The Effects of Mindset on Behavior: Self-Regulation in Deliberative and Implemental Frames of Mind

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The effects of deliberative and implemental mindsets—cognitive and motivational states associated with predecisional and postdecisional frames of mind, respectively—were examined in the context of the self-regulation of behavior. Participants who had been induced to deliberate the merits of participating in a specified task formulated more pessimistic expectations about this task than did participants who had been induced to imagine implementing a plan to complete the task. Moreover, participants in the deliberation condition underperformed relative to the participants in the implemental condition, demonstrating that deliberative and implemental thinking can influence behavior as well as cognition.

In a celebrated piece of advice given to an uncertain decision maker, Benjamin Franklin counseled a friend not on *what* to decide but on *how* to decide:

> I cannot, for want of sufficient premises, advise you *what* to determine, but if you please I will tell you *how*. . . . My way is to divide half a sheet of paper by a line into two columns; writing over the one *Pro*, and over the other *Con*. Then, during three or four days consideration, I put down under the different heads short hints of different motives, that at different times occur to me *for* or *against* the measure. When I have thus got them all together in one view, I endeavor to estimate the respective weights . . . [to] find at length where the balance lies. (as quoted in Dawes, 1988, p. 202)

This method, which Franklin referred to as "prudential algebra," has been argued to be a useful technique for making appropriate, well-reasoned decisions and for avoiding many of the snares of judgment, prediction, and decision making to which people are commonly prone (see Dawes, 1988). Franklin himself argued that through the use of this method, he made better judgments and rendered himself "less liable to make a rash step."

By any calendar oriented to the tides of progress in social psychology, Benjamin Franklin was well ahead of his time. Some 200 years later, researchers inspired by the Rubicon model of action (Heckhausen, 1986; Heckhausen & Gollwitzer, 1987) and by Gollwitzer's notion of deliberative and implemental mindsets (see Gollwitzer, 1990; Gollwitzer & Bayer, 1999), have found some empirical truth to Franklin's claims. According to Gollwitzer, a "deliberative mindset" will develop whenever people are actively debating between two distinct action possibilities or between action and inaction. Thus, when Robert Frost stood before two roads that diverged in a yellow wood, or when Shakespeare's Hamlet contemplated whether to be or not to be, the basic task they were engaging in was one of deliberation. Because deliberation typically involves the careful appraisal of potentially competing goals, the weighing of likely pros and cons with respect to each potential goal, and consideration of the feasibility of these goals (Gollwitzer, 1990), the resulting mindset—like Franklin's prudential algebra—is expected to foster relatively even-handed and accurate appraisal of evidence. Research to date has supported this conclusion: The experimental induction of a deliberative mindset has

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been found to lead to a greater receptivity to incoming information (Heckhausen & Gollwitzer, 1987), impartial processing of information that is available (Beckmann & Gollwitzer, 1987), and a decreased vulnerability to self-serving biases such as the illusion of control (Gollwitzer & Kinney, 1989) and overly positive self-perceptions (Taylor & Gollwitzer, 1995).

It is important to note, however, that the effects of deliberative thinking have not been examined in the context of ongoing self-regulation, and it is possible that prolonged deliberation may have costs as well as benefits. Shakespeare's Hamlet, after all, was only the Prince of Denmark, but he was the king of deliberation; yet, few would applaud him for his decision-making prowess or for his initiative. William James heaped further scorn on those for whom deliberation was an enduring state rather than a finite process stepped through en route to a goal: "There is no more miserable human being than one in whom nothing is habitual but indecision" (James, 1890). From these observations, one might conclude that although the prolonged consideration of pros and cons may make one "less liable to make a rash step," this practice also may render one less liable to make *any* step, or slow any steps that are eventually taken.

According to the Rubicon model of action (Heckhausen, 1986; Heckhausen & Gollwitzer, 1987), there is a sharp distinction between this predecisional, deliberative frame of mind and a postdecisional frame of mind marked by thoughts about how a given decision might be implemented (yielding an "implemental mindset"; Gollwitzer, 1990; Gollwitzer & Bayer, 1999). In contrast to the deliberative mindset, which is characterized by an open-minded and even-handed consideration of alternative possibilities, the implemental mindset is characterized by a concentrated focus on goal achievement. As research in this tradition has shown (Heckhausen & Gollwitzer, 1987, Study 1; Taylor & Gollwitzer, 1995, Study 3), postdecisional thoughts tend to be concerned with the essential elements of planning—the issues of how, when, and where goal-directed actions are to be initiated, maintained, and completed. The resulting mindset has been found to focus people's attention on information that is relevant to the achievement of their chosen goal (Beckmann & Gollwitzer, 1987) and away from alternative concerns and, in particular, away from any negative thoughts about the desirability and attainability of their goal (Taylor & Gollwitzer, 1995, Study 3; see also Gollwitzer, Heckhausen, & Steller, 1990; Heckhausen & Gollwitzer, 1987). Such thoughts would presumably undermine the confidence, determination, and commitment needed for effective goal pursuit (Gollwitzer, 1990).

Although the implemental mindset has been argued to be adaptive (Gollwitzer et al., 1990; Heckhausen & Gollwitzer, 1987), it is not entirely clear that this mindset should be expected to facilitate effective goal pursuit. The planning-based style of thinking that has been shown to be representative of implemental thought closely resembles a scenario-based style of thinking that has been identified as a root cause of optimistic prediction biases such as the planning fallacy (Buehler, Griffin, & Ross, 1994; Kahneman & Tversky, 1979, 1982; for reviews, see Armor & Taylor, 1998; Buehler, Griffin, & Ross, 2002). Furthermore, the experimental induction of implemental mindsets has been found to exaggerate self-serving biases such as the illusion of control (Gollwitzer & Kinney, 1989), overly positive self-perceptions, and illusions of invulnerability to both controllable and uncontrollable risks (Taylor & Gollwitzer, 1995). An open question, then, is whether implemental thought enhances both expectations and performance, as theoretical work on mindset would suggest, or whether implemental thought primarily influences expectations, leaving the implemental thinker particularly vulnerable to underachievement as performance fails to live up to inspired but untethered expectations.

Although there has been little research addressing these issues directly, several lines of research suggest that the general planning orientation that characterizes implemental mindsets may have positive effects on both predictions and performance. A number of studies have shown, for example, that the mere act of making a decision (which passes an individual from a predecisional state to a postdecisional one) leads to increases in intrinsic motivation and enhanced performance (e.g., Cordova & Lepper, 1996; Staw, 1976; Zuckerman, Porac, Lathin, Smith, & Deci, 1978; for reviews, see Deci & Ryan, 1985; Taylor, 1989). Other studies have focused people's attention on reasons why they might succeed at a soon-to-be-completed task and found that this focus, as opposed to a focus on reasons for failure, leads to more favorable performance expectations and enhanced performance (Campbell & Fairey, 1985; Sherman, Skov, Hervitz, & Stock, 1981), although focusing people on reasons for poor performance more generally has not consistently been found to influence either predictions or performance (see, e.g., Newby-Clark, Ross, Buehler, Koehler, & Griffin, 2000). Consideration of the process one needs to go through to attain one's goals, much like the implemental task of planning, has been shown to have a strong and positive effect on subsequent behavior (Pham & Taylor, 1999). Furthermore, several studies have now shown that a particular subset of implemental thoughts—the formal statement of specific implementation intentions—can influence behavior (e.g., Gollwitzer & Brandstätter, 1997; for a review, see Gollwitzer, 1999). Implementation intentions refer to if-then contingency plans that specify how people will

behave if certain performance opportunities arise ("If I encounter Situation X, then I'll perform Behavior Y!"; Gollwitzer, 1999). A recent study testing the effects of implementation intentions on the planning fallacy has found these intentions to influence both predictions of and actual task completion times (Koole & Spijker, 2000). There is thus a growing body of evidence that suggests that implemental thought processes may help to bring people's behavior more in line with their expectations (for discussion, see Taylor, Pham, Rivkin, & Armor, 1998).

The current research extends this line of work by examining the effects of both deliberative and implemental thinking on a variety of performance-relevant expectations, including performance predictions, assessments of the task, and self-evaluations, as well as on actual behavior. We assessed expectations in a variety of ways because, as many theories of self-regulation attest, these types of perceptions and predictions are often important components of the mental regulation of behavior (Atkinson, 1964; Bandura, 1977, 1997; Carver & Scheier, 1981, 1998; Scheier & Carver, 1988). On the basis of past research on mindset, we expected that task assessments and performance predictions would be less optimistic following deliberation and more optimistic following thoughts of implementation. We also expected that the effects of deliberative and implemental thinking would carry over to influence performance, with the more optimistic implemental group outperforming a relatively pessimistic deliberative group. By manipulating task and performance expectations via mindset in an experiment that required participants to actually complete the considered task, the relationships between mindset, expectations, and performance could be directly assessed.

PRELIMINARY STUDY

Before conducting our primary experiment, we conducted a preliminary study to assess participants' reactions to our experimental task and to pilot test the effects of a mindset manipulation on participants' assessment of that task and their performance predictions. Pilot participants (95 university undergraduates) were told that they would be evaluating a "scavenger hunt" activity so that the experimenter could get an idea of what the reactions would be of people who were actually asked to complete the hunt. The scavenger hunt, which will be described in detail in the context of our primary experiment, involves finding a variety of objects—in this case, common objects such as a pinecone, a credit card application, and a library book—within a set amount of time. Participants who had been randomly assigned to a deliberation condition were asked to think about the pros and cons of participating in the scavenger hunt (the reasons why they would and why they would not want to participate), whereas participants assigned to an implemental condition were asked to imagine that they were about to participate in the hunt and to think about what their participation in it would be like. To obtain a check on our manipulation, participants in the two mindset conditions were asked to write down relevant thoughts on a response sheet before turning to the dependent measures. Participants in a third (control) condition were given neither of the orienting instructions.

Following the manipulation, all participants were asked a series of questions about the scavenger hunt and their performance expectations. We assessed how difficult participants thought the scavenger hunt would be, both directly and indirectly. We asked participants to make both general predictions about their performance (on a scale from *bad* to *good*) and specific predictions (e.g., how many of the 32 scavenger hunt items they thought they could find in 30 min). Participants also were asked how efficacious they felt with regard to the hunt, how motivated they would be to perform well, and how willing they would be to actually participate in the hunt if they were given the opportunity to do so.

To provide an overall test of the effects of mindset, we first analyzed responses across all outcome variables with a planned pair of orthogonal contrasts.[1] We hypothesized a linear ordering of groups, with the deliberative group having the least favorable expectations, the implemental group having the most favorable expectations, and the control group falling in between. Consistent with this prediction, the overall linear contrast was significant, $F(1, 90) = 4.0$, $p < .05$, whereas the contrast testing deviation from the hypothesized linear ordering was not, $F(1, 90) < 1$, *ns*. Results from subsequent univariate analyses were consistent with this overall pattern: Participants who had been asked to deliberate the pros and cons of participating in a scavenger hunt expected that they would perform more poorly (both in terms of their general assessments and in terms of the number of items they thought they would find) and saw the hunt itself as inherently more difficult than did participants who had been entertaining thoughts of implementation. The mindset manipulation had no effect on our measures of efficacy, motivation, or willingness to participate. In no instance did a nonlinear model (i.e., a quadratic trend) characterize our data better than our hypothesized linear ordering, despite sufficient power to detect such deviations. Taken together, these analyses suggest that the linear model best characterized the observed pattern of results, with deliberation lowering expectations relative to the expectations of participants in the control condition and implementation elevating them.

In this preliminary study, we opted to manipulate deliberative and implemental thinking directly, and our analyses of participants' thought-listing protocols confirmed that participants had thought about the scavenger hunt in the manner intended: A full 92% of thoughts listed by participants in the deliberative condition were evaluative in nature (describing pros and cons), whereas 90% of thoughts listed by participants in the implemental condition were devoted to planning (describing where, how, and in what sequence they would find items).

It is possible, however, that the effects attributed to deliberation may have been driven by only half of our manipulation. Although participants in the deliberation condition were asked to attend to both the positive and negative aspects of the hunt, their expectations may have been overly influenced by their consideration of negative possibilities rather than by a more even-handed consideration of the task, as we proposed. Analyses of the thought-listing data revealed that participants in the deliberation condition considered positive and negative consequences in a relatively even-handed manner, as intended, instead of focusing disproportionately on the negative aspects of the scavenger hunt (on average, 48% of deliberative participants' thoughts were concerned with positive aspects of the hunt, whereas 44% of their thoughts were concerned with negative aspects). Nevertheless, to guard against this potential explanation for the effects of mindset, we employed a more indirect and subtle method of inducing deliberative and implemental mindsets in our main experiment.

TESTING THE EFFECTS OF MINDSET ON BEHAVIOR

Our primary study examined the effects of deliberative and implemental mindsets in an experiment that required participants to actually complete the considered task. To maximize the generalizability of the results obtained in our preliminary study and to eliminate a possible concern that our initial manipulation raised, we used a very different manipulation of deliberative and implemental thinking. Instead of prompting the specific content and structure of participants' thoughts, as was done in the preliminary study, we allowed deliberative and implemental mindsets to develop naturally as the consequence of manipulated decision environments. Specifically, we manipulated whether participants evaluated a scavenger hunt as one option in a choice that was, at the time of evaluation, unresolvable (to induce deliberation) or as a task that participants would soon be completing (to induce thoughts of implementation). Following this manipulation, participants completed measures of task assessment and performance predictions and then completed an actual scavenger hunt.

One additional aspect of this study is worthy of mention. Because deliberation and implementation represent mutually exclusive pre-actional states of mind (if a given action is only a possibility, any reasoning about it will be deliberative; if an action is an eventuality, thoughts about it will be implemental), it was not possible to create a true control group (i.e., one that eliminated both deliberation and implementation) while still allowing the real possibility of completing a scavenger hunt. In light of this, and in light of the symmetrical effects of mindset in our preliminary study, only deliberative and implemental groups were included in the design.

METHOD

Participants

Participants were 52 undergraduates (28 women, 24 men) at the University of California, Los Angeles, who took part in the study in partial fulfillment of a course requirement.

Procedure

All participants were run individually to protect against potential social facilitation effects (in the prediction and evaluation stage of the study) and to prevent cooperation (in the performance stage). After arriving, all participants were informed that the study was concerned with people's performance on games and that, as participants in this study, each would be asked to play one of two games that the experimenter would describe. To enhance the believability of this cover story, participants were seated in front of two large boxes that were prominently labeled "Game 1" and "Game 2" (no other markings distinguished the boxes). In addition, all participants were told that the top performers at each game would receive a $25 prize (in reality, the top performer in each experimental condition was awarded this prize). This incentive was included at the suggestion of several participants from the preliminary study who reasoned that such an incentive would facilitate motivated performance.

Mindset manipulation. Mindset was manipulated by varying the manner in which the scavenger hunt task was presented to participants. To induce deliberation, the scavenger hunt was presented in the context of indecision: Participants were told that they would be playing one of two games and that part of their task would be to decide which of these two games they would rather play. To prevent snap decisions (and to maximize active deliberation), participants in this condition were told that only one game would be presented to them at a time and that they would be asked to answer questions about the first game before being presented with a description of

the second. By design, the scavenger hunt was presented first (in reality, there was no second game) and the questions asked were the dependent measures for this stage of the experiment.

Similar to the deliberative participants, implemental participants were told that they would be playing one of two games as part of the experiment. However, they also were told that the game they would be playing would be determined by the flip of a coin. This procedure, like the apparent choice in the deliberation condition, was a ruse: The coin always "landed" with the indication that the participant was to play the scavenger hunt, and no mention of a choice between games was made. Implemental participants were told that they would be asked some questions about the game (the dependent measures for this stage) before they actually played it.

Notably, these manipulations did not direct participants' thinking in any explicit way. In contrast to the procedures employed in the preliminary study, participants in this experiment were not told what aspects of the hunt to think about, to think through pros or cons, to plan what they might do, or to consider what the other game might be like. Rather, mindsets in this study were allowed to develop naturally as a consequence of the decision environments that we created.

Scavenger hunt details. All participants were presented with a written description of a scavenger hunt. The stated object of this hunt was to find as many items as possible from a list of 32 common objects (e.g., a plastic fork, a safety pin, etc.) within a 30-min time interval. The description of the scavenger hunt also specified a number of rules that scavengers would be required to obey; these rules (e.g., "no item may be obtained illegally," "you must work alone") were included to provide all participants with a common frame of reference for imagining the hunt.

Dependent measures. The first four dependent measures were intended as checks of the manipulation and were adapted from similar measures used by Gollwitzer et al. (1990). On 7-point scales, participants were asked to indicate (a) how determined they felt at the moment, (b) how strongly they felt they had committed themselves to the scavenger hunt, (c) how curious they were about the other game, and (d) how much they thought they would prefer the other game to the scavenger hunt (endpoints for all questions were labeled *not at all* and *extremely*). Participants were then asked a series of questions about the scavenger hunt and their performance expectations. We assessed how difficult participants thought the scavenger hunt would be both directly, by asking them how easy or difficult they thought the hunt would be for themselves, and indirectly, by asking them how they thought another person ("a typical UCLA student") would do on the hunt. Personal predictions were assessed by asking participants to make both general predictions (how well they would do if they were to participate in the hunt) and specific ones (how many of the 32 listed items they thought they could find in 30 min and how long it would take them to find approximately 50% of the items on the list if no time limit was imposed). Participants also were asked how efficacious they felt with regard to the hunt ("How good are you at this type of game?"). Responses to the specific prediction questions were assessed in task-appropriate units (number of items, minutes); responses to all remaining measures were assessed on 7-point scales with endpoints labeled *not at all* and *extremely*.

These measures appeared on a single page and were presented, face down, to participants after they received the description of the scavenger hunt. All participants were told to review the scavenger hunt materials and to turn to the questions once they had a good feel for the game. Deliberative participants were reminded that there was another game that had yet to be described, and implemental participants were reminded that they would be participating in the hunt after they had finished.

The hunt. To maintain consistency with the cover story, the experimenter proceeded with participants in the deliberation condition as if there really was another task (even though there was none) before "discovering" that the materials needed for the second game were "not available." This discovery was enacted with the appearance of genuine surprise and was followed by an apologetic request for the participant to complete the scavenger hunt. No participant reported suspecting that this ruse was other than an unfortunate mistake. In the implemental condition, participants were simply informed that they would now participate in the scavenger hunt that they had just evaluated.

The scavenger hunt was conducted according to the description provided to all participants. Participants were reminded of the rules (e.g., that no item may be obtained illegally) and the 30-min time limit was restated. All participants were then given a shopping bag in which to carry their items and a digital stopwatch so that they would have an accurate record of how much time was left. The experimenter also had a stopwatch to keep official record of the hunter's time and all participants were made aware that the time they spent hunting would be recorded. Participants were then given detailed directions to a second experiment room where they were to go when they had finished the hunt. The hunt began at the experimenter's cue, at which point both the participant and the experimenter started their stopwatches. Participants completed their hunts without supervision and were free to go anywhere on the univer-

sity campus to obtain items. Once they had left, the experimenter gave his stopwatch to a second experimenter who was to be responsible for administering an assessment survey after the hunt; this experimenter was blind to the participant's experimental condition.

RESULTS AND DISCUSSION

Results are presented for 47 participants who completed the scavenger hunt task. Of the 52 initial participants, 4 declined to participate in the scavenger hunt and 1 participant failed to complete the hunt she started. Of interest, the 4 participants who refused to take part in the scavenger hunt were in the deliberative condition and a chi-square analysis revealed that this differential attrition was significant, χ^2 (1, N = 49) = 5.36, $p < .05$ (note, however, that the 1 participant who did not complete the hunt was from the implemental condition). A plausible account for this effect is that our forced-choice paradigm promoted reactance (e.g., Brehm, 1966) in at least some of our participants. Such an explanation presumes, however, that we successfully created an active choice environment (i.e., before we took that choice away), something our deliberation manipulation was expressly intended to do.

Pre-Performance Measures

A principal components analyses (PCA) was conducted to determine the underlying structure of our various pre-performance assessment measures. From this analysis, three components emerged with eigenvalues greater than 1.0. However, inspection of the eigenvalues revealed a clear break after the first component (eigenvalue = 4.49), with the remaining eigenvalues indistinguishable from scree. The first principal component accounted for 45% of the overall variance and all variables—except the question assessing curiosity about the other game—loaded onto this component. The remaining loadings ranged from a high of .85 to a low of .42; the median loading was .72. As further indication of the appropriateness of the single-component data structure, the full set of pre-performance measures, including curiosity, was internally consistent (Cronbach's α = .84). Exclusion of curiosity did not appreciably increase the reliability of this composite, and so it was retained for remaining analyses.

Given this support for a single-component solution, we tested the effects of our mindset manipulation on the pre-performance measures with an omnibus multivariate analysis of variance (MANOVA), including all pre-performance measures as dependent variables. Results of this analysis revealed a clear effect of mindset, $F(10, 36)$ = 5.79, $p < .001$, suggesting that our manipulation reliably influenced the network of manipulation checks, task assessments, and predictions that we assessed. As can be seen in Table 1, mean differences were in the predicted direction across all measures. Including gender in the analysis did not change these results, and gender had neither main nor interactive effects on the dependent measures and therefore will not be discussed further.

Performance

In our next set of analyses, we assessed the effects of mindset on participants' actual task performance. Performance on the scavenger hunt was assessed by tallying the number of items each participant returned. Initial analyses confirmed that implemental participants did return with more items than participants in the deliberative condition, $t(45) = 2.36$, $p = .02$. As can be seen in the lower portion of Table 1, participants in the implemental condition found nearly 25% more items than participants in the deliberation condition.

It is important to note, however, that a substantial proportion of participants failed to complete the scavenger hunt within the stated 30-min time limit and returning late was somewhat more likely in the implemental condition (in which 42% of the participants returned late) than in the deliberative condition (in which 26% returned late), although this differential tardiness between conditions was not significant, $\chi^2(1, N = 47)$ = 1.27, *ns*. To provide a more conservative estimate of performance that would take into account the extra time that some participants used to complete their hunts, we adjusted the number of items returned to correct for advantages afforded by coming in late. This was done by dividing the number of items that participants obtained by the amount of time they took to find them; this value was then multiplied by the time allowed to complete the hunt to create a corrected score.[2]

Results of the analysis of the corrected performance scores are presented with the uncorrected performance scores in Table 1. As can be seen in the table, the effects of mindset on performance were not an artifact of longer hunting times: Analysis of the corrected performance scores reveal that participants in the implemental condition still found more than 20% more items than did participants in the deliberative condition, revealing that the effects of mindset did carry over to influence performance, $t(45) = 2.24$, $p = .03$.

A Note on Accuracy

A close look at Table 1 reveals that participants' performance predictions were generally accurate in both conditions. Although participants in the deliberation condition slightly underestimated their performance (expecting to find 0.61 items fewer than they actually found), and although participants in the implementation condition slightly overestimated their performance (expecting to find 0.63 items more than they found),

TABLE 1: Effects of Mindset on Pre-Performance Measures and on Performance

	Mindset Condition	
	Deliberative	*Implemental*
Pre-performance measures		
Determination	3.13	4.63
Commitment to scavenger hunt	2.96	5.33
Curiosity about other game	5.91	5.54
Preference for scavenger hunt	3.44	3.79
Task difficulty	5.61	4.79
Predicted performance (other)	3.57	4.67
Predicted performance (self)	3.17	3.63
Predicted number of items found	11.87	13.25
Time to find half of items on list	68.61	54.46
Personal efficacy	3.65	3.92
Performance		
Performance (number of items found)	11.26	13.88
Adjusted performance	11.02	13.39

NOTE: An omnibus MANOVA indicated a significant effect of mindset on the pre-performance variables included in the table.

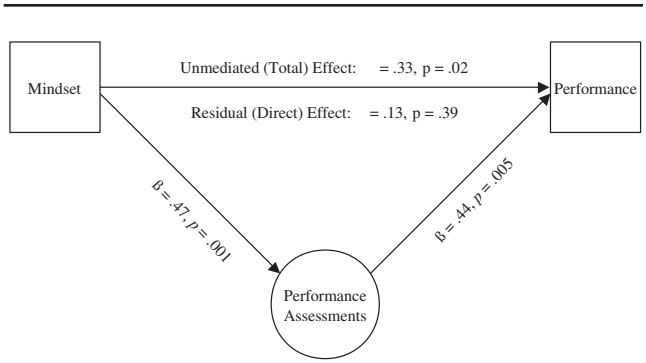

Figure 1 Results of mediational analyses.

neither of these differences were significant from zero (both paired *t*s < |1|, *ns*), and the prediction-performance discrepancies were not significantly different across conditions. (These results are not changed if we compare predictions to the adjusted performance scores.) As another indication of overall accuracy, the number of items that participants expected to find tended to be correlated with the number of items they actually found. Although this correlation was somewhat stronger in the deliberation condition ($r = .66$, $p < .001$) than in the implementation condition ($r = .34$, $p = .10$), the difference in correlations between conditions was only marginally significant, $Z = 1.41$, $p = .16$.

Mediational Analyses

To determine whether our set of pre-performance dependent variables mediated the effects of the mindset manipulation on performance, we first standardized and then combined the responses to all measures to create an overall composite. To establish mediation, one needs to demonstrate that (a) our manipulation influences the mediating variable, (b) the mediator is reliably associated with our outcome (i.e., performance), and (c) controlling for the mediator reduces or eliminates the impact of the manipulation on the final outcome (see Baron & Kenny, 1986). Results of our mediational analyses are presented in Figure 1. As might be inferred from the results of our omnibus MANOVA and PCA analyses, the effect of mindset on the overall composite was significant, $t(45) = 3.52$, $\beta = .47$, $p = .001$. Regression analysis revealed that the composite was a significant predictor of performance, $t(44) = 2.99$, $\beta = .44$, $p = .005$. Consistent with the mediational model, the effect of mindset was considerably reduced when the composite was included in the analysis, $t(44) = .88$, $\beta = .13$, $p = .39$ (without controlling for the effect of the composite, the standardized regression coefficient for the effect of mindset was .33).

GENERAL DISCUSSION

Results of these studies indicate that the assessment of tasks, performance expectations, and subsequent task performance will differ depending on whether the tasks have been considered in the context of deliberation or implementation. It appears that the simple difference in perspective that mindsets create—from the uncertain query "Will I do X?" to the agentic assertion "I will do X"—can yield substantial differences in how the considered action will be perceived and, subsequently, acted on. In keeping with previous research on the effects of mindset on illusory self-perceptions (e.g., Taylor & Gollwitzer, 1995), both our preliminary study and our main experiment revealed that task expectations and performance predictions become less favorable following deliberation and more favorable following thoughts of implementation. However, in contrast to previous studies, which have presented a general perspective on how mindset influences more global self-evaluations, the predictions and task assessments that were found to be influenced by mindset in these studies were specific and directly relevant to the task that was being deliberated or implemented. These studies thus afford a more precise picture of the self-regulatory consequences of deliberative and implemental thinking by demonstrating that these mindsets can influence how people evaluate the very aspects of themselves and their environments that are focal to solving problems at hand.

Results of our main experiment demonstrate that the effects of deliberative and implemental thinking can extend to influence behavior. When given the opportunity to complete a scavenger hunt, participants who had

been placed into an implemental mindset outperformed (i.e., found more items than) those who had been placed in a deliberative mindset. When taken together with the results from the task evaluation and expectation measures, the behavioral data suggest that whereas the relative pessimism of deliberation may exert a cautionary effect on goal setting and decision making, this caution depresses performance (at least as compared with the participants' potential, as estimated by the performance of participants in the implemental condition). This result is consistent with recent research showing that the uncertainty associated with choice can become burdensome and that manipulations that make choice difficult (such as increasing the number of choice options) can undermine motivation (Iyengar & Lepper, 2000). By contrast, the relatively favorable assessments of implementation appear to act as an insurance policy that goals will be aggressively pursued once deliberation is over.

A comparison of predictions to performance reveals that people's predictions were surprisingly—and equivalently—accurate in the two mindset conditions. These results would seem to stand in stark contrast to the conventional conclusion that people's predictions are routinely optimistically biased (e.g., Buehler et al., 1994; Weinstein, 1980). Recently, however, there has been a growing body of research that suggests that people may not be indiscriminately optimistic (Armor & Taylor, 1998, 2002) and that whether a person appears optimistic or accurate may depend on the demands of the situation and on the immediate needs of the individual. In light of this research, the overall lack of optimistic biases observed in our behavioral study may not be so surprising. In particular, research by Gilovich, Kerr, and Medvec (1993) has found that optimistic biases in prediction tend to be reduced and are sometimes even eliminated as the time to test those predictions grows near. Because participants in our main experiment expected that some task was imminent (and therefore that their predictions could be tested or challenged), they may have been especially motivated to make accurate predictions. Recent research in our lab has directly manipulated whether people expect to complete a specific task. In several studies using a variety of performance tasks, participants were found to make overly optimistic predictions for tasks that they did not expect to complete but accurate predictions—much like the ones reported here—when they did expect that they would have to complete the task they were considering (Armor & Sackett, 2002; Sackett, 2002).

LIMITATIONS, IMPLICATIONS, AND FUTURE DIRECTIONS

The present studies demonstrate important self-regulatory functions of deliberative and implemental thinking. People's appraisals of tasks and of their ability to complete these tasks, as well as the behavioral consequences of these appraisals, appear to be determined by the frame of mind in which these tasks are approached. One might argue that the freedom to generalize from the results of these two studies may be limited by the fact that all task assessments, predictions, and performance measures were assessed on only one task and that this task was a game. It should be noted, however, that the hunt itself was quite involving for participants: Many participants in our preliminary study expressed desire to come back to complete a "real" hunt, and many participants in our main experiment returned from their hunts showing obvious signs of exertion, suggesting that they were engaged with the task and that they took it quite seriously. Moreover, the multiple tasks and time limits that were central features to the scavenger hunt do bear resemblance—in form, if not in content—to many tasks in daily life. When we ask ourselves how much work we can get done before the weekend or if we can get our holiday shopping done before Christmas, we must size up exactly how much we can expect to accomplish within a set and often limited amount of time. We thus expect that the effects of deliberative and implemental mindsets to generalize, at the very least, to any of a number of situations such as these.

Nevertheless, an important task of future research will be to see whether the effects of mindset on expectations, and expectations on performance, can be obtained for tasks that have more personal relevance and consequences of greater importance for the individual. It also may be important to determine whether the effects of deliberative and implemental thinking will have implications for more complex and longer lasting tasks than the scavenger hunt we employed. Research by Buehler and Griffin (1996, as cited in Buehler et al., 2002), for example, has found that manipulations that influence predictions can influence performance on immediate tasks (e.g., solving anagrams) but that the same manipulations may be less effective at influencing behaviors that extend over time (e.g., finishing a term paper). Although our results demonstrate that mindsets can influence predictions and performance over the course of a half-hour-long assignment, the difficult task of initiating and maintaining complex behaviors in pursuit of longer term goals may be facilitated by additional volitional aids, such as the specification of implementation intentions (see, e.g., Gollwitzer, 1999; Koole & Spijker, 2000).

In 1929, Italian political theorist Antonio Gramsci wrote that he was "a pessimist because of intelligence, but an optimist because of will" (Gramsci, p. 299). If we equate Gramsci's "intelligence," like Franklin's "prudential algebra," with the more even-handed style of infor-

mation processing associated with deliberation, his insight captures well the main results of the studies reported here. Specifically, the careful consideration of goals and motives that occurs prior to making decisions was here found to lead to relative pessimism, and willful determination was found to foster relative optimism. Moreover, these effects appear to be self-fulfilling, demonstrating that mindsets can have behavioral as well as cognitive consequences.

NOTES

1. For the purpose of these analyses only, the dependent variables were standardized and treated as a within-subjects repeated-measures factor.

2. We did not correct the performance scores of participants who finished the hunt with time to spare (these participants were given the opportunity to prolong their hunts but chose not to). This adjustment thus penalized those who finished late by reducing their item score in proportion to the extent of their violation of the time limit but neither penalized nor rewarded those who finished early.

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