inert predictors of future behavior" (1984:

242). Though both constructs involve forethought, self-efficacy is viewed as having *generative* capability: it influences thought patterns, emotional reactions, and the orchestration of performance through the adroit use of subskills, ingenuity, resourcefulness, and so forth (Bandura, 1984, 1986).

Measures in use also contribute to the divergence (or convergence) of these constructs. Locke and his colleagues (1984) articulated a number of differences typically found between effort-performance and self-efficacy measures (e.g., self-efficacy measures often distinguish between magnitude and strength, whereas effort-performance measures typically do not). As is the case with differences between self-esteem and self-efficacy, operational definitions of E_1 sometimes approach in similarity those typically used for self-efficacy (i.e., assessing expectancies across a range of performance levels rather than for one assigned performance goal, and assessing for immediately subsequent performance—cf. Ilgen, Nebeker, & Pritchard, 1981). However, self-efficacy generally encompasses a broader range of predictors of a performance level for a specific task, whereas expectancy focuses on a narrower behavioral predictor of overall performance on a job.

Relevance to self-regulation. Self-efficacy is one of several cognitive processes frequently considered in self-regulation (a comprehensive process of cognitive, individual determination of behavior). Convergent evidence for the importance of self-regulation in motivation and performance is provided by several streams of organizational research. These include, but are not limited to, goal setting (cf. Locke & Latham, 1990), control theory (see Klein, 1989, for a review of various control theory perspectives), and an integrative model of motivation and cognitive abilities (Kanfer & Ackerman, 1989).

Even though a complete review of the role of self-efficacy in self-regulation is beyond the scope of this article, several consistent findings deserve mention. First, self-efficacy has been shown to influence both goal level and goal commitment (Locke et al., 1984; Taylor et al., 1984). Second, self-efficacy influences an individual's initial choice of activities and tasks and his or her coping efforts while engaged in these tasks (Lent et al., 1987; Stumpf et al., 1987). "People process, weigh, and integrate diverse sources of information concerning their capabilities, and they regulate their behavioral choices and effort expenditure accordingly" (Klein, 1989: 167). Finally, self-efficacy influences the interpretation of feedback (Silver, Mitchell, & Gist, 1991) and affective reactions to the task (Gist et al., 1989; Kanfer & Ackerman, 1989), which have an impact on the self-regulatory processes that influence subsequent performance (Bandura, 1986; Kanfer & Ackerman, 1989).

In sum, self-efficacy is an important motivational construct. It influences individual choices, goals, emotional reactions, effort, coping, and persistence. Self-efficacy also changes as a result of learning, experience, and feedback. To clarify further the construct of self-efficacy (and to consider its determinants), brief attention should be given to how the construct is assessed and the factors influencing that assessment.

Measurement Issues

The traditional measurement of self-efficacy (discussed by Bandura, 1984, 1986) requires that an individual respond dichotomously (yes or no) to whether he or she is capable of performing at several specific levels on a specific task (the sum of positive responses is the magnitude of self-efficacy). For each affirmative response, confidence is then rated on a scale that ranges from 1 or 10 (quite uncertain) to 100 (quite certain) at 1- or 10-point intervals, respectively (cf. Gist, 1989; Gist et al., 1989). The sum of confidence ratings is the strength of self-efficacy. A variation is that strength may be measured by eliciting and summing the confidence ratings for all performance levels (as opposed to only those for which there is an affirmative response—cf. Locke et al., 1984). Whichever method is used, scores are then correlated with performance across subjects. Magnitude and strength can account for independent sources of variation in performance, so both may be used. However, strength seems to be preferred for analyses because of its wider variance. On some occasions, Likert-type scales have been used which simply ask how well the person thinks he or she can do on the task: that scale score is then correlated with performance (Bandura, 1977; Hill et al., 1987; Schunk, 1983, 1984).

An important question arising from the measurement protocol is "whether subjects can accurately predict their own behavior" (Eastman & Marzillier, 1984: 224). The methodological issue inherent in this question is the construct validity of self-efficacy. Based on the literature cited previously, the predictive validity of self-efficacy is well established, and predictive validity is part of overall construct validity (Cook & Campbell, 1979).

However, self-efficacy is unique from a construct validity perspective. In many behavioral research situations, construct validity is established by showing that different measures of the same construct are highly correlated (Campbell & Fisk, 1959). When measuring self-efficacy, an individual is asked to predict performance, yet the criterion to which self-efficacy should be related most is also performance. Thus, predictive validity for self-efficacy is conceptually similar to the way in which construct validity would be assessed, and support for predictive validity can be construed as partial support for construct validity (Landy, 1986). In this sense, support for the theory is very similar to the type of support generated for the Fishbein and Ajzen (1975) and Ajzen and Fishbein (1980) model of attitudes, in which a very specific intention to engage in a very specific behavior is correlated with the demonstrated behavior. When the correlations are high, then the support is strong and unambiguous; it supports both the measure and the theory.

Problems arise when the correlations, although supportive, are not very strong (e.g., Locke et al., 1984; Stumpf et al., 1987; Taylor et al., 1984; Wood & Locke, 1987). A moderate or low correlation can mean that (a) self-efficacy is not strongly related to performance on this particular task (e.g., a task in which luck plays a large part, such as gambling), (b) the

measure of self-efficacy was not very good (i.e., weak differentiation of performance levels), (c) there was difficulty in assessing self-efficacy accurately (e.g., a task that was new to the subject), or (d) the theory is wrong.

A number of factors can degrade this self-efficacy-performance relationship. For example, complex tasks (cf. Campbell, 1988; Wood, 1986) require the subject to estimate numerous skill and motivational parameters (Bandura 1988b). The complexity of this cognitive activity may increase the error of assessment. Second, the time between self-efficacy assessment and criterion assessment should decrease the predictability of self-efficacy, as demonstrated by Wood and Locke (1987). Third, inaccurate or ambiguous feedback can degrade the self-efficacy → performance relationship. Fourth, the less well defined the performance levels are on the task, the lower the correlation (Eastman & Marzillier, 1984). And fifth, the less experience people have with a task, the less accurate their prediction of performance (Bandura, 1988b; Kanfer, 1991). The problem for the researcher is to determine whether low correlations between self-efficacy and performance are due to the complexity of the task involved, when and how self-efficacy was assessed, or the person's familiarity with the task.

Another implication for construct validity arises from examining the measurement protocol. When people are asked to evaluate their "capability" of performing a task at specific levels, what do they consider exactly? This question is addressed in the next section. Given the foregoing methodological discussion, the subsequent ideas in this article are based on the assumption that the task for which self-efficacy is being assessed has relatively well defined (i.e., unambiguous) performance levels. Also, although self-efficacy is a dynamic construct, at any given point of measurement, a person must consider a variety of information cues to form a judgment. The following analysis of self-efficacy determinants depicts such a point in time.

DETERMINANTS OF SELF-EFFICACY

Theoretical Analysis

Bandura suggested that four categories of experience are used in the development of self-efficacy: enactive mastery (personal attainments), vicarious experience (modeling), verbal persuasion, and physiological arousal (e.g., anxiety). Although these experiences influence efficacy perceptions, it is the individual's cognitive appraisal and integration of these experiences that ultimately determine self-efficacy (Bandura, 1982). Thus, self-efficacy may be thought of as a superordinate judgment of performance capability that is induced by the assimilation and integration of multiple performance determinants.
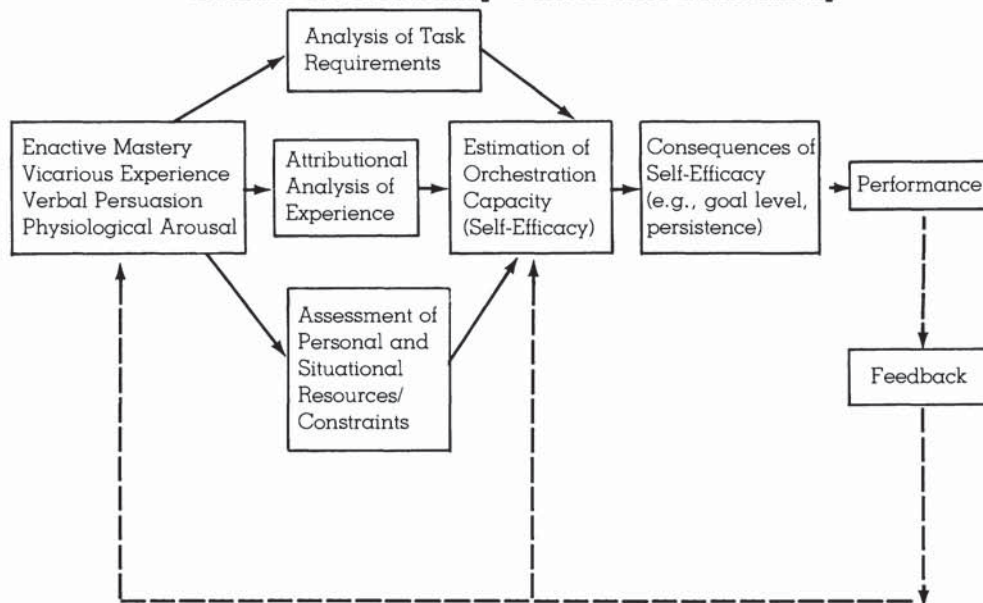
Theoretical implications of these experiences and their attendant efficacy perceptions have been articulated for organizational behavior and human resource management (Gist, 1987). However, little attempt has been made to identify and organize the specific information cues provided by the

four types of experience. Further, limited understanding exists as to how individuals evaluate those cues in forming self-efficacy.

Figure 1 presents a simplified view of the process by which self-efficacy is formed. Note that the major emphasis is placed on those judgments and information categories that precede the efficacy assessment; the consequences of efficacy beliefs (e.g., goals) are not the focal concern in this figure. Three types of assessment processes appear to be involved in forming self-efficacy. First, there is an analysis of task requirements. This analysis produces inferences about what it takes to perform at various levels. For example, someone considering the task of making a market forecast may consider the extent to which mathematical abilities (e.g., statistics) will be required in order to perform well and how much time will be needed. This task analysis should be most explicit when the task is fairly novel or when it has been observed only. When the task has been performed personally and frequently in the past, the individual is likely to rely more heavily on his or her interpretation of the causes of previous performance levels.

Thus, a second form of analysis is typically involved in efficacy judgments: an attributional analysis of experience. This analysis involves the individual's judgments, or attributions, about why a particular performance level occurred (e.g., "I've done good forecasts in the past which I attribute to my math skills and/or my hard work"). People seek answers to the question of why things happen, both out of a desire for mastery as well as out of simple curiosity (cf. Kelley & Michela, 1980; Weiner, 1985). Kelley (1971: 22)

FIGURE 1
A Model of Self-Efficacy–Performance Relationship

asserted, "The attributor is not simply an attributor, a seeker after knowledge: his latent goal is that of effective management of himself and his environment." Although personal experiences may provide the strongest information for attributional analysis, causal information also can be inferred from experiences such as modeling or persuasion. For example, through the symbolic coding process (cf. Decker, 1980), an individual may deduce the relevant skills and behaviors used by a model in performing a task, approximate the extent to which those skills are similar to his or her own, and infer the amount of his or her own effort versus skill that would be required to produce a comparable performance.

The assessment of task requirements and attributional analysis of experience provide some sense of what it will take to do well on the task in terms of ability and motivational components, and in terms of the relative contributions of these to performance. However, these two antecedent processes appear to yield necessary but insufficient data in the formation of self-efficacy. There remains an examination of self and setting by which the individual assesses the availability of specific resources and constraints for performing the task at various levels. This assessment requires consideration of personal factors (e.g., skill level, anxiety, desire, available effort) as well as situational factors (e.g., competing demands, distractions) that impinge on future performance.

Though these three assessment processes are relatively independent, progression through them may occur in an iterative manner, and the relative emphasis on each process may be influenced by the nature of the task itself or by the extent of prior experience with the task. These assessment processes yield interpretive data that are used in a summary-level judgment process which defines self-efficacy: the estimation of orchestration capacity. Indeed, Bandura (1988b) argued that self-appraisal is a process in which different sources of information are weighted and integrated to form self-efficacy, and that the relative weighting of information may vary across domains of functioning and situational circumstances.

Information-Processing Issues

The theoretical analysis of the process by which self-efficacy is formed, presented in Figure 1, can imply extensive cognitive activity or very limited activity. Even though it is beyond the scope of this article to present a detailed description of how various cues may be processed and integrated (indeed, there are extensive possibilities), some issues about this processing deserve attention.

Depth of processing. An important distinction is noted between a fairly in-depth analysis (often called controlled processing) and a quicker, more superficial judgment process (often called automatic). A number of authors have focused on this distinction in areas such as attitude development and change (Petty & Cacioppo, 1986), attitude strength (Fazio, 1986), task perceptions (Zalesny & Ford, 1990), decision making (Mitchell & Beach, 1990), mental health (Langer, 1989), organizational behaviors (Weiss & Ilgen,

1985), performance appraisal (Feldman, 1981), and group norms (Gersick & Hackman, 1990).

There exist several theoretical descriptions of the systematic, detailed, controlled, in-depth, and analytic approaches (Beach & Mitchell, 1978; Einhorn & Hogarth, 1981; Feldman, 1981; Graik & Lockhart, 1972; Petty & Cacioppo, 1986), as well as theories of judgment processes described as automatic, intuitive, mindless, unanalytic, or schema driven (Chaiken, 1986; Feldman, 1981; Schneider & Schriffen, 1977; Taylor & Crocker, 1981). Although these theories differ in some important ways in focus, there is some agreement about the factors that prompt controlled versus automatic processes to occur. Specifically, novelty, unexpected failure, salience or importance of the task, and changes in major aspects of the self or task tend to prompt more rigorous analysis. Also, with respect to more in-depth or controlled judgments, methodological procedures have been developed that demonstrate how multiple cues are weighted and evaluated. These methods include the lens model (Beach, 1967; Brunswick, 1956; Slovic & Lichtenstein, 1971) and functional measurement procedures (Anderson & Zalinski, 1988).

It is suggested here that judgments about efficacy become more routinized and automatic as experience with a task increases. Drawing on the previous literature, when tasks are novel, when changes have taken place in the person or task which affect performance, or when the task is salient or important to the individual, a more detailed analysis is likely. In these situations, a person may assess, in depth, the task demands, the environmental constraints and support, and his or her own attributes and feelings when forming self-efficacy.

However, under routine circumstances, the individual is apt to refer simply to his or her previous performance level and to utilize that level as the primary determinant of self-efficacy. Between these two extremes may be situations in which the person considers past performance, makes simple attributions about the causes of past performance, and adjusts self-efficacy accordingly, or invokes scripts or other cognitive schema (perhaps developed from vicarious experience or experience with other tasks) when judging efficacy.

Accuracy. The accuracy of self-efficacy judgments can be viewed in various ways. Most global is the accuracy of the efficacy judgment itself. This accuracy basically is reflected by the predictive validity of self-efficacy. The higher the correlation, the greater its accuracy, but a number of subordinate accuracy judgments are important for overall accuracy. These are estimates of (a) the amount of a particular resource that is needed to perform well, (b) how much of an attribute or resource the individual has or the situation provides, (c) how various resources and attributes contribute to performance relative to other resources, and (d) the specific attributions that are made about causes of performance.

Two major factors appear to influence the accuracy of these assessments. First, as suggested previously, there is the individual's experience

with the task. As a person gains experience with a task, it is less likely that detailed task and resource analyses will be done and it is more likely that the person simply will use past performance and attributions about the causes of that performance as major predictors of how he or she can perform. In general, past experience regarding the task should increase the accuracy of self-efficacy to the extent that causal attributions about past performance are accurate.

The second factor concerns personal and task stability. If personal characteristics have changed in major ways or are currently undergoing change, an individual may be less accurate in judging efficacy. Similarly, if the task itself involves characteristics that change (e.g., working with a new person may be different than working with a known co-worker), the less stable the task attributes, the less accurate self-efficacy may be.

In summary, forming an efficacy judgment initially may require an extensive analysis of the task and the person's own situational resources and constraints. As experience with the task increases, shorthand evaluations and stable attitudes about the task may evolve; these may be reflected in the formation of self-efficacy through simpler processes of recalling past performance level(s) and making attributions (perhaps aided by schema or scripts, such as "I did a mediocre job last time, but then I never do well at those types of tasks, so I'm sure I'll do poorly next time too"). Thus, the judgment process, with repeated exposure to a task, moves from controlled to automatic, and from weakly held, unstable and potentially less accurate judgments to more strongly held, stable, and accurate ones. Indirect support for this is suggested by Bandura's (1982) identification of a hierarchy of influence in forming self-efficacy, whereby mastery experiences (personal attainments) are viewed as providing the strongest information for self-efficacy, followed in decreasing order of influence by vicarious experience, verbal persuasion, and physiological arousal. Accumulated personal experience with a task provides direct information about performance attainments, whereas data from modeling, persuasion, and arousal are less direct. Direct knowledge about capabilities should lead to more automatic information processing and the formation of efficacy judgments that may be more stable and accurate, compared to judgments formed from the indirect information provided by modeling, persuasion, and arousal.

AN OVERVIEW OF EFFICACY CUES

The following specification of self-efficacy determinants reflects an intellectual debt to attribution theory in two distinct ways. First, one of the antecedent processes involved in forming efficacy judgments has been described as a causal attribution process. The resulting attributions become cues for subsequent self-efficacy. Thus, some of the determinants of self-efficacy are well-recognized attributional causes (i.e., effort, ability, luck, task difficulty). These attributions are clearly distinct from efficacy beliefs; whereas attributions are assessments about causes of past behavior, self-

efficacy pertains to future performance capability (cf. Silver et al., 1991). However, attributions made through a causal analysis of the past are useful in assessments of future capability. "The factors singled out by attribution theory serve as conveyors of efficacy-related information that influence performance attainments mainly by altering people's beliefs in their efficacy" (Bandura, 1988a: 38). Specifically, self-efficacy mediates the attribution → performance relationship (Bandura, 1988a; Fosterling, 1985; Schunk & Gunn, 1986).

The second contribution of attribution theory for understanding self-efficacy determinants is derived from the work of Weiner (1985) and others who provided distinctions (i.e., internal/external, stable/unstable, controllable/uncontrollable) that could be used to categorize attributions. The same distinctions can be used to group the factors influencing efficacy judgments. More specifically, a variety of factors that influence efficacy are external task factors (e.g., group interdependence, distractions such as noise), whereas other factors are internal (e.g., health, mood). Also, some of these factors can either change or be changed readily (e.g., distractions and mood), but other factors may be more resistant to change (e.g., group interdependence or health). Finally, some factors are more or less under the control of the person (e.g., effort), some are largely controlled by the organization (e.g., task resources), and some may be uncontrollable (e.g., weather, temporary illness). Thus, the structural framework (but not the content) of attribution theory can be helpful for organizing the types of cues that influence efficacy assessments.

One final comment is needed regarding this overview. As mentioned previously, efficacy judgments may require an analysis of a large number of cues. External factors appear to affect self-efficacy indirectly through their influence on internal variables, such as motivation, ability, performance strategies, and so on. Some of these same internal factors (i.e., motivation, ability, performance strategies) can be estimated directly through reflection and internal focus. This point is important for later discussion of the ways in which self-efficacy can be changed by methods that are designed to change these external factors or internal assessments.

External Cues

The primary external cues pertain to the task itself, and they indirectly influence self-efficacy through their evaluation by the individual. First, the task attributes are important. Individual estimates of efficacy may include considerations of the degree of interdependence (cf. Kiggundu, 1981) and the amount of resources (i.e., material resources, time, and staff) required to complete the task successfully (Bandura, 1988a). In an organizational context, a lead programmer asked if he or she is capable of completing a large software project within a certain schedule would consider factors such as whether others who are working on interdependent subcomponents of the program will complete their portions in time, whether user time is required on the hardware to fully test the software, and so on. Evidence that task

attributes are determinants of self-efficacy is offered by Cervone (1985), who demonstrated that when people were asked to focus on formidable aspects of the task, their self-efficacy was lowered. Self-efficacy was increased by focusing on doable aspects of the task.

Another external cue pertaining to any task is its complexity (Campbell, 1988; Wood, 1986). In the formation of self-efficacy, the important components of complexity include the number of component parts involved in completing the task, uncertainty (dynamic elements or probabilistic linkages), and the sequential or coordinative steps required to perform the task successfully. Cervone and Peake (1986), for example, changed efficacy judgments simply by manipulating (i.e., increasing or decreasing) the level of possible performance attainments on a task.

The task's environment also may influence performance estimates. For example, when a person performs a task that requires the application of analytical skills in a task environment in which there are many distractions (e.g., noise, interruptions), this environment may lower performance estimates when compared with a task environment that is less distracting. Also, the amount of risk or danger in the setting (whether physical or psychological) may influence self-efficacy. Distractions and risk may increase anxiety, which can reduce efficacy through thoughts of failure, physiological manifestations of stress, and the reduction of coping mechanisms (Lazarus & Folkman, 1984). Other environmental factors that may relate to self-efficacy are physical conditions (e.g., weather) or the geographic setting (e.g., performance of a negotiator at the home office versus performance at the opponent's site).

Watching others (modeling) also may provide information about abilities. "People partly judge their capabilities in comparison with others" (Bandura, 1988c: 143). Modeling appears to be a particularly effective means of providing information on "correct" performance strategies, because this information may not be available otherwise (even from past performance). In addition, psychological strategies (such as coping with boredom or anxiety, or persisting despite difficulty) can be evaluated by observing others. Also, task familiarity and the observation of others provide knowledge about the relative contribution of ability and motivational components (e.g., effort, persistence) required by the task (Kanfer & Ackerman, 1989).

Information cues derived from external verbal persuasion may include feedback or instruction about abilities. Bandura and Cervone (1986) demonstrated that feedback information (in the form of a discrepancy between performance and a personal standard or goal) can influence self-efficacy. Of critical importance are the credibility, expertise, trustworthiness, and prestige of the person doing the persuading (Bandura, 1977).

Other persuasive discussions (i.e., pure persuasion) may lack specific information about the person's ability and focus primarily on convincing an individual, through emotional or cognitive appeals (e.g., exhortations), that he or she can perform a task at a certain level. Though such appeals may

result in more weakly held efficacy beliefs because less is learned about the requirements of task performance, they clearly can have an impact on efficacy judgments (Schunk, 1983, 1984). Arguments resting on pure persuasion may provide information about the amount of effort that an individual should expend (perhaps altering goals, priorities, interest, or affect).

Internal Cues

Familiarity with a task through personal or vicarious experience will provide information that is directly accessible. Of particular importance is the adequacy of an individual's ability (knowledge and skills) and the effectiveness of various performance strategies that utilize these skills (Bandura, 1988c; Earley, Connelly, & Ekegren, 1989). Different types of task performance strategies may facilitate performance. These may include behavioral strategies (such as feedback-seeking or interpersonal negotiations), analytical strategies (such as breaking the task into subparts for ease of cognitive processing or identifying a simpler way of solving a problem than is typically considered), and psychological strategies (such as persisting despite difficulty, coping with boredom, or managing anxiety). Self-efficacy will be determined, in part, by the individual's assessment of whether his or her abilities and strategies are adequate, inferior, or superior for performance at various task levels. Also relevant is whether the person believes these abilities and strategies are either fixed and immutable (i.e., inborn talent) for the task or can be acquired or improved through additional training and experience (Wood & Bandura, 1989a).

Individuals also make judgments about anticipated performance based on how positively aroused (i.e., excited, enthusiastic) or negatively aroused (i.e., fearful, anxious) they feel when confronted with a particular task (Bandura, 1988a, 1988b). Arousal may be influenced partly by external variables discussed previously (e.g., distractions, risk). However, three other factors may induce arousal. First, there is general physical condition. For example, an existing ulcer may inhibit performance on tasks that a person deems stressful. Second, there are certain personality factors that influence arousal, subsequent performance, and probably self-efficacy. For example, Type A personalities, recognized for having generally higher levels of psychological arousal than Type Bs (Friedman & Rosenman, 1974), have been shown to have higher self-efficacy and performance (Taylor et al., 1984). In contrast, individuals with low self-esteem, who suffer from anxiety in many task-performance situations, typically have an elevated self-attentional focus (i.e., concern about their anxieties and inadequacies) that detracts from task performance (Brockner, 1979). Thus, it is expected that self-efficacy may be depressed across a greater variety of tasks for individuals with low self-esteem when compared to those who are high in self-esteem. Finally, a person's immediate affect (or mood) may affect arousal and efficacy. Mood can be determined by numerous events that are both task related (Russell & McAuley, 1986) and not task related, such as incidents in a person's private life, the kind of traffic the person encountered on the way to work, or the

time of day. Kavanagh and Bower (1985) demonstrated that a mood manipulation resulted in higher self-efficacy scores for a positive state (mood) and lower self-efficacy scores for a negative state.

A Three-Dimensional Model of Efficacy Determinants

As discussed previously, the experiences of mastery, modeling, persuasion, and arousal (Bandura, 1986) are more complex than their labels imply; each of these experiences contributes a variety of external and internal information cues that can influence self-efficacy. However, this consideration examines only one dimension of attribution theory: the locus of causality. Two other major dimensions which should be considered are the variability (over time and occasions) and the controllability of the causal influence. In Figure 2, we have presented a two × two table which organizes the cues according to their locus of causality and variability. Also, we have indicated the extent to which these cues are associated with controllability.

In the low variability/external determinant category are factors pertaining to the attributes of the task (e.g., interdependence and resources) and the complexity of the task (e.g., difficulty, uncertainty). Low variability/ internal determinants refer to assessments of ability as well as stable dispositional attributes (e.g., physical condition, personality). The high variability/external cues are produced by the task environment (e.g., distractions, risk). Finally, the high variability/internal determinants include current performance strategies, and motivation to exert effort (which is influenced by goals, priorities, interest, and mood).

The third distinction suggested by attribution theory is controllability (Weiner, 1979). When making efficacy assessments, individuals also consider whether they exercise control over the determinants (Bandura & Wood, 1989). However, controllability can vary in several ways. First, some factors are primarily under personal control (depicted as internal in Figure 2), and some are primarily under the control of others in the organization (depicted as external in Figure 2). In many cases, individuals have, or perceive themselves to have, little or no control or influence over external factors. Thus, perceived control is likely to be higher over internal than external factors.

A second way in which control can vary is based on the time horizon between self-efficacy assessment and performance. Some factors can change immediately (such as effort), whereas others may be changeable, but only after a long period of time (such as ability or general physical condition). Thus, perceived control may be higher over determinants that are immediately variable than over those that are relatively more stable.

Finally, independent of the time available, some factors may be relatively uncontrollable by either the organization or the individual (e.g., fortuitous resources arising from unanticipated profits, temporary physical illness). Thus, controllability is partly, though not entirely, independent of the locus and stability of efficacy determinants shown in Figure 2. With the

FIGURE 2
Determinants of Self-Efficacy
Locus of Determinant[a]

	External	**Internal**

L O W	Task Attributes
	  Interdependence
	  Resources
	
	Task Complexity
	
	Number of
	  component parts
	
	Sequential
	  performance
	  requirements
		Ability
		  Knowledge
		  Skills
		
		General Physical Condition
		  Average fitness level
		  General health
		  Skill variety
		
		Personality
		  Type A/B
		  Self-esteem

H I G H	Interpersonal
	Environment
	  Persuasion
	  Feedback
	  Models
	
	Task Environment
	  Distractions
	  Risk/Danger
	  Physical/Geographical
	    setting
		Performance Strategies
		  Behavioral
		  Analytical
		  Psychological
		
		Effort
		  Goals
		  Priorities
		  Interest
		  Affect (mood)

Variability of Determinant[b] (vertical axis label, LOW at top, HIGH at bottom)

[a] External determinants are primarily under the organization's control. *Internal determinants are primarily under personal control.*

[b] In general, greater control may be perceived over highly variable determinants than over determinants low in variability. With the exception of spontaneous, luck-oriented factors (such as temporary illness), the *high variability internal determinants should correspond with the highest perceived control.*

exception of spontaneous, luck-oriented factors (temporary illness, etc.), when individuals make attributions to internal, more variable causes, controllability should be perceived as highest (Fosterling, 1985). When control seems low, especially over causes that are likely to lead to poor performance (e.g., poor health or risk), negative outcomes in the form of learned helplessness or anxiety may occur (Mikulincer & Nizan, 1988; Seligman,

1975). Holding constant other variables, the greater the personal control, the higher self-efficacy should be (Fosterling, 1985).

In sum, experiences such as mastery and modeling provide information cues regarding efficacy that can be categorized using the distinctions of externality, stability, and controllability provided by Weiner (1985). The meaning of these cues (in terms of relative importance or weighting) appears to be inferred primarily from an attributional analysis of experience when tasks are familiar. When tasks or personal/situational factors are new or have changed significantly, the meaning of cues may be inferred from an in-depth analysis of task requirements, coupled with an assessment of personal and situational resources/constraints. Weighted cues can then be processed (cf. earlier references to theories and methodological procedures involved in complex judgment formation) to estimate orchestration capacity for performance (i.e., self-efficacy). In turn, self-efficacy affects performance through behavioral choices such as goal level, effort, and persistence. When researchers conceptualize performance information cues in terms of their underlying dimensions (e.g., externality), this process facilitates an understanding of how self-efficacy may be changed—an important topic for improving motivation and performance.

IMPLICATIONS FOR ENHANCING SELF-EFFICACY

The significance of self-efficacy in predicting performance on work-related tasks has been demonstrated clearly by the studies cited previously. An important implication for researchers and practitioners is that an increase in positive beliefs or a reduction of debilitating beliefs may lead to higher task performance. Some organizational studies have reported positive posttest differences in mean self-efficacy and performance for participants who were exposed to various forms of self-management and modeling training (Frayne & Latham, 1987; Gist, 1989; Gist et al., 1989). Other studies in the clinical and educational arenas have used techniques based on operant principles (Andrews & Debus, 1978), modeling (Zoeller, Mahoney, & Weiner, 1983), information (Wilson & Linville, 1985), and persuasion (Schunk, 1984) to change beliefs, attributions, expectancies, and self-efficacy (Bandura, 1977). However, the extent to which self-efficacy and performance can be raised and the overall malleability of self-efficacy still are unresolved issues. Little attempt has been made to understand systematically which determinants might be altered to yield the greatest change in self-efficacy and which change strategies should be used. The model shown in Figure 2 serves as a theoretical framework for conceptualizing the change process.

Limits to Change

Based on the previous discussion, the degree of change in self-efficacy should be influenced by four factors. These are the initial level of self-

efficacy (high or low), and the variability, locus, and controllability of the determinants of self-efficacy.

Level effects. Within person analyses of self-efficacy increases should be subject to ceiling effects when pretest self-efficacy is high. Regardless of its accuracy (predictive validity), there is little room for positive change in self-efficacy level. In contrast, low self-efficacy will be less subject to a ceiling effect and can be increased contingent on the extent to which initial efficacy perceptions were inaccurate.

When low self-efficacy is an inaccurately low assessment of performance "capability," this perceptual error may result from incorrect assessments of task or individual influences on performance (i.e., how much and of what is required, how much the person has, and the relative contributions of each determinant). Positive information about these determinants (e.g., reassurance about task resources or abilities, emphasis on the need for concentration and effort) can lead to greater increases in self-efficacy when it is low than when it is already high. Alternatively, low self-efficacy may be an accurate reflection of performance capability. In this case, the level of self-efficacy can be raised through verbal persuasion, but this increase in self-efficacy probably will reduce its predictive validity and will be of short duration if performance fails to improve.

Thus, two processes seem to account for increases in self-efficacy level which lead to corresponding increases in performance. The first is direct intervention to correct inaccurate and low perceptions of performance capability. Such misperceptions may be widespread, but they are by no means the only cause of low self-efficacy. When low self-efficacy results from an accurate assessment of low capability, self-efficacy is best increased indirectly through an alteration in task and personal factors that are directly related to performance levels (e.g., skill level, distractions).
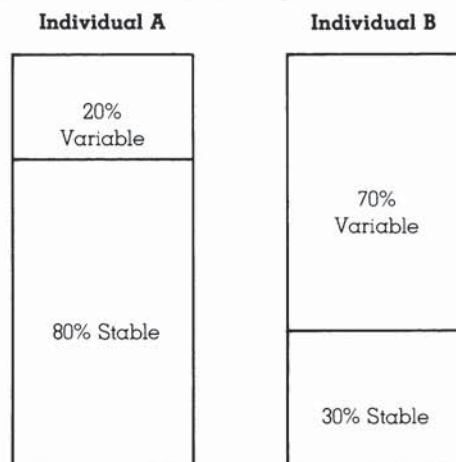
Stability and locus of determinant. Much of the research on changing self-efficacy has been conducted in clinical or educational settings (cf. Bandura, 1986; Wilson & Linville, 1985). However, these findings may not generalize completely to organizational contexts where the task demands may be quite different. Using the model in Figure 2, differences in self-efficacy between phobics (e.g., snake phobics) and nonphobics might arise from the locus and variability of the determinants of self-efficacy. Regarding phobias, the focal determinants may be primarily internal and highly variable (e.g., effort exerted toward approaching the snake, a performance strategy such as psychological coping with anxiety). The motor and intellectual skills required for touching a snake are present in most individuals. By contrast, many work tasks require knowledge and skills that must be learned over time through extensive training. To the extent that ability is a relatively important and less variable determinant of performance than effort, the potential for generating immediate and accurate changes in self-efficacy will be limited.

A further understanding of how self-efficacy can be changed is enhanced by attention to external determinants: the task and its environment.

Kanfer and Ackerman (1989) and Norman and Bobrow (1975) pointed out that tasks vary in the extent to which performance is sensitive to the amount and type of resources (e.g., effort, ability) expended. Some tasks are resource dependent, whereas other tasks are resource insensitive (Wickens, 1984). On the one hand, if the task is resource insensitive (i.e., ability and effort are not strongly related to performance), then either the individual or the organization must change the task or its attributes (e.g., uncertainty, risk) if self-efficacy is to be increased and subsequent performance enhanced. On the other hand, if performance on the task is sensitive to ability, effort, and persistence, then efforts to change self-efficacy (by changing beliefs, information, and knowledge) may lead to performance increases.

The degree of change that might be expected in self-efficacy is partly a function of the variability and locus of its determinants; thus, individual differences in the composition of self-efficacy must be considered when interventions are designed to enhance it. As an illustration, using Figure 3, consider the situation of two budget analysts facing intensive preparation of divisional forecasts for the coming fiscal year. Assume that each individual has an identical, accurate (i.e., very predictive), and low self-efficacy for the task. Individual A perceives that the forecasting task is high in complexity and that she has limited skills (technical knowledge) to apply to it. She generally copes very well with the high pressures of her other work; thus, she plans to work hard on the forecasting task, although she is troubled about her lack of requisite task knowledge. In contrast, Individual B acknowledges the high task complexity, but feels he has excellent skills for the forecasting job. However, he is disinclined to work hard on it because of his high volume of other work and his anticipation that one of the managers from whom he needs input will be typically late in providing it.

FIGURE 3
Individual Differences in Composition of Self-Efficacy

Individual A

20% Variable

80% Stable

Individual B

70% Variable

30% Stable

Because ability is a necessary, but not sufficient, requirement for performance (i.e., a person can have high ability but intend to put forth no effort), the relative contribution of ability and effort to perceived capability (i.e., self-efficacy) and performance can vary widely across individuals for the same task. Note that two people can have either different levels of a particular factor (e.g., ability) or weight that factor differently in the extent to which they perceive it contributing to their performance. Thus, the same self-efficacy score can result from multiple combinations of weights and values assigned during the estimation of orchestration capacity. In the example above, the low self-efficacy of Individual B results primarily from the heavy weights and low values applied to psychological coping and effort (relatively variable determinants). Individual A's low self-efficacy results primarily from the heavy weight and low value applied to her technical knowledge (a more stable determinant). An intervention designed to enhance self-efficacy through training and providing task knowledge may yield greater improvement in self-efficacy and performance for Individual A than for Individual B. Similarly, interventions designed to increase intentions to expend effort (e.g., goal setting, incentives) may increase self-efficacy substantially for Individual B, but only marginally for Individual A.

Thus, a change in the mean level of self-efficacy may lead to a change in the mean level of performance across individuals. However, it is the highly variable, internal determinants that are most likely to lead to immediate changes in self-efficacy and performance within individuals. Some support for this is found in the educational literature where the greatest amount of positive change in self-efficacy, effort, and persistence occurs when people are led to believe their failures are due to lack of effort (Fosterling, 1985). Similarly, Anderson (1983) found that subjects who believed task performance was determined by variable causes (e.g., effort, task strategies) were less discouraged by failure than people who believed that the causes of performance were stable (e.g., character dispositions and ability).

Controllability. The more that people believe that the causes of performance are uncontrollable, the lower and more resistant to change will be their self-efficacy. However, most of the determinants of efficacy are at least partially under the control of the individual and the organization, although the relative control will vary. As was mentioned, internal cues like effort may be controlled directly by the individual, whereas external cues such as task interdependence tend to be controlled more by the organization (i.e., organizational structure or work assignment). Some external cues (i.e., interdependence, task difficulty) will influence self-efficacy only to the extent that they are recognized in advance by the individual. Also, some of the internal factors, like effort, can be influenced by organizational interventions (e.g., bonuses for hard work), and people can be taught how to improve their control over the environment through training in assertiveness, influence tactics, impression management, leadership skills, and so on.

Self-efficacy level is limited in a variety of ways by the controllability of the determinants. Some determinants are not controllable by anyone

(e.g., weather). Other determinants may be controllable for long-term development but not for immediate change (e.g., personality, physical fitness, extent of knowledge and skills). Still other determinants are controllable only to the extent that they are recognized, or acted upon by the organization or the individual (e.g., task complexity, appropriate strategies). An understanding of both the task and the individual is needed if self-efficacy is to be enhanced.

The Process of Change

Recall that self-efficacy mediates the translation of knowledge and abilities into skilled performance (Bandura, 1988b). Two potential contributors to this process deserve further attention: the attributional process and feedback.

Attributions about the causes of performance differ for people with high and low self-efficacy. For example, Collins (1982) and Silver and his colleagues (1991) demonstrated that people with high and low self-efficacy interpret performance feedback similarly when successful, but dissimilarly when unsuccessful. When a person with high self-efficacy and a person with low self-efficacy both succeed (get a problem right), they attribute that success to the presence of ability. Under conditions of failure, people with high self-efficacy attribute their failure to insufficient effort or bad luck, whereas people with low self-efficacy attribute their failure to lack of ability. Because ability may be viewed as a relatively stable determinant of performance, self-efficacy and effort may decline with subsequent attempts at the task. In such a case, a spiraling downward of performance, called an exacerbation cycle (Storms & McCaul, 1976), may occur, and this may be difficult to reverse.

One major way to change self-efficacy is to intervene in this attributional process (Fosterling, 1985). This intervention is especially important if there is reason to believe that causal attributions are inaccurate, especially attributions about stable abilities or traits. The adoption of new beliefs about performance capability can be facilitated by the provision of accurate information about the causes of performance, as well as information about the specific tasks that the employee is doing well or poorly.

Thus, when attributional errors are made, it is clear that frequent and detailed feedback should enhance the accuracy of self-efficacy. However, the mechanism by which it does so needs to be understood. Feedback clarifies person-performance contingencies that may be used in the revision of self-efficacy. Bandura (1986, 1988b) conceptualized these contingencies in terms of an image-matching process. Individuals have a cognitive representation of efficacious action based on past experience, learning, observations, and the integration and synthesis of this knowledge (cf. Figure 1). These images guide behavior and function as internal standards for change. Feedback on task performance provides information for detecting as well as correcting discrepancies between images, actions, and outcomes. When performance is substandard, an accurate conception of effi-

cacy determinants will facilitate an employee's readiness to receive appropriate interventions. For example, an employee who inaccurately attributes performance failures to lack of effort may be reluctant to acknowledge the need for more skill training. However, frequent, specific feedback may help the employee correct improper attributions and participate actively in training activities.

Traditional approaches to improving performance have encompassed task-relevant improvements (i.e., work design and working conditions), motivational techniques (goal setting, reinforcement, etc.), and improvements in ability through training. Here, it has been discussed how self-efficacy can mediate the effects of these changes on performance. Evidence also has demonstrated that self-efficacy influences the degree of skill acquisition and retention in learning situations (Gist et al., 1989; Gist, Stevens, & Bavetta, 1991; Wood & Locke, 1987). Efforts to improve employee abilities (through classroom or on-the-job training) can be facilitated by understanding how to improve self-efficacy, and the ideas developed thus far suggest several strategies for improving self-efficacy and performance.

Intervention Strategies

A review of Figure 2 suggests that when the individual is engaged in efficacy analysis, major questions are asked: what is required by the task, how much can I offer under the situation, and what is the relative contribution of each performance determinant. From this perspective, three strategies for changing self-efficacy emerge:

> *Strategy 1: Provide information that gives the individual a more thorough understanding of the task attributes, complexity, task environment (primarily through the use of mastery and modeling experiences), and the way in which these factors can be best controlled.*

> *Strategy 2: Provide training that directly improves the individual's abilities or understanding of how to use abilities successfully in performing the task (primarily through the use of mastery, modeling, and persuasion experiences).*

> *Strategy 3: Provide information that improves the individual's understanding of behavioral, analytical, or psychological performance strategies or effort expenditure required for task performance (primarily through the use of modeling, feedback and persuasion).*

Individually, or in combination, these methods should lead to changes in self-efficacy accuracy and level. Strategies 1 and 2 entail the use of some fairly standard procedures, including on-the-job training, work simulations and samples, assessment techniques and centers, mentoring, counseling, job rotation, and apprenticeships. However, because self-efficacy is partly a motivational construct, the importance of individual determinants must be

weighed heavily in any consideration of how to alter self-efficacy and performance. Strategy 3 is aimed at the highly variable, internal determinants, which are generally the most individually controllable and may influence self-efficacy most immediately; thus, it deserves particular attention and it can be utilized in the following ways.

First, persuasion should take the form of counseling or coaching to clarify the pros and cons of various performance strategies. Obviously, counseling can specify the behavioral and analytical strategies that lead to better performance. However, counseling also can address psychological strategies that may increase task performance—particularly the way in which these strategies may be used to counteract task environmental concerns (e.g., imaging or relaxation).

Second, training may be required to improve an awareness of correct strategies or effort considerations. The role of behavioral modeling is well established in the training literature, yet most modeling interventions focus primarily on behavioral performance strategies (i.e., an observable sequence of actions). Successful performance may require the effective use of other types of performance strategies. Positive results have been found through the use of cognitive modeling of psychological performance strategies (i.e., the use of self-statements to mitigate inhibitions and guide performance) during training for idea generation among managers (Gist, 1989). The effectiveness of this method of training should be explored for other tasks in which psychological performance strategies may be important and for tasks involving analytical performance strategies (such as correct judgment factors and sequences in decision making).

A final utilization of Strategy 3 is suggested in a study by Bandura and Schunk (1981), who found that task interest increased, along with performance and self-efficacy, when incremental subgoals were used. Thus, training in proximal goal setting may facilitate performance (by increasing effort and interest) in cases where employees have low self-efficacy.

Each of the three major strategies for changing self-efficacy rests on the provision of information. However, even though feedback must play an important role in the revision of self-efficacy, the content of this information may vary. For example, some evidence exists that distorted information may be useful for increasing self-efficacy. Studies have shown that video feedback of prior performance can be edited, as a form of "self"-modeling, to enhance performance (e.g., Gonzales & Dowrick, 1982). One way of doing this is to remove (edit out) the individual's mistakes (selective information); another is to edit the mistakes themselves to show correct performance (positive misinformation). Apparently, the first method alters the individual's assessment of task requirements and ability level (Strategies 1 and 2). The second method might provide information (feedforward) on more effective task strategies (Strategy 3). Collectively, these data can be used to revise self-efficacy. Findings in the area of selective and distorted feedback are supported by those of Eden and Ravid (1982), who studied the effects of self-expectancies. They found that the mere induction of positive

self-expectancies (through verbal feedback) initiated and sustained higher performance for one group of trainees when compared to a control group not given the positive feedback.

The use of distorted information has ethical and practical implications that dictate caution. When individuals do not have the ability to perform well on a particular task, continued exhortations to work harder are likely to increase, rather than decrease, the exacerbation cycle and may be detrimental to self-esteem over time. The assumption that permanent, positive changes in an individual's self-efficacy can be established for every task may be both incorrect and harmful. In employment settings, attention should be focused on training methods that enhance both the motivation to learn and skill mastery, as well as self-efficacy.

SUMMARY AND IMPLICATIONS

Bandura has argued convincingly that "human accomplishments and positive well being require an optimistic and resilient sense of personal efficacy" (1988a: 49). The questions addressed here pertain to how these judgments of efficacy are made and how they can be changed. The process involved in forming self-efficacy (Figure 1) was conceptualized, the cues that people use in constructing their beliefs (Figure 2) were described and categorized, and theoretical issues related to enhancing self-efficacy were examined (Figure 3).

Much of Bandura's work has focused on how self-efficacy influences subsequent thought and motivational mechanisms, which in turn influence performance. Although current work with colleagues such as Cervone, Schunk, and Wood has focused on education or decision-making processes, some of the earlier developmental work on this theory was conducted in clinical settings with phobics. Thus, several implications exist for the extension of self-efficacy theory and practice in organizational settings.

First, further research is needed on the formation of self-efficacy. Even though this paper conceptualizes a number of self-efficacy determinants, processes by which meaning is inferred from information cues, and a perspective on how the estimation of orchestration capacity occurs, empirical validation of these is needed. Attributional analyses of past experience have been studied widely; however, the mechanisms by which individuals analyze task requirements and assess personal and situational resources or constraints in new or revised task situations are less clear. Therefore, the following propositions are offered.

> *Proposition 1: In novel task situations, self-efficacy is formed through an assessment of task requirements and personal and situational resources and constraints. The identification and weighting of multiple cues in estimating orchestration capacity (self-efficacy) in these situations is subject to the constraints and processes involved in the formation of other complex judgments.*

Proposition 2: As task experience increases, individuals rely more heavily on simple attributional analysis of past performance and current motivation as determinants of self-efficacy rather than on more comprehensive assessments of task requirements and personal and situational resources and constraints.

Next, the measurement of self-efficacy may be improved through attention to task complexity. Some evidence suggests that the predictive validity of self-efficacy for performance on complex tasks may be weaker than for performance on simple tasks (cf. Stumpf et al., 1987; Taylor et al., 1984; Wood & Locke, 1987), probably reflecting lower accuracy in assessing task requirements and individual or situational resources or constraints for these tasks. When self-efficacy is measured, attention to the subcomponents or subordinate processes required for the performance of complex tasks may enhance validity. However, some subordinate processes (e.g., creative thought) may not lend themselves well to the delineation of specific difficulty levels used in traditional measures of self-efficacy. Thus, further psychometric studies of self-efficacy for complex tasks are needed. Valid process measures could be used as a diagnostic tool for developmental needs (e.g., training and self-efficacy change), as well as for predicting performance on complex tasks with greater accuracy. Therefore,

Proposition 3: The predictive validity of self-efficacy is dependent not only on the measurement protocol but on the complexity of the task and performance criteria.

Also, more empirical studies in work-related settings are needed to develop targeted interventions for enhancing self-efficacy. Training techniques including actual experience, modeling, and persuasion can be effective. Yet more knowledge is needed about which self-efficacy determinants are influenced most by which methods and the boundary conditions on the effectiveness of various interventions. Thus,

Proposition 4: The effectiveness of interventions designed to increase self-efficacy will depend on the determinants (e.g., perceptions of abilities, task complexity) that are affected by the interventions and on the weighted contribution of these determinants to performance.

Because changing self-efficacy may require changing the way in which individuals process information and make attributions, studies are needed on the value of alternative forms of feedback for individuals who have low and high self-efficacy. Specific feedback regarding the subordinate processes involved in performance (e.g., strategies) may be more valuable than outcome feedback for enhancing self-efficacy on some tasks. Also, studies are needed to determine the effects that negative feedback has on the performance of subjects with low self-efficacy. Negative feedback may exacerbate an already fragile image of person-performance contingencies, leading to lower subsequent performance. Operant conditioning suggests that positive feedback (praise) on process components that may

have been performed successfully, coupled with the establishment of incremental subgoals on weaker process components, might be ideal for breaking exacerbation cycles among individuals with low self-efficacy. Therefore,

> *Proposition 5: Frequent feedback can increase the accuracy of self-efficacy as well as motivation. To be maximally effective, the content and sign of the feedback must be appropriate for the individual (based on self-efficacy level and the task).*

The significance of self-efficacy for motivation and performance in work settings has been well demonstrated, although many questions remain about how efficacy perceptions are formed and how they influence behavioral choices. This article provides a theoretical analysis of the determinants of self-efficacy and its malleability by integrating ideas from several domains. A number of implications of this analysis exist for research and practice in organizational behavior. Research should be pursued regarding the theoretical issues identified, the methods and techniques to enhance self-efficacy, and the understanding of how and why these interventions work. Knowledge gained from addressing these issues would be valuable not only to researchers but also to practitioners concerned with improving employee performance.

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Marilyn Gist received her Ph.D. from the University of Maryland. She is an associate professor of organizational behavior and human resource management in the Graduate School of Business Administration at the University of Washington. Her research interests focus on self-efficacy as it relates to other social cognitive influences on motivation, training, and performance.

Terence Mitchell received his Ph.D. from the University of Illinois. He holds the Carlson professorship in the Graduate School of Business Administration at the University of Washington. His current research interests include the study of social cognitive influences on decision making, motivation, and human performance.