The Changing Signs in the Relationships Among Self-Efficacy, Personal Goals, and Performance

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The common interpretation of the positive correlation among self-efficacy, personal goals, and performance is questioned. Using self-efficacy theory (A. Bandura, 1977), it was predicted that cross-sectional correlational results were a function of past performance’s influence on self-efficacy, and using control theory (W. T. Powers, 1973), it was predicted that self-efficacy could negatively influence subsequent performance. These predictions were supported with 56 undergraduate participants, using a within-person procedure. Personal goals were also positively influenced by self-efficacy and performance but negatively related to subsequent performance. A 2nd study involving 185 undergraduates found that manipulated goal level positively predicted performance and self-efficacy positively predicted performance in the difficult-goal condition. The discussion focuses on conditions likely to affect the sign of the relationship among self-efficacy, goals, and performance.

Self-efficacy and goals are widely touted as two of the more important constructs in psychology and management (Austin & Vancouver, 1996; Bandura, 1986, 1997; Gist, 1987; Locke & Latham, 1990a; Mitchell, Hopper, Daniels, George-Falvy, & James, 1994; Stajkovic & Luthans, 1998). Particularly since Gar-land’s (1984) resolution of an apparent contradiction between goal setting theory (Locke, 1968) and expectancy–valence models (Kanfer, 1990), researchers and theorists have created a marriage between these theories (Bandura, 1986, 1991, 1997; Latham & Locke, 1991; Locke, Frederick, Lee, & Bobko, 1984; Locke & Latham, 1990a). For example, Locke and Latham (1990b) have developed a very optimistic model of the high-performance cycle that relies heavily on the adoption of more difficult goals owing to higher levels of self-efficacy, as well as the general positive effects of goals and self-efficacy on motivation. This optimism is found not only in the authors and their projections for the future of management but also in the prescriptions for the individual worker.

This optimism seems reasonable given the empirical support for self-efficacy as a correlate with performance and behavior (Ban-dura, 1997; Stajkovic & Luthans, 1998). However, a closer inspection of the theories and the nature of most of the empirical evidence generated to this point gives us reason for caution. With regard to theory, we argue that often-ignored aspects of self-regulation theories suggest that self-efficacy may decrease, not increase, the amount of resources allocated to performance. Specifically, the role of complacency, although always recognized as an issue (Bandura, 1977, 1997), may be more critical than previously thought. With regard to research, we argue that an over-reliance on cross-sectional, correlational designs has hidden the complexity of self-regulation. Specifically, it is likely that for many situations, the strong positive relationships between self-efficacy and performance are a function of performance’s influence on self-efficacy, not the influence of self-efficacy on performance. Although there are likely times when self-efficacy causally affects performance in the positive direction, there are other times self-efficacy will have no or a negative effect on performance. This article presents one condition in which a nonpositive effect could occur.

Meanwhile, goal level (i.e., difficulty) has been hypothesized as one of the mediating mechanisms of self-efficacy in self-regulating theories of motivation (Bandura, 1991; Latham & Locke, 1991). These theorists hold that individuals with high self-efficacy are more likely to accept or self-set difficult goals, which increases motivation. Specifically, one is motivated to reduce the dissatisfaction that arises from discrepancies between goals and current perceptions of performance (Bandura, 1986). Higher goals mean individuals must get their perceived level of performance up to higher levels to reduce the dissatisfaction. This discrepancy-reducing mechanism is similar to the mechanism described by control theorists (Carver & Scheier, 1981; Powers, 1973), except that the role of dissatisfaction is more complex in control theory (Carver & Scheier, 1990; Powers, 1992).

Indeed, the relationship between goal level and performance seems unassailable (Looce & Latham, 1990a; Mento, Steel, & Karren, 1987). Yet, measures of goal level may be less robust than previously thought (Austin & Vancouver, 1996). Particularly when measuring changes in personal goals, reported goal level may be more a function of past levels achieved than a representation of a desired state to which a person is striving (Vancouver, 1997). We do not dispute that goal level is related to performance. Instead, we argue that measuring personal goals assumes that individuals are
actually striving for the particular goal (not merely providing an answer to a question put to them) and that the goal’s level can be cognitively retrieved (and reported) accurately. All these assumptions may not be tenable, and they likely affect the sensitivity of personal goal measures.

Manipulating goal levels by assigning goals has additional assumptions. Austin and Vancouver (1996) have argued that assigned goals are meaningless until they become internally represented desired states within the individual (i.e., personal goals). In the process of becoming personal goals, assigned goals are subject to redefinition or rejection. One important variable hypothesized to reduce the possibility of rejection (i.e., increase the probability of acceptance) is self-efficacy. One of the questions addressed here is whether self-efficacy affects acceptance of a difficult goal over and above past performance. On the basis of decision-making theories (e.g., Vroom, 1964), we believe it should and that accepting a difficult goal level positively influences performance because of its effects on motivation. Nonetheless, the relationships are much more complex than many research paradigms can reveal. Below we describe why this is the case and present two studies that attempt to move beyond the traditional paradigms to examine these relationships.

Background


The elements of each paradigm are familiar to most. The decision-making paradigm involves subjective calculations of expected utility of options (i.e., motivational force) on the basis of the estimates of (a) one’s capacity to engage in the necessary behaviors (i.e., self-efficacy) or the relationship between effort and behavior (i.e., expectancy), (b) the relationships between behavior and outcomes (i.e., instrumentality or outcome expectancy), and (c) the degree of positive or negative values associated with the outcomes (i.e., valence). The cybernetic systems paradigm is based on the negative-feedback structure, which accounts for control processes (see Figure 1). Control systems are now common in mechanical systems, like a temperature control system, which keeps the temperature of a room constant despite changes in heat flow out of the room. The temperature control system works by creating a perception of the current room temperature (i.e., the variable), comparing that perception with a goal, and acting (e.g., engaging the furnace) when the perception is less than the goal. Because the system’s actions reduce discrepancies between the goal and perception, a negative-feedback loop is created. Through these processes, the system can regulate the room temperature (or, more proximally, its perceptions of the room temperature) all by itself.

Although goal-setting theorists have not accepted any underlying theoretical mechanisms for the core goal-setting findings (Locke & Latham, 1990a), others have tried to explain the findings using concepts from either the decision-making paradigm (Naylor & Ilgen, 1984) or the cybernetic systems paradigm (Campion & Lord, 1982). In addition, Locke and Latham (1990a) have expanded the nomological net of their theory by incorporating decision-making concepts around the choice to set or accept difficult goals. However, Locke (1991, 1994), at least, has rejected cybernetic structures altogether.

Likewise, Bandura (1997) seems to reject the cybernetic systems paradigm, citing Locke’s (1991, 1994) arguments. However, a closer look at Bandura’s writings reveals some acknowledgment of the role of control. As mentioned, he claimed that individuals are motivated to reduce the dissatisfaction that arises from the discrepancies between the individuals’ goals and their perceptions of performance so far (Bandura, 1986). Indeed, Bandura (1997) noted that “discrepancy reduction clearly plays a central role in any system of self-regulation” (p. 131). However, he also claimed that “self-regulation via negative discrepancy tells only half the story and not necessarily the more interesting half” (p. 131). The result has been a virtual neglect of the cybernetic half of self-regulation by those who emphasize the decision-making half. This is unfortunate because it creates a paradox for self-efficacy and goal setting theories that may challenge some of the recommendations emanating from these literatures.

The paradox relates to the role of expectations or self-efficacy beliefs, goal levels, and performance and was revealed in a debate between Powers (1991) and Bandura (1989). Specifically, Powers (1991) argued that Bandura (1989) described several variations of self-efficacy beliefs. One variation was the “belief that one is justified in setting high goals [that, because discrepancies from goals drive behavior] would lead to an increase of effort and, if the effort were successful, an increase of the perceived and actual effectiveness of action” (Powers, 1991, p. 152). In other words, self-efficacy beliefs promote the adoption of high standards, and the high standards result in higher performance if the person actually has the capacity to perform at that level. However, another
variation was the belief “about one’s actual effectiveness in achieving a given goal” (Powers, 1991, p. 152). Powers (1991) argued “a belief that works by increasing the optimism in perceptions—by representing the same actual consequences of behavior more favorably—reduces the apparent shortfall that is driving behavior, and so decreases behavior” (p. 152). That is, when individuals believe that they are meeting their goals, they are less likely to allocate resources (i.e., time and effort) toward those goals as compared with when they believe they are not meeting their goals.

For example, assume that one is interested in maintaining some level of performance but that the actual state of one’s performance is unknown, is ambiguous, or must be predicted to determine the resources (e.g., time or effort) to apply. In these cases, performance levels are inferred. One’s level of self-efficacy may tend to influence these inferences of performance, such that high self-efficacy translates into higher inferred levels of performance. Given that higher levels of performance are likely to be closer to one’s goal, discrepancies (and thus resources applied) are lower than when one has lower levels of self-efficacy. Powers (1991) was not arguing for self-efficacy to have a key role in control; the effect he described would likely be weak or nonexistent. Instead, he merely pointed out that self-efficacy’s effect on performance would not always be positive.

Powers’s (1991) argument seems to be in direct contradiction to SCT and expectancy–value theories, which predict that those who believe that they can meet their goals are more likely to work harder toward meeting them than those who do not believe in their ability to achieve the goal. Perhaps more problematic for Powers (1991) is that the argument appears to contradict a plethora of empirical research (Stajkovic & Luthans, 1998). Therefore, it may not be surprising that Bandura and Locke do not take the cybernetic side of self-regulation seriously.

Nonetheless, the evidence for one theory and against another is not clear-cut. In an attempt to pit these theories against each other, Phillips, Hollienbeck, and Ilgen (1996) found mixed results. Indeed, the approach taken here is not that the theories contradict each other but that they complement each other. The apparent contradictions are resolvable for two reasons. First, theoretically, Bandura (1997) reluctantly acknowledged the effect Powers (1991), predicted and, indirectly, its reasoning. Second, the comparison of high and low self-efficacy in Powers’s (1991) conceptualization is within a person, whereas for Bandura and most other researchers, it is between people, which may account for the empirical findings. Each issue is addressed here.

Bandura (1997) distinguished between preparatory and performance efficacy. He noted that high preparatory efficacy can undermine motivation to apply effort toward preparation (i.e., study). In contrast, performance efficacy enhances motivation. Bandura (1997) gave the example of a coach who berates players and inflates the competition during practice but boosts player confidence before a game. Indeed, Tomarken and Kirschenbaum (1982) found that participants instructed to monitor positive performance in a 3-week graduation admissions preparation program performed poorer and engaged in less subsequent self-monitoring compared with participants instructed to monitor negative performance. Likewise, Salomon (1984) found that not only was less effort exerted on an easy learning task but also self-efficacy was negatively related to self-reported effort for the easy task and negatively related to reading time for the difficult learning task.

Unfortunately, many settings do not allow for a clean distinction between preparatory and performance contexts. Nor is the motivational power of negative expectations likely to occur in just preparatory circumstances. For example, in a decision task, Stone (1994) found that inducing mild negative expectations improved performance as compared with those given positive expectation information. Likewise, Bandura and Jourden (1991) found a negative relationship between self-efficacy and performance in one of their conditions and suggested that “complacent self-assurance creates little incentive to expend the increased effort needed to attain high levels of performance” (p. 949). In a creative task, Podsakoff and Farh (1989) found that negative normative feedback, a common efficacy manipulation, led to better performance than positive feedback. On a cognitively complex task, Cervone and Wood (1995) found negative correlations between self-efficacy and subsequent performance, which they explained as individuals being too confident in their abilities. In a sport example within a performance context, Gilovich, Vallone, and Tversky (1985) found that for eight out of the nine basketball players they examined, the probability of making a basket decreased slightly after a successful shot (it was only a significant effect for one of the players). However, they could not determine if this decreased probability was the result of the other team mounting a stronger defense against the player or player complacency (e.g., attempting low-percentage shots). Mizuchi (1991) eliminated this confound by looking at National Basketball Association (NBA) playoff wins at the team level between 1947 and 1982. He found that “winning the previous game increased the probability of losing the present game by about 12 percent” (p. 186). Finally, Waldersee and Luthans (1994) found that those in the positive-feedback group had poorer performance on a highly routine work task than individuals in the control or corrective (i.e., negative) feedback groups.

These findings and the theoretical argument seem in stark contrast to the recently published meta-analysis of self-efficacy’s relationship with performance (Stajkovic & Luthans, 1998). Stajkovic and Luthans found a strong significant positive correlation, $G(r_{109}) = .38$, based on 109 studies, 148 correlations, and 16,441 participants. They claimed that this correlation translated to a “28% increase in performance due to self-efficacy” (p. 252). Indeed, a moderator analysis that was based on the complexity of the tasks used and the research settings (simulation-lab vs. actual-field) found the lowest boundary of the 95% confidence intervals for the lowest cell (high task complexity, field setting) to still be a reasonably high .17. The meta-analysis emboldened Stajkovic and Luthans (1998) to suggest that “the above findings represent something that usually skeptical practicing professionals may rely on with a reasonable amount of confidence” (p. 255). They went on to exhort managers to enhance self-efficacy, particularly on complex tasks.

As skeptical academics, we think the practicing professionals may want to remain skeptical as well. Indeed, its authors acknowledged the problem with the above interpretations of the meta-analytic results:

Because most of the studies examined in this meta-analysis used a correlational design, and the meta-analysis procedures applied were respectively concordant, the results of this meta-analysis should be
The causality question is tricky. Some researchers statistically control for past performance when assessing the relationship between self-efficacy and subsequent performance. For example, Mitchell et al. (1994) found that self-efficacy predicted performance only on the first of seven trials, where no measure of past performance was available. Once a measure of past performance was available (Trials 2 through 7), self-efficacy lost any significant predictive power. Feltz (1982) found that the relationship between past performances on self-efficacy increased over time but the effect of self-efficacy on subsequent performances decreased over time when past performances were in the model. However, Bandura (1997) argued that this procedure overcorrects for the effects of past performance. He claimed that because a person’s self-efficacy is likely to be partly responsible for past performance, partialing out past performance partials out some of self-efficacy’s influence. Hence, he used a procedure developed by Wood (Bandura & Wood, 1989; Wood & Bandura, 1989) to return the variation in past performance accounted for by past self-efficacy back into the subsequent performance scores that had past performance partialed out. As a result of this procedure, self-efficacy continues to account for performance, even though part of past performance is partialed out.

This strategy makes sense if, in fact, the covariance between past self-efficacy and past performance is completely because of self-efficacy’s effect on performance. If, however, the covariance is due to the effect of past performance unmeasured by the researcher but observed by the individual, the procedure confounds unmeasured past performance into the self-efficacy measures. Hence, the procedure cannot be used to infer causality or to allow for accurate assessments of effect sizes.

A better procedure is to operationalize variance more like we conceptualize change. That is, we conceptualize change as occurring within persons over time, not between persons. The question is what happens to a person’s performance as his or her self-efficacy changes, or what happens to self-efficacy as his or her performance changes. This reconsideration of the problem is similar to the approach Garland (1984) used to reconcile expectancy theory and goal setting theory, that is, by considering the level of analysis. Only this time, the difference between levels is within-person versus between-person, not within-group versus between-group. The within-person level has received very little empirical attention, perhaps accounting for the lack of contradictory studies. Indeed, Garland (1984) had multiple observations within a person, but he collapsed those observations so as “to create reliable indexes for each of these measures” (p. 81).

One study that approached a similar question (Vancouver, 1997) looked at the relationship between past performance and subsequent performance. Vancouver (1997) argued that because of the negative-feedback loop, we would see a negative relationship between past performance and subsequent performance if we looked at one person at a time working on a task with conflicting goals. He found a strong positive correlation between past performance and subsequent performance at the between-person level but a negative relationship within a person. In that study, he also looked at goal commitment across time and found that a person’s level of commitment to a difficult goal correlated with the previous round of performance. It did not predict subsequent performance at all. Below, we present two studies that take the within-person approach used by Vancouver (1997). In these studies, we examine the relationships among self-efficacy, goals, and performance to illuminate potentially hidden processes.

**Study 1**

In this first study, we examined the relationship among self-efficacy, self-reported personal goals, and performance, yet we studied these relationships across time, not people. We predicted, as discussed by Bandura (1986) and Gist and Mitchell (1992), that past performance would strongly and positively relate to subsequent self-efficacy. However, we also predicted that self-efficacy would weakly and negatively relate to subsequent performance because of the role of the self-regulating cybernetic structure. Indeed, we expected a significant between-person correlation between self-efficacy and performance because of the stronger positive effect of performance on self-efficacy overcoming the weak negative effect of self-efficacy on performance. We also predicted that self-reported personal goals, like goal commitment in Vancouver’s (1997) study, are subject to the immediate exigency of past performance. That is, reported goal would likely be correlated with past performance (see, e.g., Button, Mathieu, & Aikin, 1996; Mathieu & Button, 1992) but negatively or not at all with subsequent performance. We predicted this not so much because we think personal goal levels are unrelated or adversely affect performance, but because we feared self-report measures are not up to the task at hand. Specifically, when the variance in scores arises from a single person over a relatively short period of time, self-report measures are not likely to be sensitive enough to capture the level of the internally represented desired state. Instead, we predicted that self-efficacy would mediate the relationship between past performance and self-reported personal goal. Figure 2 contains a summary of the relationships expected within individuals.

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1 The procedure involves multiple phases of data collection. To return the variation in past performance accounted for by past self-efficacy (or whatever other self-regulatory variables are under investigation), the researchers enter past performance on the prior measures of the self-efficacy. The residuals of past performance are then entered as a control for the next self-efficacy to performance analysis.
Analysis guessed color matches that column’s color in the solution set and the feedback. The feedback indicates the number of columns in which their game in which winning is achieved by determining the color and position program. The program introduced the participants to the game of Mastermind, participants received all instructions by means of a computer in the study in exchange for course credit. After obtaining informed consent, participants received all instructions by means of a computer in the study in exchange for course credit. The solid line represents the pairing of observations when looking at the effects of past performance on self-efficacy and personal goals. The dotted line represents the pairing of observations when looking at the effects of self-efficacy and personal goals on subsequent performance. To conduct the analyses, hierarchical linear modeling (HLM) was used (Bryk & Raudenbush, 1992). HLM allows for the simultaneous assessment of two (or more) levels of analysis. In this case, HLM calculates a regression equation for each person on the basis of the within-person variables of interest. The regression coefficients then represent properties of the person that can be regressed on additional, person-level variables, or simply averaged across individuals. In the latter case, individuals simply serve as replicates of the within-person analysis. In the former case, tests for individual differences can be made, although in the present study, we did not hypothesize any individual differences.

Method

Participants, Procedure, and Task

Fifty-six undergraduate students from an eastern university participated in the study in exchange for course credit. After obtaining informed consent, participants received all instructions by means of a computer program. The program introduced the participants to the game of Mastermind. We programmed the game into a computer so that participants could play the game and we could track their behavior. Mastermind is an analytic game in which winning is achieved by determining the color and position of four pegs in a row (i.e., the solution set). Players make a guess about the four colors by placing them in a row on the screen. When ready to commit to their guess, they click the appropriate button on the screen to receive feedback. The feedback indicates the number of columns in which their guessed color matches that column’s color in the solution set and the number of colors in their guess that matched the colors in the solution set (but not necessarily the column). Players then try again until they either find the solution or run out of tries (i.e., rows). Previous tries and the feedback remain on the screen for players to review.

For each game, participants had 10 tries. Each participant played 10 games, including 2 practice and 8 experimental trials. The computer program randomly determined the solution sets at the beginning of each game and recorded the row on which participants found a solution. Beginning after the 2nd practice trial, the computer program presented the self-efficacy and personal goal measures. Generally, participants would take between half an hour and an hour to finish a session. Five participants either never found a solution across the 10 games or found a solution only once (not an unreasonable accomplishment even if responding randomly). These individuals were dropped from the within-person analysis. In addition, 4 more participants had no variance for some of the variables, which excluded them from the within-person analysis. However, because the within-person analysis was based on repeated measures, we had between 376 and 408 observations per variable.

Measures

Performance. Performance was the row on which the solution was found. Because the object of the game was to find the solution in as few attempts as possible, higher scores represented lower performance.

Self-efficacy. Two measures of self-efficacy were obtained between each game. The simplest, magnitude, asked participants to identify the number of attempts they thought it would take them to find a solution in the next game. The second measure, strength, was the average of questions asking participants to rate how likely they were to find the solution by Row 1 through Row 10 in the next game, on a scale that ranged from 1 (extremely unlikely) to 6 (extremely likely). Because the direction of the strength measure was different from all other measures (e.g., higher is stronger self-efficacy), this measure was reverse coded.

Personal goal. A single item asked participants to identify their goal for the number of attempts in which they were trying to find the solution in the next game.

Analysis

The data were analyzed at two levels. The first was the typical person level. Data were aggregated to the person level (i.e., averaged across trials), and variance between persons was the source of variance for examining relationships. This approach is contrasted with the within-person level used to test the hypothesis. Figure 3 represents the type of analysis conducted over trials (i.e., games) within a person. The solid line represents the pairing of observations when looking at the effects of past performance on self-efficacy and personal goals. The dotted line represents the pairing of observations when looking at the effects of self-efficacy and personal goals on subsequent performance. To conduct the analyses, hierarchical linear modeling (HLM) was used (Bryk & Raudenbush, 1992). HLM allows for the simultaneous assessment of two (or more) levels of analysis. In this case, HLM calculates a regression equation for each person on the basis of the within-person variables of interest. The regression coefficients then represent properties of the person that can be regressed on additional, person-level variables, or simply averaged across individuals. In the latter case, individuals simply serve as replicates of the within-person analysis. In the former case, tests for individual differences can be made, although in the present study, we did not hypothesize any individual differences.

Results

Descriptive Statistics

Table 1 provides the means, standard deviations, intraclass correlations (ICCs), and intercorrelations among the study variables at the between-person level of analysis. The average game was completed in about 6.6 rows, which was just above (i.e., worse than) the average personal goal for the games. Mean self-efficacy magnitude indicated that individuals tended to predict a worse level of performance by one row than their espoused goal. The standard deviation in performance indicated that performance varied less than goals or self-efficacy magnitude. Meanwhile, average self-efficacy strength fell in about the middle of the scale, but the standard deviation indicated a fairly tight distribution.

The ICCs reported are of two kinds (James, 1982; McGraw & Wong, 1996; Shrout & Fleiss, 1979). ICC(1) indicates the percentage of variance in each variable that was a function of individual differences. They indicate that most of the variance in performance was due to differences within individuals, whereas most of the variances in the self-report measures were a function of differences among individuals. Were all the variances attributable to individual differences, none would be available for the analysis used to test the hypotheses. In these cases, all the variables indicated a mixed model. However, the relatively low performance ICC(1) value indicated that individual differences were responsible for very little of the variance in performance.

The ICC(2) indicated the reliability of the variables aggregated to the individual level. That is, each variable was measured for each trial, resulting in several scores per individual. The consistency of aggregated scores is revealed by ICC(2). The calculations are the same as Cronbach’s alpha (McGraw & Wong, 1996).
although in this case they measure stability as opposed to internal consistency.

The correlations reported in Table 1 were based on average performance, personal goals, and self-efficacy measures for each person across the eight performance trials. The results conform to Stajkovic and Luthans’s (1998) meta-analytic findings for laboratory studies using simple tasks (i.e., correlations between .45 and .55). Specifically, personal goals and self-efficacy magnitude and strength were correlated in the expected direction ($r = .40$, .55, and .53, respectively).

**Hypothesis Tests**

The main hypothesis tests involved assessing the relationship between the self-efficacy measures and performance within a person across time. Table 2 contains the average regression weight (i.e., $\gamma$) across all 56 participants. For the first hypothesis, we predicted a positive relationship between past performance and self-efficacy. For both measures of self-efficacy, the effects were significant ($p < .001$) and in the expected direction. We also predicted that past performance would positively relate to personal goals. Again, the effect was significant ($p < .001$) and positive. That is, better past performance led to reporting more difficult personal goals and higher levels of self-efficacy magnitude and strength. The percentage of within-person variance explained by performance ranged from 7% to 27%, depending on the variable. The average ordinary least squares (OLS) results are reported as well because HLM uses standard errors to weight each participant’s equation (Bryk & Raudenbush, 1992). Because standard errors are likely to be higher (worse) when individuals are doing a better job of controlling, HLM can bias estimates downward when studying the effect of control (Vancouver, 1997). In this case, the OLS results did not differ much from the HLM analysis.

The second and third hypotheses predicted that the effect of past performance, personal goals, and self-efficacy beliefs would be negatively related to future performance. The predicted effect was found for all the independent variables, although for past performance the effect was only marginally significant ($p < .10$). Also, the effects were much smaller in that only between 1% and 4% of the variance in performance was related to these variables. Note further that OLS results revealed stronger negative relationships.

Figure 4 pictorially represents the findings regarding self-efficacy and performance. The overlapping distribution curves represent individual distributions of the variables. The high overlap for performance relative to self-efficacy represents the lower ICC(1) for performance than for self-efficacy. The dotted upwardly sloping line represents the positive relationship between

### Table 1

**Descriptive Statistics and Between-Person Level of Analysis**

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>ICC(1)</th>
<th>ICC(2)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>1. Performance (row)</td>
<td>6.56</td>
<td>1.10</td>
<td>.11</td>
<td>.52</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<tr>
<td>2. Personal goal</td>
<td>6.18</td>
<td>1.73</td>
<td>.73</td>
<td>.96</td>
<td>.40**</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3. Self-efficacy magnitude</td>
<td>7.18</td>
<td>1.73</td>
<td>.72</td>
<td>.96</td>
<td>.55***</td>
<td>.65***</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4. Self-efficacy strength</td>
<td>3.35</td>
<td>0.75</td>
<td>.67</td>
<td>.95</td>
<td>.53**</td>
<td>.40**</td>
<td>.76**</td>
<td>—</td>
</tr>
</tbody>
</table>

*Note.* ICC = intraclass correlation.

**Table 2**

**Hypotheses Tests at the Within-Person Level of Analysis**

<table>
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<tr>
<th>Variable</th>
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<th>OLS coefficient</th>
<th>$\gamma$</th>
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<td>HLM results</td>
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<td>Personal goal</td>
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<td>.18***</td>
<td>.02</td>
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<td>Self-efficacy magnitude</td>
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<td>.02</td>
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<td>.05***</td>
<td>.01</td>
<td>7</td>
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<td>Performance as dependent variable</td>
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<td>Past performance</td>
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<td>-0.06</td>
<td>-.06</td>
<td>.05</td>
<td>1</td>
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<td>Personal goal</td>
<td>47</td>
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<td>-.40**</td>
<td>.14</td>
<td>3</td>
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<td>Self-efficacy magnitude</td>
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<td>Self-efficacy strength</td>
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<td>Self-efficacy magnitude</td>
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<td>.91***</td>
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</tbody>
</table>

*Note.* OLS = ordinary least squares; HLM = hierarchical linear modeling.

**Table** **Note.** **p < .01.** ***** p < .001.
The purpose of this study was to provide a more balanced accounting of self-regulation on performance. The initial analysis replicated the typical findings of a strong positive correlation between self-efficacy and performance (Stajkovic & Luthans, 1998). However, when we looked at the self-efficacy-to-performance relationship within persons across time, we found a negative relationship, as anticipated by the cybernetic or discrepancy-reduction side of self-regulation (Powers, 1991). To account for the between-person correlation, we suspected that performance would have a strong positive effect on self-efficacy, and this is what we found. The primary difference between this study and much of the previous empirical work related to the design and nature of the analysis. Unlike the within-person analysis procedure used in this study, the between-person correlational approach generally used in the literature cannot separate direction of causality. Thus, the within-person design provided a more internally valid means of assessing causality and exposed a very different type of relationship than commonly assumed. Further, the inclusion of the control processes in the theory of self-regulation required a more individually oriented design.

Following the implications of control theory, we predicted that the causal relation of self-efficacy on performance might be negative. Although not strong enough to mask the strong positive effects of performance on self-efficacy and goals, it appears that something like complacent self-assurance undermined motivation to adversely affect a person’s performance across time. This finding is important not only because of what it says about the relationship of self-efficacy and performance but also because of what it says about the importance of the cybernetic paradigm in self-regulation. Specifically, in contrast to the arguments of several prominent researchers (Bandura, 1997; Locke, 1991, 1994), control theory provides important and unique predictions regarding human behavior. It also provides a description of the architecture likely responsible for these and other findings (e.g., Campion & Lord, 1982). We would argue that without this understanding, a full accounting of self-regulation is not possible.

Perhaps more surprising than the self-efficacy finding was the negative effect of self-reported personal goals on performance. Neither control theory nor SCT predicts that higher personal goals would cause poorer performance. The content and level of the goals one is seeking are central components of the complete description of self-regulation (Austin & Vancouver, 1996; Vancouver, 2000). What is questioned in this study is the sensitivity of self-efficacy and performance across participants. The large dots represent the average level of self-efficacy and performance for a participant. The two solid lines represent the negative relationship within individuals. The figure depicts how both findings can occur in the same set of data.

The final hypothesis related to the mediating role of self-efficacy on the past performance to personal goal relationship. Table 2 shows the strong positive relationship between the self-efficacy measures and reported personal goal (explaining between 32% and 53% of the within-person variance in personal goals). Likewise, the direct effects of past performance on self-efficacy and personal goals were already established. To test for mediation, past performance and both measures of self-efficacy were entered simultaneously. The results indicated that past performance still significantly related to personal goals ($\gamma = .06, SE = .02, p < .001$). Given the original coefficient of .18, support for partial mediation was found (James & Brett, 1984).

In addition to our hypothesized effects, we also considered and tested the possibility of curvilinear relationships and the effect of time (trial) on variables and relationships. In terms of curvilinearity, it is possible that if self-efficacy dropped too low, the participant might give up, and performance would suffer. Curvilinearity was tested two ways. First, each self-efficacy measure was squared and entered in the Level 1 analysis along with its main effect term. In both cases, the squared term was nonsignificant. Second, the average self-efficacy of the participant was entered as a Level 1 variable to predict both the intercept and the slope for each individual. Although both measures of self-efficacy were significantly related to the intercept, which replicated the correlational analysis presented in Table 1, neither measure was related significantly to the slope.

In terms of the effect of time, we were interested in detecting practice effects and the possibility that the relationships we found would drop off over time. To test for practice effects, we entered trial as an independent variable in the within-person analysis. Trial did not significantly relate to performance ($\alpha = .05$). To test for changes in the relationships over time, we first standardized all our variables including trial (our measure of time), created product terms, and then performed a moderated regression analysis. We found no effect for trial on the relationships between past performance and self-efficacy or personal goals. On the other hand, we found that trial significantly interacted with self-efficacy when predicting subsequent performance. Specifically, the interaction term ($\gamma = -.31, SE = .15, p < .05$) indicated that the negative relationship between self-efficacy magnitude and subsequent performance became stronger over trials. Likewise, the interaction term ($\gamma = -.70, SE = .16, p < .001$) indicated that the negative relationship between self-efficacy strength and subsequent performance became stronger over trials. Given the ancillary nature of these analyses, we saved discussion of them until the end of this article.

**Discussion**

The purpose of this study was to provide a more balanced accounting of self-regulation on performance. The initial analysis replicated the typical findings of a strong positive correlation between self-efficacy and performance (Stajkovic & Luthans, 1998). However, when we looked at the self-efficacy-to-performance relationship within persons across time, we found a negative relationship, as anticipated by the cybernetic or discrepancy-reduction side of self-regulation (Powers, 1991). To account for the between-person correlation, we suspected that performance would have a strong positive effect on self-efficacy, and this is what we found. The primary difference between this study and much of the previous empirical work related to the design and nature of the analysis. Unlike the within-person analysis procedure used in this study, the between-person correlational approach generally used in the literature cannot separate direction of causality. Thus, the within-person design provided a more internally valid means of assessing causality and exposed a very different type of relationship than commonly assumed. Further, the inclusion of the control processes in the theory of self-regulation required a more individually oriented design.

Following the implications of control theory, we predicted that the causal relation of self-efficacy on performance might be negative. Although not strong enough to mask the strong positive effects of performance on self-efficacy and goals, it appears that something like complacent self-assurance undermined motivation to adversely affect a person’s performance across time. This finding is important not only because of what it says about the relationship of self-efficacy and performance but also because of what it says about the importance of the cybernetic paradigm in self-regulation. Specifically, in contrast to the arguments of several prominent researchers (Bandura, 1997; Locke, 1991, 1994), control theory provides important and unique predictions regarding human behavior. It also provides a description of the architecture likely responsible for these and other findings (e.g., Campion & Lord, 1982). We would argue that without this understanding, a full accounting of self-regulation is not possible.

Perhaps more surprising than the self-efficacy finding was the negative effect of self-reported personal goals on performance. Neither control theory nor SCT predicts that higher personal goals would cause poorer performance. The content and level of the goals one is seeking are central components of the complete description of self-regulation (Austin & Vancouver, 1996; Vancouver, 2000). What is questioned in this study is the sensitivity of...
a self-report measure of that goal (i.e., personal goal). An earlier study had revealed the ephemeral nature of goal commitment (Vancouver, 1997), and the fear was that self-reported personal goals were equally as transitory. The covariance of personal goals with self-efficacy and performance seemed to support the nomological net constructed by Locke and Latham (1990b), but the possibility of spurious relationships had not been tested. Although the findings here support the notion that much of the variance in personal goals is a function of self-efficacy, personal goals did not have a positive effect on performance.

As it stands, Study 1 leaves us with two uncomfortable conclusions: Self-efficacy and personal goals can undermine performance. Study 2 seeks to put those conclusions into perspective. Specifically, the role of actual personal goals is central to both control theory (Powers, 1973) and SCT (Bandura, 1986). Both theories hypothesize that more difficult goals will cause actions designed to achieve that higher level. Further, we believe decision processes play a role in the acceptance of goals from an external source (Austin & Vancouver, 1996). Self-efficacy, as a component of decision making, is likely to have a significant positive effect in accepting high goal levels or behavioral options important to organizations (Bandura, 1997). We examine these issues in Study 2.

Study 2

For Study 2, we made the assumption that the problem with personal goals was in the measure, not the construct. Hence, to more adequately obtain individuals with relatively higher goal levels, we assigned goals. This is a tried and true method of manipulating goals. This is a tried and true method of goal-level manipulation (Locke & Latham, 1990a). We predicted that assigned goal level would relate positively to performance. In addition, we tested the effects of individual differences in self-efficacy on performance when assigned a difficult goal. Specifically, we hypothesized, in line with the findings in the literature (Bandura & Cervone, 1986; Locke et al., 1984; Taylor, Locke, Lee, & Gist, 1984), that individuals with higher self-efficacy would be more likely to accept the difficult goals. However, given the findings from Study 1, we took a conservative approach in that past performance was statistically controlled before entering self-efficacy. Finally, we sought to replicate the findings from Study 1. That is, between manipulations, participants were expected to exhibit the same positive effects for past performance on self-efficacy and personal goals and the same negative effects for self-efficacy and personal goals on subsequent performance.

Method

One hundred eighty-seven undergraduate students from a midwestern university participated in Study 2 in exchange for course credit. The data from 2 participants were lost due to a computer error. The task and the measures used in Study 1 were used in Study 2. However, each participant played only eight games, two practice and six trials. In addition, a second measure of self-efficacy magnitude was calculated from the set of questions asked between each trial. In addition to adding the confidence ratings for each level of performance to form the self-efficacy strength measure, we determined the level at which the participant first endorsed a rating of 4 (somewhat likely) on a scale from 1 (extremely unlikely) to 6 (extremely likely). We refer to this measure as the Magnitude 1 measure. The Magnitude 2 measure was the response to the question asking on which row they thought they would find the solution.

After the self-efficacy measures were administered for the third experimental trial but before the personal goal measure was given, a goal manipulation was introduced. Sixty-eight participants were told to try to find a solution by the seventh try (easy-goal condition). Fifty-three participants were told to try to find a solution by the fourth try (difficult-goal condition). The remaining 64 were not given any additional instructions (control condition). The computer determined the condition randomly, so that it was unknown to the experimenter.

Results

Descriptive Statistics

Table 3 provides the means, standard deviations, ICCs, and intercorrelations for many of the key variables. Only the easy- and

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<td>5. Post-self-efficacy strength</td>
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<td>.805</td>
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<td>.834</td>
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</tr>
</tbody>
</table>

Note. Condition reflects data for easy (1) and difficult (2) goal conditions. For the condition variable, N = 121. For all other variables, N = 185. ICC = intraclass correlation.

* * * p < .01 *** p < .001.
difficult-goal conditions are represented in the condition variable so correlations would be meaningful. As with Study 1, the ICCs indicated that most of the variance in performance occurred within participants, whereas most of the variance in the self-report measures occurred between participants. Although condition did not correlate with any other measure, all the other measures intercorrelated significantly with each other. Specifically, and like the results from Study 1, self-efficacy and personal goal were positively correlated with performance. However, uncovering the within-person relationships was somewhat more complicated in Study 2, given the manipulation that occurred halfway into the experimental trials. Below, we describe the test of the manipulation, tests to replicate the findings from Study 1, and the tests of the role of self-efficacy on personal goals and performance within the difficult-goal condition.

**Goal Effect**

To test the effect of goal condition on performance, an analysis of covariance controlling for premanipulation performance was conducted and found to be significant, $F(2, 181) = 3.061, p < .05$. A post hoc analysis indicated that only easy- and difficult-goal conditions differed (Fisher’s least significant difference = 2.10, $p < .05$). Table 4 provides the mean performance of each group before and after the goal manipulation.

**Self-Efficacy–Performance Relationship**

Like the first study, we initially describe the effect of past performance on self-efficacy. The addition of a manipulation adds a level of analysis, trial type, between the trial and individual levels of analysis. The basic Level 1 model, given at the top of Figure 5, indicates that self-efficacy can be predicted by means of a constant ($\pi_0$), plus row performance on the previous trial weighted by $\pi_1$. The values for $\pi_0$ and $\pi_1$ depend on their own constants ($\beta_0$ and weights ($\beta_1$) for the type of trial (pre- or postmanipulation). The regression weights ($\beta$s) are a function of gammas ($\gamma$s) that summarize the data across all the participants and depending on condition when modeled (e.g., for $\beta_0$). In other words, three pairs of observations of performance and self-efficacy (Level 1) are nested within two trial types (Level 2), which are nested within each participant (Level 3). The gammas are given for each measure of self-efficacy.

The key gamma is $\gamma_{100}$. It reflects the main effect of row performance on self-efficacy. For all three measures, past row performance was significantly related to subsequent self-efficacy. Indeed, row performance accounted for 9%, 5%, and 19% of the variance in self-efficacy strength and the first and second measures of self-efficacy magnitude, respectively. The positive signs indicate that as performance increased, self-efficacy increased. The lack of a significant effect for $\gamma_{100}$ indicates that the relationships held regardless of the trial type (i.e., before or after the goal manipulation).

Figure 6 depicts the findings of the relationship when performance was the dependent variable for each of the self-efficacy measures. Again, the main effect of self-efficacy on performance is reflected in $\gamma_{100}$. All three measures of self-efficacy were significantly and negatively related to performance. Here, self-efficacy strength accounted for 5% of the variance in performance, the first measure of magnitude accounted for 2%, and the second measure accounted for 7%. Hence, the results of Study 2 replicated the results of Study 1 regarding the relationships between self-efficacy and performance across time.

Generally, the negative relationships were stable across trial types. However, the significant $\gamma_{110}$ for the first self-efficacy magnitude measure indicated that the relationship of performance regressed on self-efficacy depended on whether the trials were pre- or postmanipulation. Specifically, multiplying $-.274$ by the value for trial type ($-.5$ for premanipulation trials and $.5$ for postmanipulation trials) revealed that $\pi_1$ equaled $-.133$ for premanipulation trials and $-.407$ for postmanipulation trials. Thus, the trial type moderated the relationship between self-efficacy and performance so that after the manipulation, individuals showed a stronger negative relation between self-efficacy and performance than they did before the manipulation, but only for the first measure of magnitude. This could be interpreted as a replication of the Trial X Self-Efficacy interaction found in Study 1. That is, over time (trials), the negative relationship became stronger. Although reasonable, in this case, trial and trial type (pre- vs. postmanipulation) were confounded. This confound might have hidden a strengthening relationship for the other measures of self-efficacy, or it might account for the significant effect found for the first measure of magnitude (i.e., it was not a replication of the findings from Study 1).

Given the relatively few observations within trial type, we did not try to replicate the moderated regression analysis in this second data set (because we would have run out of degrees of freedom).

Also included in Figure 6 is an analysis of the effect of the goal manipulation on row performance. The gammas associated with $\beta_0$ (i.e., $\gamma_{010}$, $\gamma_{011}$, and $\gamma_{012}$) reflect the effect of the goal manipulation through dummy codes for the conditions. Specifically, individuals in the easy-goal condition were coded 1 on easy and 0 otherwise, and individuals in the difficult-goal conditions were coded 1 on difficult and 0 otherwise. Hence, the intercept ($\gamma_{010}$) reflects individuals in the control condition. Although none of the gammas were significant, the effect of condition on row performance, as reflected in Table 4, is largely re-created with the multilevel model. Specifically, the difference in row performance for individuals in the difficult- versus easy-goal conditions was .436 (almost 7/16 of a row better for difficult-goal individuals).

Because the effect of condition is captured in three terms (i.e., $\gamma_{010}$, $\gamma_{011}$, and $\gamma_{012}$), the significance of any one is difficult to achieve. However, together they accounted for 28% of the variance in the slope ($\beta_0$) of trial type (pre–post).
Self-Efficacy =

\[ \pi_0 + \beta_{00} Y_{000} + \beta_{01} Y_{010} + \gamma_{011} Y_{011} \text{Easy} + \gamma_{012} Y_{011} \text{Hard} + \pi_1 \text{Row Performance} \]

<table>
<thead>
<tr>
<th>Strength</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Magnitude 1</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Magnitude 2</th>
<th>Coefficient</th>
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<td>.059</td>
<td>(.085)</td>
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<td>(.090)</td>
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<td>.043</td>
<td>(.196)</td>
<td>-.376</td>
<td>(.208)</td>
<td>.167***</td>
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</table>

Figure 5. Model of performance and condition effects on self-efficacy for each measure of self-efficacy. \( \pi \) and \( \beta \) represent random effects for the first- and second-level models, respectively; \( \gamma \) represents the fixed effects for the third-level model. \( N = 672 \) Level 1 and 224 Level 2 records. ***p < .001.

**Personal Goals**

As with self-efficacy, we sought to replicate the effect of performance on personal goals and personal goals on performance. Three-level models identical to those developed for self-efficacy were developed for personal goal. In keeping with Study 1, past performance positively predicted personal goal (\( \gamma_{100} = .154, p < .001 \)). Also in keeping with Study 1, personal goal negatively predicted subsequent performance (\( \gamma_{101} = -.758, p < .001 \)).

**Relationships Among Performance, Self-Efficacy, and Personal Goals Given a Difficult Goal**

Except for the main goal-manipulation effect, the analyses so far have replicated Study 1 findings. The most important replication is that self-efficacy and personal goals appear to negatively relate to subsequent performance. However, these analyses were conducted within trial types (pre- and postmanipulation) and do not account for the significant differences in performance (or personal goals) associated with the manipulation. It is at the point of the manipulation that self-efficacy and personal goals are likely to have positive effects on performance. However, because the manipulation is a between-person factor, conventional analysis must be applied to examine these relationships.

Recall that SCT and goal-setting theorists argue that self-efficacy beliefs play a role in the adoption of difficult goals (Bandura, 1986; Locke & Latham, 1990a). We know that the goal assignment significantly related to performance, but there may have also been substantial individual differences in the acceptance of the assigned goal. Indeed, only 43% of the participants in the difficult-goal condition indicated the assigned goal as their goal for the next trial (the goal manipulation was given before asking for personal goal). All but 1 of the remaining participants indicated an easier personal goal. Further, personal goal for this trial was correlated, \( r(54) = .34, p < .05 \), with performance averaged across the last three trials. Self-efficacy might help account for this individual difference.

To test this possibility, the first step was to correlate the three measures of self-efficacy, averaged across the three premanipulation trials, with personal goal for the first postmanipulation trial. The correlations were all significant (\( p < .05 \)) and in the expected direction, \( r(54) = .34, .31, \) and .36, for strength and Magnitude 1 and 2, respectively. That is, they reflected a positive relationship between self-efficacy and personal goal. However, these relationships might simply represent the effect of individual differences in ability. To control for this possibility, average premanipulation performance was partialed from the correlations. Although no longer significant, the correlations dropped only about 10 points to .23, .22, and .21, respectively.

Finally, and in keeping with our lack of faith in the sensitivity of the measurement of personal goals, we correlated self-efficacy averaged across the three premanipulation trials with performance averaged across the three postmanipulation trials. Only self-efficacy strength and the second magnitude measure correlated significantly (\( p < .01 \)) with performance on the postmanipulation trials.
trials, \( r(53) = .37 \) and \( .52 \), respectively. The direction of these correlations indicated a positive relationship between self-efficacy and performance. More important, though, the second measure of self-efficacy magnitude retained its significance \( (p < .05) \) even after controlling for average premanipulation performance \( (pr = .30) \), indicating a unique effect for self-efficacy.

**Discussion**

Study 2 sought to replicate the findings from Study 1 while demonstrating the positive effects of goal level and, potentially, self-efficacy on performance. Both tasks were accomplished. Within individuals and trial types, but across time, self-efficacy was positively influenced by past performance and negatively related to subsequent performance. Likewise, personal goal was positively influenced by past performance and negatively related to subsequent performance. However, goal assignment (i.e., difficult or easy vs. control) was significantly and positively related to subsequent performance. Furthermore, when a participant was assigned a difficult goal, one of the self-efficacy measures from the premanipulation trials predicted performance on the postmanipulation trials, even after controlling for earlier performance. Whereas the negative effects of self-efficacy on performance conform to the cybernetic side of self-regulation, these last two findings conform to the decision-making side of SCT (Bandura, 1986) and goal setting theory (Locke & Latham, 1990a). In the General Discussion, we discuss all the findings in terms of theory and the internal validity provided by the methods used in these studies.

Immediately below, we discuss a methodological feature, the three-level hierarchical linear model, unique to Study 2.

To accommodate a pre-post design with a continuous within-subjects factor, we developed models at three levels of analysis (Bryk & Raudenbush, 1992). The first level captured the covariance over time among two or more variables. Note that unlike growth or other dynamic research (e.g., Hofmann, 1997), time or event was not one of these variables. We were less interested in the effects of time than in the relationship among variables over time. The second level separated the premanipulation trials from the postmanipulation trials. The procedure allows one to capture differences in intercepts (i.e., main effects on the dependent variable) or slopes (i.e., interactions between the Level 1 independent variables and the manipulation). This is similar to interrupted time-series analysis in which the researcher is interested in changes to levels or slopes brought on by the introduction of the manipulation (Cook, Campbell, & Peracchio, 1990). However, the HLM analysis is more flexible because time need not be the independent variable. Finally, the third level of analysis was the individual participant, and the actual level of the manipulated variable was the Level 3 variable.

This procedure allowed us to develop individual models dependent on individual differences, which in this case were the levels of the manipulations. Such idiothetic models combine the idio- graphic feature required to test modal models of humans while providing for the nomothetic feature required of science (Austin & Vancouver, 1996). Austin and Vancouver argued that models of...
goal-striving behavior are likely to need this feature because to some extent individuals have unique goals, hold those goals at unique levels, have unique methods of assessing progress toward those goals, and have unique means of achieving or maintaining those goals. Meanwhile, Austin and Vancouver argued that the basic goal-striving processes are likely universal and the role of properties associated with those goals must be understood at a general level. Below, we turn to the role that self-efficacy and goal level played in the two studies reported here.

General Discussion

Self-efficacy and personal goals have become important factors in studies of motivation and organizational behavior. However, theoretical accounts of self-regulation, particularly within SCT (Bandura, 1997), raise a paradox regarding the relationship among self-efficacy, goals, and performance. Unfortunately, the majority of the studies that have examined these variables have not questioned or assessed underlying assumptions regarding direction of causality and measurement. Specifically, we questioned the direction of causality between self-efficacy and performance, and the sensitivity of personal goal measures. The two studies presented here suggest answers that differ from most of the literature on self-efficacy and goals (Austin & Vancouver, 1996).

Self-Efficacy

With regard to the direction of causality between self-efficacy and performance, we noted in the introduction that Bandura (1986) acknowledged the likely causal effect of past performance on self-efficacy. Yet, the tendency in the literature is to interpret a positive correlation between performance and self-efficacy as supporting a motivational effect of self-efficacy on performance. To assess the direction of influence, a longitudinal, within-person design was used in the two studies reported here. Both found that performance does indeed positively influence self-efficacy but that self-efficacy does not positively influence subsequent performance.

On the basis of a control theory account of behavior (Powers, 1991), acknowledged by Bandura (1997) as an aspect of self-regulation, we argued that self-efficacy may be negatively related to subsequent performance. Both studies presented here found significant negative effects between self-efficacy and subsequent performance within persons across time. At the same time, both studies found highly significant, positive, between-person correlations between self-efficacy and performance.

Although these findings have serious implications regarding how to interpret Stajkovic and Luthans’s (1998) meta-analysis of self-efficacy research, they have only a minor implication for SCT (Bandura, 1986). Given that the meta-analysis was based almost exclusively on cross-sectional correlational studies, conclusions regarding the motivational impact of self-efficacy cannot be made. Instead, it is likely much of the association found between self-efficacy and performance is because of the information one’s performance gives one about one’s capacities. However, because SCT acknowledges this likely effect, as well as a role for control (i.e., discrepancy reduction) systems, the only implication for SCT regards the relative role of discrepancy reduction. Bandura (1997) relegated discrepancy reduction to a diminutive role, but the evidence presented in these two studies suggests its role is critical to a thorough understanding of motivation.

Meanwhile, we wanted to avoid swinging the proverbial pendulum too far. Hence, in Study 2, we considered the positive effect of self-efficacy on the adoption of a difficult goal. We found that even under the onerous constraint of controlling for past performance (Wood & Bandura, 1989), at least one measure of self-efficacy positively related to subsequent performance within the difficult-goal group. Hence, the role of self-efficacy in deciding to adopt a difficult goal is at least partially supported in the same task for which the negative effect was found.

Bandura’s (1986) claims for self-efficacy may be overly optimistic. For him “self-efficacy for goal attainment raises the level of self-set goals, strengthens commitment to goals, and enhances performance” (p. 471). We found evidence that supports the first two claims, but not the last. The problem arises on the same page in Bandura’s book. In acknowledging the discrepancy-reducing aspect of self-regulation, he stated, “The more self-dissatisfied persons are with a substandard performance, the more they increase their subsequent effort” (italics added; Bandura, 1986, p. 471). However, in the same paragraph, he stated, “When people aim for a challenging standard but have to guess how they are doing, the stronger their perceived self-efficacy for goal attainment and the more pleased they are with whatever they surmise their performance to be, the more they heighten their efforts” (italics added; Bandura, 1986, p. 471). This is the inconsistency to which Powers (1991) referred. It appears that for Bandura, displeasure with a discrepancy motivates unless performance levels are ambiguous, in which case self-efficacy inflates perceived performance levels and, somehow, along with pleasure, increases efforts. This latter process is what Powers (1991) questioned because of the structure of control systems, and our evidence supports his reasoning. Specifically, Powers (1991) argued that when performance levels are ambiguous, self-efficacy inflates perceived performance levels, which decrease efforts. Powers’s (1991) model does not require pleasure or displeasure as a mediator.

Indeed, owing to Powers’s (1973) control theory, we suspect the dynamics are even more complex than we could demonstrate in these two studies. Control theory describes humans as parallel processors, striving for multiple goals simultaneously and with a multitude of methods possible. The multitude of methods requires choices from time to time (Austin & Vancouver, 1996), and it is with regard to the processes involved in making these choices that decision-making concepts hold sway. For example, those with particularly low levels of self-efficacy may have chosen not to play the game with any level of seriousness. Choosing to cognitively participate, like choosing to accept a difficult goal, will likely result in a positive effect of self-efficacy on performance. We attempted to test for this kind of curvilinear effect. However, it may have been the case for only those few who never found a solution or found a solution only once in the games played (perhaps by pure luck). For the within-person analysis, these individuals had to be dropped because they presented an inadequate amount of variance in performance. Hence, a study with a different design would be needed to adequately test this aspect.

Further, one could argue that much of the between-person variance in performance was caused by self-efficacy. These studies measured performance and self-efficacy only for a limited time period. Individual differences in capacity beliefs were likely al-
Perhaps self-efficacy affected performance before self-efficacy and performance were measured for these individuals on this task. Perhaps children, the study participants with high self-efficacy in analytical tasks practiced these types of games, whereas those with low self-efficacy did not. Perhaps the practice developed the skills used in this study, which determined average performance, but not any particular trial performance. Thus, in the time frame of this study, “complacent self-assurance” (Bandura, 1997) could have been the process in effect, but over longer periods of time, motivated application of resources toward perceived attainable goals may have had a greater effect. Longer term studies are necessary to assess this possibility. Nonetheless, for those who pass the hurdle of choosing to participate or choosing to accept a difficult goal, increases in self-efficacy are negatively related to performance. In ongoing work settings, these hurdles may occur early and then lose their relevance as task behavior becomes much more routine.

This brings us to the issue of the increasing negative effect over time found in Study 1 and for one of the measures of self-efficacy in Study 2. Given research that has tended to show a drop-off in the relationship between self-efficacy and performance (e.g., Feltz, 1982; Mitchell et al., 1994), we expected a drop-off here. However, those studies used between-person analyses. The processes within a person across time or trial may be different. It may be, for instance, that over time one will more readily act on consequences predicted by one’s internal (i.e., mental) model of a task instead of waiting for actual consequences (Johnson-Laird, 1989). Bandura (1989) seemed to claim that self-efficacy beliefs are the part of one’s mental model that may be responsible for inflating or deflating those predicted consequences. This is the effect Powers (1991) used to make his prediction of a negative effect. Nonetheless, the finding is surprising because we would expect that over time, self-efficacy beliefs would stabilize. This stability would translate into lack of variance within a person and, hence, a lower effect. Perhaps the number of games played did not provide sufficient time for a stabilizing effect in these studies. Future research is needed to address this question.

In line with control theory’s description of humans pursuing multiple goals simultaneously, we also suspect that the sign of the relationship between self-efficacy and performance might change depending on the goals for which discrepancies are created and reduced and the nature of the resources required to maintain those goals. If limited resources are required to maintain two goals, beliefs that one goal is being met frees up resources for the other goal. Consider, for example, the academics’ role of teaching. It takes time to prepare quality lectures for one’s courses. We find in our own behavior the tendency to rest on the laurels of a lecture we think went over well rather than continue to put time into improving it. Indeed, we think this is a very reasonable strategy (i.e., if it ain’t broke, don’t fix it), particularly in light of our other duties (e.g., research). Nonetheless, one can give the lecture the next term and feel it bombed. The result is to revisit the lecture before the next time it is given. This result, applying the analysis we used here, would be that more effort would be put into revising the lecture when it was believed to be of low quality (i.e., “I am not capable of giving a quality lecture as it now stands”) than when one believes the lecture is of high quality. This relationship may be exacerbated when the quality of the information we have about the quality of our lectures is poor.

The sign of the relationship between self-efficacy and performance might change yet again if we consider a different set of goals. In experimental studies, self-efficacy is often manipulated through false normative feedback (Bandura, 1997). Participants are told they are doing worse or better than average. If these individuals are seeking to maintain positive impressions of themselves and themselves to others (e.g., impression management), feedback that indicates one is doing well relative to others creates a perception that those goals are being met (Kluger & DeNisi, 1996). This may free up cognitive or attentional resources that might have been used by these goal systems to find ways to impress the experimenter or reaffirm one’s worth (Steele, 1988). These resources could then be used on the task at hand, which if complex, needs them (Kanfer & Ackerman, 1989). Feedback that indicates relatively poor performance is likely to create greater discrepancies in these self-systems as well as low self-efficacy beliefs for the task at hand. The discrepancies in the self-systems steal cognitive resources away from the task at hand, resulting in poor performance (Kluger & DeNisi, 1996) and a positive correlation between self-efficacy and performance.

These ideas are speculative and have not received the research attention necessary to confirm or disconfirm them (Kluger & DeNisi, 1996). The point of the present study is to highlight flaws in current research methods that may be lulling the research community into accepting the simple explanations of SCT. We suggest that (a) the positive correlation of self-efficacy with performance may be largely an effect of past performance on self-efficacy, (b) self-efficacy can negatively affect subsequent performance by rendering a person complacent, and (c) self-efficacy can positively affect subsequent performance by affecting choices like the adoption of a difficult goal. The role of self-efficacy in day-to-day behavior deserves a more critical review. In the task used here, participants had to decide whether to think more about each guess or ask for feedback, hoping they had found the solution. Their actual performance was ambiguous at that point in time. Once they sought feedback it was too late to correct their guess. The findings tend to suggest that when individuals had higher than their typical self-efficacy, they may have committed to their guess too early. In other words, their self-efficacy encouraged them to act rather than think.

We found these negative effects for personal goal and self-efficacy on performance using undergraduates playing a game within a 1-hr block of time. Given that the purpose of the study was to assess a basic argument, greater focus was placed on internal validity and experimental control, and less on external validity (Mook, 1983). Additional studies using different tasks, different populations, and different time periods (e.g., total number of trials, greater lengths of time between trials) are required to assess the generalizability of the findings. However, as noted in the beginning of this article, a negative relationship has been found between past performance or self-efficacy manipulations and performance with learning tasks (Salomon, 1984; Tomarken & Kirshenbaum, 1982), decision-making tasks (Bandura & Jourden, 1991; Cervone & Wood, 1995; Vancouver, 1997), routine work tasks (Waldensee & Luthans, 1994), creative tasks (Podsakoff & Farh, 1989), and professional basketball players and teams (Gilovich et al., 1985; Mizruchi, 1991). Our results support the notion...
that, as might be relevant in some work contexts, performance could suffer when action is taken before completely thinking through the consequences and what current information is telling one about those possible consequences (e.g., strategic decision making). For other tasks, the opposite may be true. That is, acting may be preferable to thinking because the consequences can be easily corrected (Lord & Levy, 1994). Until these contingencies are understood, skeptical practitioners may want to remain skeptical.

Method and Analysis

The design and analysis procedures used in this study are fairly unique (Hofmann, 1997) but provide for much better internal validity than typical correlational designs (Cook et al., 1990). Nonetheless, we cannot unequivocally interpret the negative relationship found as causal. Indeed, we think it is clearly not causal for personal goals because we cannot think of a mechanism. On the other hand, because of control theory and the mechanism described by Powers (1991), we do think it is reasonable to suggest self-efficacy beliefs had a causal influence in the negative relationships found.

In general, Runkel (1990) argued that when attempting to understand a system, within-person longitudinal designs are required. Because these types of studies are rare, much empirical work needs to be done. For example, Druckman and Bjork (1994) noted in their review of the training and performance research that studying confidence judgments across extended periods of performance and across situations or tasks may be the most informative paradigm for testing the relative contribution of self- or team confidence and other cognitions to performance over time, as well as for testing changes in sources of confidence information. (p. 204)

Yet, researchers have been hesitant to conduct these types of studies because they are difficult to carry out and even more difficult to analyze. Now, however, analytic procedures like the one used here and others (e.g., Chan, 1998) are emerging that make analysis of these types of studies possible.

Longitudinal designs are not enough, however. If learning, the application of new technologies, or other innovations increase the level of performance on a task or in a job over time, it is likely that self-efficacy and goals will increase along with performance. Interpreting the positive covariance in self-efficacy, goals, and performance as an indication of the motivational power of self-efficacy beliefs could be invalid. A deep understanding of the processes one is studying, and the alternative explanations that might account for a set of findings, is necessary.

For example, Feltz and Lirgg (1998) recently reported finding a positive relationship between hockey team efficacy and team performance, using an analysis similar to the kind used here. Unfortunately, they did not control for the actual quality of the team, which is likely to affect the efficacy of the team as well as the outcome of the game. Indeed, recall the Mizruchi (1991) study that looked at NBA playoff wins and losses. He initially found a higher likelihood that a team would win a target game if it had won the previous playoff game. However, once he controlled for home team advantage and the relative quality of the teams, the relationship became negative.

In addition, longitudinal within-person designs require vigilance regarding measurement. In the current set of studies, the personal goal measure when considered at the person level (i.e., when aggregated across trials) seems to have adequately captured actual performance goals for the participants. However, the variance within individuals was not random error but a systematic function of past performance. Hence, using such a measure in within-person designs raises questions of its sensitivity. Instead, Powers (1973), Runkel (1990), and others (e.g., Marken, 1997) argued for a more rigorous test for determining the goals people strive for and the level at which those goals are represented.

Conclusion

One may conclude that we are swimming against the tide of empirical research. This may be an apt analogy. Specifically, we suspect that what we are dealing with is a tide that causes the water to flow in one direction as it goes out, another when it comes in, and in no direction in the tide pools left over. For example, we found the typical goal-setting effect and that self-efficacy positively relates to accepting a difficult goal. Moreover, we found the typical positive correlations among performance, self-efficacy, and personal goals in the between-person analysis. However, we also found negative relationships among performance, self-efficacy, and goals when we looked within a person. Our analysis allowed us to measure the ebb and not just the flow of the tide. In fact, our findings are not that unusual. Others have found similar results (Bandura & Jourden, 1991; Stone, 1994). However, without theory, interpretations have been limited. It is now our job to understand what causes the change in tide. The causes of the change in tide (i.e., the position of the moon, prevailing winds and currents) are difficult to detect unless one has a reason to look. We hope the findings inspire others to explore the contingencies that determine the tide and that the combination of control theory and SCT provides some hints regarding where to look for those contingencies.

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