Many of the theories that have been proposed over the years to explain human sociocognitive functioning have relied heavily on causal models favoring one-sided determinism. In such models of unidirectional causation, behavior is depicted as being shaped and regulated either by environmental influences or by internal dispositions. In the more recent, partially bidirectional models of causation, persons and situations affect each other but their influence on behavior flows unidirectionally. Social cognitive theory explains sociocognitive functioning in terms of triadic reciprocal causation (A. Bandura, 1986). In this model of reciprocal determinism, behavior, cognitive, and other personal factors and environmental events all operate as interacting determinants that influence each other bidirectionally. In analyzing the personal determinants in this interactional causal structure, social-cognitive theory accords a central role to cognitive self-regulative processes.

In this research, interactional causal structures are examined as they operate within the context of managerial decision making in a dynamic simulated environment. Each of the major interactants in the triadic causal structure—cognitive, behavioral, and environmental—functions as an important constituent of the transactional processes. The cognitive determinant is indexed by self-beliefs of efficacy, personal goal setting, self-evaluation, and quality of analytic thinking. The managerial choices that are executed constitute the behavioral determinant. The properties of the organizational environment, the level of challenge it prescribes, and its responsiveness to managerial interventions represent the environmental determinant.

The mechanisms and outcomes of complex decision making do not lend themselves readily to experimental analysis in actual organizational settings. This is because the ongoing interaction between behavioral, cognitive, and environmental factors cannot be sufficiently controlled to elucidate causal processes. A simulated environment permits systematic variation of theoretically relevant factors and precise assessment of their impact on organizational performance and the psychological mechanisms through which they achieve their effects. The temporal dynamics of triadic reciprocity require the sequential measurement of interacting factors to isolate the effects of the constituent influences. The design of the simulated environment used in this research makes it possible to examine temporal interdependencies and cumulative effects of the major classes of variables postulated to operate in the composite causal structure (R. E. Wood & Bailey, 1985; R. E. Wood & Bandura, 1989a).

Decision-making research conducted within the framework of cognitive psychology has added substantially to the understanding of how judgmental operations affect decisional activities. However, much of the research on human decision making examines discrete judgments in static environments under nontaxing conditions (Beach, Barnes, & Christensen-Szalanski, 1986; Hogarth, 1981). By contrast, in naturalistic environments decisions must be made from a wide array of information within a continuing flow of activity under time constraints and with social and self-evaluative consequences. To complicate matters further, organizational decision making requires working through others and coordinating, monitoring, and managing collective efforts. Many of the decisional rules for effective management of dynamic environments must be learned through exploratory experiences while one is coping with ongoing organizational activities. Under these more com-
plex transactional conditions, self-regulative, affective, and motivational factors can exert substantial impact on the quality of decision making.

In social-cognitive theory (A. Bandura, 1986, 1988), self-regulation of motivation and sociocognitive functioning is governed by several self-regulatory mechanisms operating in concert. One of the mechanisms that occupies a central role in this regu-

lated process operates through beliefs of personal efficacy. Perceived self-efficacy is concerned with people's beliefs in their cap-

abilities to mobilize the motivation, cognitive resources, and courses of action needed to exercise control over environ-

mental events. Self-beliefs of efficacy have diverse psychological

effects that can facilitate or impair complex decision making. They regulate level of motivation, both directly through mobilization and maintenance of effort and indirectly by their impact on goal setting (A. Bandura, 1988; A. Bandura & Cer-

tone, 1983, 1986; Cervone & Peake, 1986). The stronger the perceived self-efficacy, the higher the goals that people set for themselves and the stronger their commitment to them (Locke & Latham, 1990; R. E. Wood & Bandura, 1989a).

Self-efficacy beliefs also influence attentional and cognitive processes in self-aidng or self-debilitating ways. People who have a strong sense of efficacy focus their attention on analyzing and figuring out solutions to problems, whereas those beset with self-doubts of their efficacy tend to turn their attention inwardly and become self-preoccupied with evaluative con-

cerns when their efforts prove unsuccessful (A. Bandura, 1989).

They dwell on their personal deficiencies and envision failure scenarios that produce adverse consequences. Such intrusive thinking activates disruptive stress reactions and undermines effective use of cognitive capabilities by diverting attention from how best to fulfill task demands to concerns over personal deficiencies and possible calamities (Lazarus & Folkman, 1984; Meichenbaum, 1977; Sarason, 1975).

The capacity to exercise self-influence by personal challenge provides a second self-regulatory mechanism of motivation and action. Motivation through pursuit of challenging standards has been the subject of extensive research on goal setting. Converging lines of evidence from laboratory and field studies in-

volving heterogeneous domains of functioning reveal that ex-

plicit challenging goals enhance motivation and performance attainments (Locke & Latham, 1990; Mento, Steel, & Karren, 1987). However, the multifaceted nature and intricate linkage of managerial decisions to organizational performance introduces complexities in the relation between personal goals and group attainment. At the individual level, individuals can exer-

cise direct control over their performances by regulating their attention and level of effort. In organizational environments, group goals must be socially mediated through the coordinated efforts of others. Sheer managerial effort alone does not ensure attainment of group goals. Moreover, systematic pursuit of operational subgoals for one segment of a social system at a time may contribute to eventual success but does not necessarily produce sizable gains in organizational performance in the short run (A. Bandura & Wood, 1989a; R. E. Wood & Bandura, 1989b). Thus enhancement of performance by goal challenges is more complicated at the group than at the individual level.

Affective self-evaluation operates as a third factor in the self-

regulation of motivation and action. People seek satisfaction from fulfilling valued goals and are prompted to intensify their efforts by discontent with substandard performances. This form of self-regulation involves cognitive comparison processes that include both proactive and reactive performances. By making self-satisfaction conditional on matching adopted goals, people proactively give direction to their actions and create self-incentives to persist in their efforts until they accomplish what they seek. Perceived negative discrepancies between performance and a standard to which they commit themselves creates self-dissatisfaction that can also serve as an incentive for enhanced effort. Negative self-reactivity augments effort in routinized activities (A. Bandura & Cervone, 1983, 1986; Locke, Cartledge, & Knerr, 1970) but can be disruptive in activities that make heavy attentional and cognitive demands.

In organizational environments, decision makers must dis-

cover managerial rules that enable them to predict and exercise influence over the collective effort. Discernment of predictive rules requires effective cognitive processing of multidimen-
sional information that contains ambiguities and uncertainties. Predictive factors are usually related probabilistically, rather than invariably, to future events, which leaves some degree of uncertainty. If too many factors are altered at once, it is difficult to gauge which ones are responsible for the observed results.

In the formal characteristics of the simulated organization

used in this research, managers had to learn the form of the functions relating several motivational factors to aggregate outcomes. Some of the factors involved nonlinear and compound rules that were more difficult to learn than were linear ones (Brehmer, Hagafors, & Johansson, 1980). Moreover, the man-

agers had to figure out the best way to integrate the set of rules and to apply them discernably to each member of the group. To achieve all this, they had to generate hypotheses about func-
tional relations for different motivational factors and to inte-
grate them into a coherent managerial effort. People who had a strong sense of problem-solving efficacy were likely to exhibit more efficient analytic thinking than were those who were be-
set by self-doubts.

The way in which ability is construed can have powerful impact on the self-regulatory mechanisms governing motivation, action, and the cognitive processing of outcome information (M. M. Bandura & Dweck, 1989; Nicholls, 1984; R. E. Wood & Bandura, 1989b). People who view ability as an acquirable skill display stronger resiliency of self-efficacy, profit more from failure experiences, set higher personal challenges, and engage in more efficient analytic thinking than those who regard ability as a fixed entity reflecting one's basic cognitive capacities. So-

cial comparison operates as a primary factor in the self-apprai-
sal of capabilities (Festinger, 1954; Goethals & Darley, 1977; Suls & Miller, 1977). This is because most activities do not provide objective, nonsocial standards for gauging level of abil-
ity. People must therefore appraise their capabilities in relation to the performance attainments of others.

The research on self-appraisal of capability through social standards has centered mainly on why people engage in social comparison, whom they choose to compare themselves with, the role of performance and attribute similarity in the selection of social referents, and the self-evaluative consequences of such choices (Suls & Miller, 1977; Suls & Mullen, 1982; J. V. Wood, 1989). Results of these studies have helped to clarify some im-
portant aspects of comparative self-appraisal. However, the laboratory situations generally differ in several respects from how socially comparative influences operate under naturally occurring conditions. In the former case, people can choose from a set of social referents whose accomplishments they want to hear about to determine whether they prefer upward or downward comparisons. The comparative self-appraisal typically involves a single evaluative instance. In contrast, under ordinary conditions, people are continually confronted with comparative information with social consequences whether they seek it or not. Moreover, comparative evaluation is an ongoing process often involving changes in the level, rate, and direction of performance discrepancies. Comparative self-appraisal therefore entails interpreting the ability implications of changing patterns of comparative information over time. Moreover, full understanding of how social-comparative influences affect human functioning requires broadening this line of inquiry to their impact on ongoing performance and the mediating mechanisms through which they produce their performance effects.

Research on the mechanisms of modeling reveals that exposure to the attainments of others has significant impact on self-efficacy appraisals (A. Bandura, Reese, & Adams, 1982; Brown & Inouye, 1978; Kazdin, 1979; Schunk, 1986). Assumed similarity to the models strengthens the impact (Prince, 1984). Comparative information conveyed in the form of normative indexes affects self-efficacy appraisals in much the same way as does observing the attainments of similar others (Jacobs, Prentice-Dunn, & Rogers, 1984; Litt, 1988). Alterations in perceived self-efficacy, in turn, influence the level of goal setting, affective self-evaluation, and the quality of analytic thinking.

This experiment was designed to test hypotheses that different patterns of social comparison exert differential impact on achieved levels of organizational performance and that they do so through their effects on the mediating self-regulatory mechanisms described earlier. Subjects managed a simulated organization in which they had to match a set of employees to production subfunctions and had to use goals, instructive feedback, and social incentives in appropriate ways to achieve gains in organizational performance that were difficult to fulfill. They managed the group activity over a series of production trials under conditions of social comparison in which they either performed as well as a comparison group of decision makers, consistently surpassed them, achieved progressive mastery, or experienced a progressive decline relative to the attainments of their comparators. These particular social-comparative patterns were selected because they encompass the range of divergencies commonly encountered and they represent psychologically interesting disparities in accomplishments. At three points in the organizational simulation, subjects' perceived self-efficacy, goal setting, and evaluative self-reactions were assessed. The adequacy of their analytic strategies for discovering managerial rules and the level of organizational performance they achieved were also measured.

It was predicted that comparative progressive mastery would instill a rising sense of managerial self-efficacy that enhances the other self-regulatory factors and organizational performance. In contrast, a progressive relative decline in attainments would rapidly undermine effective self-regulation and performance. Performing as well as or better than one's comparators would help to sustain self-regulatory guides and performance. The following self-regulatory causal structure was proposed as governing the level of organizational attainment. Perceived self-efficacy enhances organizational performance both directly and indirectly by its effects on personal goal setting, on affective self-reactions, and on use of analytic strategies. In the latter paths of influence, perceived self-efficacy is linked to adoption of challenging organizational goals, positive self-evaluative reactions, and systematic use of efficient analytic strategies to discover managerial rules. Goal setting is affected by level of prior attainments as well as by perceived self-efficacy. The stronger the perceived self-efficacy and the higher the prior accomplishments, the more challenging are the goals adopted for the organization. With regard to the paths of influence to self-evaluation, a strong sense of efficacy and high prior attainments activate positive self-evaluative reactions. High self-set organizational goals, positive affective self-reactions, and systematic analytic thinking, in turn, enhance the level of organizational performance.

Method

Subjects

The subjects were 40 male and 20 female volunteers from a graduate program in business studies. They ranged in age from 21 to 49 years, with an average age of 31 years. Eighty-eight percent of the subjects were employed full-time in various corporations, and 72% of them had had prior managerial experience. The subjects were randomly assigned, balanced for gender, to the four experimental conditions.

Simulated Organization

The study was presented to the subjects as part of a program of research designed to advance understanding of managerial decision making. They were told that they would serve as managers of a simulated organization modeled after an actual organization that had been observed over an extended period. To ensure that all participants received the same information, all the instructions were presented on their computer monitor. The orienting information described the simulation as one in which managers receive weekly orders for production of furniture items, along with a roster of available employees. The manufacture of the items in each of the weekly orders required eight different production subfunctions, such as milling the timber, assembling the parts, staining and glazing the assembled frame, upholstering the furniture, and preparing the products for shipment. The subjects would manage the organizational unit for a total of 18 production orders, with each order representing a performance trial in the simulation. The orders included producing new units, repairing old ones, and refurbishing antiques.

The subjects' managerial task was to allocate eight employees selected from a 10-member roster to the different production subfunctions to complete the work assignment within an optimal period. They were told that by matching employees' particular interests and skills to production requirements, they could attain a higher level of organizational performance than if employees were poorly matched to subfunctions. To assist them in this decision task, subjects were given written descriptions of the effort and skill required for each of the eight production subfunctions and brief profiles of the characteristics of each member. This individuating profile information described their particular skills, experience, motivational level, preference for routine or challenging work assignments, and standards of work quality. Following is the profile description of one of the employees:
Jack is one of the firm's oldest employees. He has been a builder for most of his working life and has a wide range of woodworking skills. He has a distrust of 'those fancy new machines' even though he is a competent lathe operator. Jack is usually happiest with non-technical, manual jobs. He is a perfectionist, with a fine eye for detail.

Both the production subfunctions and the employee attributes were selected on the basis of extensive observation of the actual manufacturing process to ensure that the simulation closely approximated the actual environment. Subjects were provided with the profile descriptions at the outset of the managerial task on their computer display monitor and on a sheet for referral at any time during the organizational decision making.

In addition to allocating employees to subfunctions, subjects were informed that they had to make a set of decisions on how to use the various motivational factors to optimize the group's performance. Specifically, they had to decide how to use goals, instructive feedback, and social incentives to enhance the accomplishments of each employee. For each of the motivational factors, subjects had a set of options representing the types of actions that managers might take in an actual organization. A mathematical model was used to calculate the hours taken to complete a production order on the basis of the adequacy of subjects' allocation of employees to subfunctions and their use of the three motivational factors. The group performance for each trial was reported to subjects as a percentage of a preset standard number of hours to complete each manufacturing order. This preset performance standard, which was based on information from a pretest of performance attainments on this task, was set at a level that was difficult to fulfill. The logic of the simulation model and the decision options available to subjects are described next. A more detailed explanation of the mathematics and logic of the model has been presented elsewhere (R. E. Wood & Bailey, 1985).

In performing the managerial role, subjects had to allocate the employees to the various subfunctions for each manufacturing order. They could reallocate them if they judged that a particular member would be better suited for a different job assignment. After subjects allocated the employees to the different subfunctions for a given trial, they could then assign each employee a production goal from a set of options that included urging them to do their best or assigning them one of three specific goals set at, above, or below the established standard. A fifth option allowed them to set no production goal for an employee, if they judged that it would have a negative motivational effect. Goal assignments for employees, which were made at the beginning of each trial, influenced an employee's performance according to the calculations of the simulation model in the manner predicted by goal theory (Locke & Latham, 1990). Goals that present a moderate challenge lead to higher performance than do no goals or instructions to do one's best. However, repeated imposition of goals that exceed an employee's prior performance by a moderate amount eventually led to their rejection and diminished motivation. To enhance the performance of their organizational unit, subjects had to learn the decision rule for setting the optimal level of challenge for each member.

Employees were provided instructive feedback and social incentives after the production for each order had been completed. The feedback and reward decisions, which influenced performance on the subsequent trial, modeled the temporal effects of such actions in actual organizational environments. For the feedback decision, subjects could give employees no feedback or select one of three options, which varied in the amount of direction given regarding procedures of production and analysis of difficulties. Instructive feedback had a positive effect on performance for employees who were performing below the established standard. When an employee performed above standard, the continued use of high directive feedback on three or more trials was regarded as oversupervision that would have a negative effect on performance. Effective use of the feedback options to improve organizational performance required subjects to learn decision rules for optimal adjustment of level of instructive guidance to performance attainments.

For decisions regarding social incentives, the effects of the three options varied with the type of reward given (e.g., compliment, social recognition, note of commendation) and with the degree to which rewards were contingent on employees' performance attainments. Subjects also had the option of not making any laudatory comments regarding their employees' work. Social rewards had a positive effect on performance. However, in an organizational setting the impact of rewards on performance is affected by social-comparison processes as well. Therefore, the magnitude of the incentive effect for a given member depended on the ratio of rewards to attainments for that employee compared with the equivalent ratio for other employees. Subjects therefore had to learn a compound decision rule combining incentive and equity factors to create an equitable system of incentive motivation.

In sum, to optimize performance of the organization that the subjects were managing, they had to match employee attributes to subfunctions and to master a complex set of decision rules on how best to guide and motivate their supervisors. To discover the rules, they had to test options, cognitively process the outcome feedback information of their decisional actions, and continue to apply analytic strategies in ways that would reveal the governing rules. The subjects were informed that they would receive feedback on how well their group had performed at the end of each production order. They could use this information to adjust their decisions so as to improve their group's level of performance.

Simple task demands reduce the impact of social influences on self-regulative factors because successes come easily to all performers. However, complex organizational environments present difficult decisional demands that tend to activate motivational, affective, and other self-referent processes in a flow of activities. Complex tasks thus place heavy demands on effective use of self-regulative influences for competent functioning. Therefore, our experiment used a high level of organizational complexity (R. E. Wood, Bandura, & Bailey, 1990), in which subjects had to make 32 decisions per production trial with several trade-offs in allocations of employees to production subfunctions.

**Social Comparison Conditions**

Subjects were randomly assigned to one of four treatment conditions defined by the pattern of social-comparative information presented. After each production trial, subjects received, on their computer monitor, the performance score for their own organizational unit and the corresponding mean performance score supposedly attained by other master's of business administration (MBA) students managing the same simulated organization. The feedback of the subjects' performance attainments was veridical, but the comparative information on each production trial was preprogrammed to diverge from the subject's actual attainments in the magnitude and direction designated by the treatment conditions to which subjects had been assigned. This preset procedure ensured that all subjects in a given treatment condition received the identical comparative pattern whatever their level of performance might be. To ensure that the subjects attended to the comparative information, they plotted on a graph their group's performance attainments in red and the attainments of the comparative group in blue at the end of each productional trial. The subjects could thus see clearly the emerging pattern of their performance attainments relative to the comparative group of decision makers. The effects of the following four comparative patterns were investigated.
Similar capabilities. For subjects assigned to the similar condition, the performance attainments for the comparison group varied irregularly a few percentage points above and below the subject's attainments. This comparative pattern conveyed a level of decisional capability comparable with that of peers of similar status.

 Superior capabilities. Subjects in this social comparison condition outperformed their counterparts at the outset and maintained the relative predominancy throughout the decision-making series. This comparative feedback indicated a relatively high decisional capability.

 Progressive mastery. In the information presented in this condition, the comparison group outperformed the subjects at the outset, but over the course of the production trials the subjects continued to close the gap and eventually surpassed their counterparts.

 Progressive decline. Subjects began this comparative condition at about the same level as their managerial counterparts, who rapidly surpassed the subjects and widened their descendant position as they continued to manage the organization. This relative decline suggested a faulty decisional capability that became more and more apparent over time.

 Subjects performed the simulation at a computer and entered all their decisions on the computer keyboard. After subjects demonstrated that they understood how to use the computer keyboard, the experimenter left the room. On each trial, subjects received information about the production order for that week and the roster of available employees. After they made their decisions they received, on the computer screen, quantitative feedback on the organization's performance level and the attainments of the comparison group. During the simulation, a computer timer emitted a tone every 5 min. Subjects were informed that the timer was provided to help them pace their progress rather than to time their decision making. They performed the task over a 1-hr session.

 After the final trial, subjects were given a full explanation of the nature and purpose of the study. They were also told that they had performed the organizational simulation in relation to a difficult performance standard.

 All data were collected in the context of the simulation, which included a total of 18 trials. The scales for the different self-regulatory measures were presented on the monitor following Trials 6, 12, and 18. Subjects recorded their responses on the computer keyboard. The first assessment was conducted after the 6th trial so that subjects would have at least some experience with the simulation before being asked to judge their perceived efficacy and to set goals for themselves.

 Mediating Self-Regulative Determinants

 Perceived self-efficacy was recorded on a multi-item efficacy scale that described nine levels of production attainments, ranging from 30% better to 40% worse than standard production time. Subjects rated the strength of their perceived self-efficacy for getting the group that they were managing to perform at each of the levels described. The ratings were made in terms of a 10-interval scale ranging from 0 (no confidence at all) to 100 (total confidence). The strength of perceived self-efficacy was the sum of the confidence scores for the nine levels of organizational performance.

 In assessing self-set goals, subjects recorded the level of organizational performance they were personally aiming for in the succeeding block of trials. They selected their personal goals from nine levels of possible organizational attainments ranging from 40% below to 30% above the preset level and a tenth option of no particular goal. They also rated their commitment to their goals by using a 9-point scale that ranged from 0 (not at all committed) to 9 (very strongly committed).

 In measuring self-evaluative reactions, subjects rated on a 9-point scale how self-satisfied or self-dissatisfied they were with the group performance they achieved in the prior production order and their affective reactions if they attained the same group performance level on the next production order (9 = high self-satisfaction; 5 = neutral; 1 = high self-dissatisfaction).

 The adequacy of subjects' analytic strategies was derived from their decisions regarding job assignments and how they varied the motivational factors to discern the managerial rules across each block of trials. Changing more than one factor concurrently for a given employee is a deficient analytic strategy for testing hypotheses regarding the impact of motivational factors on performance because it confounds the contribution of factors to outcomes. Systematic analytic strategies require changing one factor at a time and evaluating the effects it produces. Eight systematic tests, one for each employee, could be made in each trial. The strategy score was the sum of the decisions across a block of trials in which subjects changed more than one factor (i.e., job allocation, goal level, instructive feedback, or social reward) for each person. The more factors the subjects changed concurrently for each individual, the more erratic was the analytic thinking.

 Organizational Performance

 Organizational performance was measured in terms of the total number of hours taken by the group of employees to complete each weekly order. The number of production hours for each trial was automatically calculated by the simulation model on the basis of the subjects' job allocations and selection of motivational factors (R. E. Wood & Bailey, 1985). The fewer the production hours, the better the managerial decision making by the subject. Levels of organizational performance attained by subjects were reported as percentages of the preset standard, with a higher score indicating better performance. Organizational performance scores were averaged across three blocks of six trials each.

 Results

 Impact of Social Comparison on Self-Regulatory Factors

 The impact of the social comparative influence on self-regulatory factors was analyzed by a 3 × 4 analysis of variance (ANOVA) with social comparison as the between-subjects variable and phase of assessment as a repeated-measures variable. There were no gender differences on any of the measures, so the data for men and women were pooled. The differences between subsets of means were tested by the Newman-Keuls procedure. Note that the treatment conditions represent changing patterns rather than invariant comparative differences from the outset. Three of the four groups shifted in direction or magnitude of their comparative status over trials. Subjects in the progressive mastery and progressive decline conditions briefly passed through a crossover point of comparative similarity with their counterparts. The different treatment conditions were fully realized by the third trial block, so that was where the major treatment effects were expected to be manifest.

 Perceived self-efficacy. Figure 1 presents the mean strength of perceived self-efficacy as a function of social comparison at each of the three phases of assessment. Analysis of these data shows the interaction effect between comparative conditions and phases to be highly significant, F(6,112) = 3.77, p < .002. Results of the Newman-Keuls contrasts underscore the cumulative negative impact of unfavorable social comparison. Subjects in the similar and superior comparative conditions maintained their sense of efficacy across phases despite shortfalls in performance attainments. Those in the progressive mastery
condition displayed a sharp rise in perceived self-efficacy ($p < .05$), whereas those in the declining condition suffered a growing deterioration in their perceived self-efficacy ($p < .05$).

The groups did not differ in their perceived self-efficacy in the initial and middle phases, but by the third phase the decliners expressed a much lower sense of managerial efficacy than did their counterparts in the similar, superior, and progressive mastery conditions (all $ps < .05$). Subjects in the former three conditions ended up performing as well as, or better than, their comparators and did not differ in their perceived self-efficacy.

**Affective self-evaluation.** Subjects' affective reactions to their prior performance attainment and their reactions if they were to achieve the same performance level in the next attempt were highly correlated, $r(58) = .84$, $p < .0001$. Therefore, the analyses were conducted on the mean of the two ratings. The changes in affective self-reactions are plotted in Figure 1.

The ANOVA yielded significant main effects for comparative conditions, $F(3, 56) = 4.59$, $p < .01$, and phases, $F(2, 112) = 25.89$, $p < .0001$. However, these main effects are qualified by a highly significant interaction between comparative conditions and phases, $F(6, 112) = 4.45$, $p < .001$. Affective self-evaluation fluctuated as groups shifted in their comparative status over trials. In the initial phase, subjects who matched or surpassed their comparators expressed a high level of self-satisfaction, whereas those who were outperformed by the comparison group were self-dissatisfied with their attainments. In the analysis of intergroup differences, the similar condition differed in self-satisfaction from both the progressive declining ($p < .05$) and mastery subjects ($p < .01$), who started out poorly. Subjects in the superior condition were also more self-satisfied than their counterparts in the progressive mastery ($p < .01$) and declining ($p < .10$) conditions.

The organizational attainments of all subjects fell short of the difficult preset standard. It is not surprising that subjects in all conditions showed a rise in self-dissatisfaction in the second phase ($p < .01$) and did not differ in this regard. However, by the third phase, subjects in the superior and mastery conditions became much more positive in their self-reactions to their organizational accomplishments ($p < .01$). Both of these groups differed beyond the $p < .05$ level from decliners, who remained discontent with their performance. The self-reactions of subjects in the similar comparative condition fell at an intermediate level and did not differ significantly from those of the other groups.

**Self-set goals.** Exposure to social-comparative influence significantly affected the goals subjects set for their organization $F(3, 56) = 3.35$, $p < .025$. These effects remained similar across the three phases. Subjects who received comparative information suggesting progressive mastery set higher goals for the organization than did those in the other comparative conditions, which did not differ from each other. The progressive masterers set themselves the goal of bettering the standard time by about 5% ($M = 5.7$), whereas the other three groups set a goal that was about 5% longer ($M = 4.2$) than the standard time. Subjects were highly committed to fulfilling their personal goals ($M = 7.2$) and did not differ in this respect as a function of comparative conditions.

**Analytic Strategies**

Subjects who are erratic in their analytic thinking are likely to vary more factors concurrently in an effort to hit upon an effec-

![Figure 1.](image-url) Changes in perceived self-efficacy, effective use of analytic strategies, and affective self-reactions across successive phases of the experiment under different patterns of social comparison. (Each phase includes six different production orders.)
tive arrangement than subjects who seek to discover predictive relations by thoughtful selective variation of factors. Significant main effects on quality of analytic thinking were obtained for comparative conditions, $F(3, 56) = 6.13, p < .001$, and for experimental phases, $F(6, 112) = 52.96, p < .0001$. These effects are also qualified by a highly significant interaction between comparative conditions and phases, $F(6, 112) = 3.17, p < .01$. This two-way interaction is shown in Figure 1.

Subjects in the superior comparative condition maintained a relatively efficient level of analytic thinking throughout the different phases of the experiment. Those in the similar and progressive mastery conditions were somewhat less systematic in their decisional strategies in the second phase ($p < .05$) but regained their analytic efficiency by the third phase ($p < .01$). Subjects who got off to a superior start according to the comparative feedback but declined in comparative status did not approach the inferential task efficiently at the outset and became even more erratic in the second phase ($p < .10$). Although they improved somewhat in the third phase ($p < .01$), they were still making multiple changes that would make it difficult to discern the optimal organizational rules.

In the intergroup contrasts, subjects in the similar and superior conditions were more efficient in their analytic thinking in the initial phase than those who were changing in their comparative status. Each of the former groups differed significantly from each of the latter groups beyond the $p < .01$ level of significance. The pattern of differences was essentially the same in the middle phase except that the similar subjects exhibited some deterioration in their analytic thinking. In the final phase, each of these three conditions, which fared well in relation to the comparative group, surpassed at the $p < .05$ level the progressive decliners, who continued to exhibit erratic thinking.

**Organizational Performance**

The changes in organizational attainments across phases of the experiment were highly significant, $F(2, 112) = 43.59, p < .0001$. The social-comparative influence had strong impact on level of organizational attainment, which increased in strength the longer the subjects managed the organization. This is shown in the highly significant two-way interaction between comparative conditions and phases, $F(6, 112) = 18.22, p < .0001$. This interaction is presented in Figure 2.

Subjects who received comparative feedback suggesting growing mastery surpassed the organizational attainments of their counterparts in the similar, superior, and declining conditions (all $p_s < .01$). The similar subjects were also marginally better in their organizational attainments than the decliners ($p < .10$).

Because an exceedingly difficult organizational performance standard was preset, subjects in all of the comparative conditions, except progressive mastery, suffered varying amounts of decline in organizational attainments over time. Results of the Newman-Keuls intragroup contrasts revealed that, for each of these three groups, the decline in organizational attainments from the first to the second phase and from the second to the third phase were significant at the $p < .01$ level. In contrast, subjects in the progressive mastery condition displayed an initial decline ($p < .05$) when they were clearly outperformed by their comparators, but they achieved substantial gains in organizational attainments ($p < .01$) when they were led to believe they were gaining on their comparators and eventually surpassed them.

**Path Analysis**

Path analyses were conducted to test the hypothesized causal ordering of self-regulatory factors. The structure of the causal model is presented in the introductory section of this article and receives support in the findings of prior research (A. Bandura & Wood, 1989; R. E. Wood & Bandura, 1989a). The temporal sequencing of variables by experimental variation of factors also helps to remove ambiguity concerning the direction of causality. The full set of structural equations representing the hypothesized causal relations were analyzed separately for the second and third trial blocks.

The standardized path coefficients that are significant beyond the .05 level are shown in Figure 3. The findings reveal that in the second phase perceived self-efficacy enhanced subsequent performance attainments both directly and indirectly through its effects on analytic thinking. Effective use of analytic strategies fostered performance attainments after prior determin-
The divergent patterns of self-regulatory influence were accompanied by corresponding divergent changes in performance attainments. Whereas the decliners exhibited a progressive deterioration of performance, the masterers boosted their level of performance attainments as their comparative status ostensibly improved. Subjects’ spontaneous comments on the postexperiment questionnaire provide further testimony to the differential impact of comparative appraisal on sociocognitive functioning. The comparative masterers were more likely to adopt the type of task-diagnostic focus that ensures success, as in the following example:

At first it was very discouraging. The other MBA students seemed much better at it. I kept trying more and more changes but then I tried a few experiments that seemed to work. Then I just kept making little changes until I caught up. I think the secret is making just a few small changes after the first big adjustments.

Those who experienced progressive decline in their comparative status were more prone to a self-referent focus on their inability to do their job and some despair over their repeated failure to reverse the downward slide. Perceived self-inefficacy to produce expected organizational outcomes also fosters attributions of blame, recalcitrance, and deficiencies to others (Ash-
of advantageous social comparison under taxing conditions received additional support in the research of Brown and Inouye (1978). Comparison of subjects who achieved superiority easily with those who had to struggle to gain mastery suggests that easy comparative triumphs support self-efficacy appraisal and analytic thinking but incur demotivating effects. The easy triumphers set lower goal challenges for themselves than did the masters and were highly self-satisfied with declining performance attainments because they happened to surpass the performances of their comparators. Complacent self-assurance creates little incentive to expend the increased effort needed to attain high levels of performance.

The findings of this study lend further validity to the general thesis that the effects of particular performance outcomes are determined by their relational properties rather than by their absolute properties. However, most of the research demonstrating that the valence of performance outcomes is determined relationally has been concerned with temporal comparison with the outcomes that one has experienced in the past (Buchwald, 1960; Premack, 1965). Our study shows that the impact of performance outcomes is altered by social comparison as well and identifies mechanisms through which comparative influences produce their effects.

Subjects set their personal goal slightly below the preset standard and continued to aim for it with strong commitment even though their organizational attainments fell somewhat short of that level. This was true for all of the social-comparative conditions except for the progressive masters, who sought to better the preset standard. Thus, a growing sense of mastery fostered high aspiration as well as beneficial self-efficacy, analytic thinking, and affective self-reactions. The significant impact of changing comparative status on affective self-reactions lends further support to the growing interest in the self-evaluative consequences of social comparison (Goethals & Darley, 1987).

As previously noted, affective self-reactions provide a dual source of incentive motivation: The anticipated self-satisfaction for personal accomplishment operates as a positive motivator, and discontent with deficient performance functions as a negative motivator. The findings of this experiment taken together with those of previous studies indicate that these two forms of self-motivators contribute differentially to performance accomplishments, depending on the complexity of the activity. On simpler tasks, in which success is attainable solely by increased level of effort, self-discontent with substandard attainments is the major regulator of performance accomplishments (A. Bandura & Cervone, 1983, 1986). In contrast, on complex tasks that make heavy attentional and cognitive demands, self-satisfaction with personal progress toward challenging standards provides a positive motivational orientation for performance accomplishments. Strong self-critical reactions can detract from the intricate task of generating and testing alternative organizational strategies. Indeed, the higher the subjects' self-discontent, the more difficulty they had adhering to a systematic exploratory strategy in the second phase, \( r(58) = .36, p < .01 \), and third phase, \( r(58) = .26, p < .025 \), of the organizational management. Cervone, Jiwani, and Wood (1990) reported a similar disruptive effect of self-devaluation on decisional processes. There are two plausible explanatory contenders for this rela-

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The combined findings of a series of experiments (R. E. Wood & Bandura, 1989a) indicate that personal goals have weaker effects on organizational accomplishments than on individual accomplishments. Several factors may account for this differential impact. Personal goals operate as strong regulators of performance when people already possess the knowledge and means to exercise control, and they need only to intensify their efforts to obtain higher levels of performance. In dynamic organizational environments, people have to discover the best means of coordinating and orchestrating the efforts of others to achieve desired group outcomes. Systematic changes of organizational factors aid eventual discovery of functional rules for enhancing group performance without necessarily producing immediate improvements. Indeed, in early phases of organizational structuring, success is perhaps better achieved by linking goals to acquisition of a sound predictive model of organizational functioning than to achievement of quick performance results.

To complicate matters further, unlike the exercise of direct personal influence over one's own performance, socially mediated influence must operate through multifaceted, complex causal paths to produce organizational outcomes. The complexities of working through others create additional obstacles to transforming personal goals to group accomplishments.

Our findings reveal that social comparison can have both beneficial and detrimental effects. The adverse consequences are not easily avoidable in competitively structured systems because of the prevalence of forced social comparisons. Indeed, comparison with agemates is well entrenched even by the early years of development (Morris & Nemcek, 1982). Given that people are not about to forsake achievement pursuits and that cooperatively structured systems are hard to come by, it remains a challenge as to how to minimize the demoralizing effects of unfavorable social comparison. Construal of ability as an acquirable attribute, rather than an inherent fixed aptitude, and beliefs in controllability can help to sustain a sense of self-efficacy, motivation for self-development, and positive self-evaluation in the face of repeated failure and setbacks (A. Bandura & Wood, 1989; R. E. Wood & Bandura, 1989b). Placing greater weight on self-comparative standards and indicants of personal improvement can also lessen the detrimental effects of inimical social comparison (Frey & Ruble, 1990; Nicholls, 1990). A fruitful extension of research on social comparison would be to articulate the ways in which its demoralizing effects can be attenuated.

References


relationship between satisfaction, goal setting, and performance. *Organizational Behavior and Human Performance, 5*, 135–158.


Correction to Hsee and Abelson

In the article "Velocity Relation: Satisfaction as a Function of the First Derivative of Outcome Over Time," by Christopher K. Hsee and Robert P. Abelson (Journal of Personality and Social Psychology, 1991, Vol. 60, No. 3, pp. 341–347), the note to Table 2 on page 345 is incorrect. Instead of greater numbers in the table indicating greater satisfaction, smaller numbers in the table indicate greater satisfaction.