The Role of Motivated Reasoning in Optimistic Time Predictions

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The authors explore the well-documented tendency for people to predict that they will finish tasks earlier than they actually do. Whereas previous research has tied this optimistic bias to the operation of specific cognitive processes, the present studies examine the interplay between motivation and cognition. Two studies supported the hypothesis that incentives to finish tasks quickly exacerbate the optimistic bias. An initial field study using a naturally occurring incentive manipulation demonstrated that individuals who expected an income tax refund were more (overly) optimistic in predicting when they would complete their income tax forms than those who did not expect a refund. A laboratory experiment using a word generation task replicated this general effect and identified mediating cognitive mechanisms: Monetary incentives for early completion led to optimistic predictions, increased attention to detailed future plans, and reduced attention to relevant past experiences.

I was deceived, and I deceived myself.
—Napoleon Bonaparte

With these words, Napoleon Bonaparte, Emperor of France, explained his disastrous decision to keep his Grande Armee in Moscow for 39 days during the autumn of 1812 instead of turning back at the first hint of cold weather. The march to Moscow had taken his army 5 weeks, and the coming of cold weather would surely slow the return journey. However, hoping for news of the tsar's surrender, Napoleon stayed in Moscow, convincing himself that his army could make the return journey in record time despite the inevitable trials of winter. As a result, the Grande Armee was decimated, hundreds of thousands of soldiers died, and Napoleon lost his chance to rule all of Europe.

There are a number of ways to interpret and explain this judgmental error of truly historic proportions. Leo Tolstoy, in *War and Peace*, interpreted it as the work of fate or the playing out of a grand cosmic design. Historians tend to blame it on Napoleon personally, seeing it either as an indication of Napoleon's failing mental powers or as a result of his arrogance, overconfidence, and overreliance on his own judgment (e.g., Thompson, 1952). However, it can also be interpreted as a particularly dramatic example of the costs of a more general (and common) judgmental process: the tendency for motivation to bias people's task completion estimates. This latter interpretation is consistent with Napoleon's admission of self-deception.

In this article, we examine the role of motivation in people's predictions of how long their own tasks will take to complete. Are time predictions not only based on dispassionate planning processes—which themselves can lead to marked optimistic biases (cf. Buehler, Griffin, & Ross, 1994)—but also affected by the predictor's wishes and hopes? Do such motivational effects magnify the general tendency to make optimistic predictions? If so, how do motivational processes "contaminate" the planning process? Some previous research and theorizing provides a basis for answering these questions.

Authors' Note: This research was supported by a research grant to Roger Buehler from the Social Sciences and Humanities Research Council of Canada. We thank Ziva Kunda, Cathy McFarland, Chris Roney, and Michael Ross for their comments on an earlier draft. Address correspondence to Roger Buehler, Department of Psychology, Wilfrid Laurier University, Waterloo, Ontario, Canada, N2L 3C5.

PSPB, Vol. 23 No. 3, March 1997 238-247

Cognitive Determinants of Optimistic Time Predictions

Whereas the present research focuses on motivational factors, previous work has examined the cognitive processes underlying people's predictions of future life events (e.g., Griffin, Dunning, & Ross, 1990; Hoch, 1985; Osberg & Shrauger, 1986) and, more specifically, their forecasts of task completion times (Buehler et al., 1994; Kahneman & Tversky, 1979). In their theoretical analysis of the *planning fallacy*, Kahneman and Tversky (1979) proposed that the tendency to make optimistic predictions in the face of past failures to meet such predictions results from people's natural focus on singular rather than distributional information. Singular information refers to information that is relevant to the particular prediction at hand (i.e., case-specific information), whereas distributional information describes the distribution of outcomes in similar situations (e.g., how long it took to complete other, similar tasks). According to Kahneman and Tversky, people tend to generate their predictions by considering the unique features of the task at hand and constructing a scenario of their future progress. Essentially, this approach to prediction involves a process of mental simulation that focuses on future planning and neglects past experience, leading to overly optimistic predictions.

A recent series of studies provided an empirical validation of the planning fallacy formulation (Buehler et al., 1994). Participants tended to predict that they would complete tasks, including school assignments and household chores, earlier than they actually did. However, these same participants were fully aware that they typically finished such tasks later than expected. Furthermore, and consistent with the planning fallacy conception, individuals adopted an *internal* or *scenario* approach to prediction, focusing primarily on plan-based scenarios rather than on distributional information such as their usual outcomes. Even when participants were explicitly instructed to consider relevant past experiences, they appeared to make use of attributional mechanisms to discount the relevance of those experiences. In sum, these studies identified several cognitive processes that may give rise to overly optimistic predictions, including (a) focusing on future plans to the neglect of past experience, (b) ignoring possible impediments while constructing future scenarios, and (c) "fencing off" past failures by attributional mechanisms.

Motivation and Prediction

The present research extends previous work on the planning fallacy by examining the motivational determinants of task predictions. We first endeavor to show that motivation matters in controlling the degree of optimistic bias shown, and then we go on to explore whether the cognitive processes previously identified are also implicated in the operation of motivational effects on prediction.

We focus on a type of motivation that is relevant to many task predictions—the desire to finish tasks promptly. Intuitively, it seems that people are often motivated to finish their tasks and projects as soon as possible. In these cases, overly optimistic task predictions may represent a form of wishful thinking. Related findings support this interpretation: In many domains, individuals' predictions of what will happen appear to reflect what they would like to see happen (for reviews, see Johnson & Sherman, 1990; Kunda, 1990; Taylor & Brown, 1988). For example, Marks (1951) demonstrated that research participants were more likely to predict they would draw a picture card from a mixed deck when this outcome was desirable than when it was undesirable. In general, then, more desirable events are perceived as more likely to occur, and people's optimistic time predictions may represent yet another manifestation of this pattern. According to this "purely" motivational account, people predict an early completion merely because they wish for an early completion.

The above account implies that motivation influences prediction through a relatively "mindless" process: I wish for an early completion; therefore, I predict it. However, it seems more plausible that motivation affects prediction indirectly through its effects on intervening cognitive processes, a model known as *motivated reasoning* (Kunda, 1990). According to the motivated reasoning model, the information, beliefs, and reasoning strategies employed to solve a particular problem are, at least in part, determined by the judge's motives. Consistent with this model, we propose that the goal of finishing a task as soon as possible may determine the temporal focus that forecasters adopt. In particular, such a goal may lead to a narrow focus on successful future plans with reduced attention to past failures or future impediments.

Motivation and Behavior

Motivation may also influence people's actual completion times, both directly, through an increased desire to undertake the necessary action, and indirectly, through the process of generating a prediction. There is considerable evidence that predictions can be self-fulfilling: Asking people to imagine or predict specific future actions increases the likelihood of the predicted action taking place (e.g., Greenwald, Klinger, Vande Kamp, & Kerr, 1988; Gregory, Cialdini, & Carpenter, 1982; Sherman, 1980; Sherman & Anderson, 1987).

Several additional lines of research suggest *how* people's predictions might influence their behavior. First, the vast literature examining goal setting and task performance indicates that forming specific, challenging goals enhances performance on a wide range of tasks

(for reviews, see Locke & Latham, 1990; Locke, Shaw, Saari, & Latham, 1981). Conceivably, optimistic time predictions serve as goals or standards that motivate people to complete their tasks early. In addition, behavioral effects may result from people's constructing future scenarios or mental simulations of their actions. The process of mentally rehearsing future actions can help people to bring those actions about (Roese, 1994; Taylor & Pham, 1996; Taylor & Schneider, 1989). Similarly, Gollwitzer's (1993, 1996) work on implementation intentions has demonstrated that the process of forming clear, specific, future plans (i.e., implementation intentions) may help individuals to achieve their objectives.

Evidence that mental simulation and planning can help to bring about desired behavior might seem surprising in light of our previous findings that linked detailed, plan-based future scenarios to overly confident and optimistic predictions (Buehler et al., 1994). We suggest, however, that these two types of effects are not contradictory. Mental simulation and planning may have dual effects: simultaneously making predictions more optimistic and actions more likely to occur. Whether these mental processes contribute to increasing the optimistic *bias* in prediction depends on their relative impact on prediction and behavior.

Three previous studies on overconfidence in knowledge suggest that motivation may affect judgment more than it affects behavior (Henry, 1994; Henry & Sniezek, 1993; Sieber, 1974). In each study, extra motivation to generate the correct answers to a series of questions increased respondents' confidence more than their accuracy, and thus increased the overconfidence bias. In the first two studies, motivation was manipulated through the use of monetary incentives, and the incentives left accuracy completed unaffected despite their marked effects on subjective certainty.

The Present Research

We sought to test the effects of motivation using a task and a setting that was familiar to the participants and of some importance to them. We met these criteria by first examining a familiar real-world task that was both well known and important to our participants, though generally disliked: the completion of income tax forms. We followed this nonexperimental field study with a more controlled laboratory study, which, although less realistic and involving than the real-world demonstration, still provided participants with preexperimental experience on the task and real incentives to complete the task promptly and/or accurately.

A number of methods have been used to demonstrate the effects of motivation on judgmental processes (for reviews, see Ditto & Lopez, 1992; Kunda, 1990; Larrick, 1993). Essentially, researchers seek to compare the judgments of individuals who differ in their desire to reach a particular conclusion, while holding constant the information available to them. One effective technique has been to compare the judgments of individuals who differ on only a single motivationally relevant dimension and who are not likely to have widely varying life experiences. Kunda (1987), for example, compared coffee drinkers and nondrinkers on their judgments of a message describing the dangers of caffeine. Similarly, Lehman and Taylor (1988) compared California students who lived in dormitories rated either seismically sound or unsound on their judgments of the likelihood and severity of an impending earthquake.

We used a variant of this method in our first study. In this initial tax-prediction study, we compared the task completion estimates of individuals who expect a tax refund from the government, and thus were motivated to complete their income tax forms as early as possible, with the estimates of those who expected no refund. Although it is conceivable that people who differ on their tax refund status also differ on other relevant dimensions—such as when they typically finish their tasks—we attempted to control for this possibility by obtaining reports of their past experiences with completing income tax forms. We then followed up this real-world demonstration with a laboratory experiment that allowed us to manipulate motivation using financial incentives and also to assess the cognitive processes underlying participants' predictions.

STUDY 1

Our first study examined the impact of motivation on predicted and actual completion times for an important, real-world task—completing income tax forms. The study took advantage of a naturally occurring manipulation of people's motivation to complete the task promptly. Each year, some individuals owe the government money, whereas others are owed by the government. Those individuals expecting a refund presumably have a relatively strong motive to submit their forms early (and thus receive an early payment). We expected this motive would affect people's predicted completion more than it did their actual completion times, leading to a larger optimistic bias for those expecting a refund than those not expecting a refund. We also expected that those individuals motivated to submit their forms early would give less weight to their past experiences in making their predictions relative to those without such a motivation.

Method

Participants. Participants were selected randomly from the telephone directory for Vancouver, British Columbia, Canada. For the initial survey, 221 people were contacted, and 96 people participated. For the follow-up

survey, we were able to contact 79 (82%) of the original respondents, and they all participated. All analyses were conducted on the final sample of 79 individuals who responded to both surveys.

Procedure. The initial survey was conducted in a 2-week period that ended 6 weeks before the April 30 deadline for submitting income tax forms. A trained interviewer contacted potential respondents by telephone and asked them to take part in a study of people's thoughts and judgments concerning their income tax forms. After obtaining consent, the interviewer conducted the survey immediately and transcribed all responses. Respondents were assured that their responses would remain anonymous and were encouraged to answer all questions accurately and honestly. They were asked first whether they expected to receive an income tax refund. They then reported when, relative to the deadline, their income tax forms were typically (a) completed to the point of being ready to mail in and (b) actually mailed in. After this, respondents were asked to predict, as accurately as possible, when their tax forms for the current year would be (a) completed to the point of being ready to mail in and (b) actually mailed in. Finally, respondents offered a percentage judgment of how certain they were that they would finish by the predicted time (0% = *not at all certain*; 100% = *completely certain*).

The follow-up survey was conducted during a 3-week period beginning 1 week after the deadline for submitting income tax forms. The interviewer asked respondents when their income tax forms were actually completed to the point of being ready to mail in and when the forms were actually mailed in. In addition, respondents reported the outcome of the income tax assessment—that is, whether they had ended up receiving a refund or paying taxes.

Results and Discussion

Our primary hypothesis concerned differences between the respondents who expected to receive a refund and those who did not. Fortunately, the proportion of respondents was roughly equivalent for each of these two groups, with 44 (55.7%) expecting a refund and 35 (44.3%) not expecting a refund, thus affording a powerful test of the hypothesis.

Predicted and actual times. We expected that the respondents who anticipated a refund would make more optimistic predictions than those who did not. Consistent with our hypothesis, the refund group predicted that they would mail the forms earlier[1] (M = 27.55 days before the deadline) than did the no-refund group (M = 16.91 days before the deadline), t (77) = 3.05, $p < .005$. In contrast, the participants expecting a refund did not actually mail their forms earlier than those without such

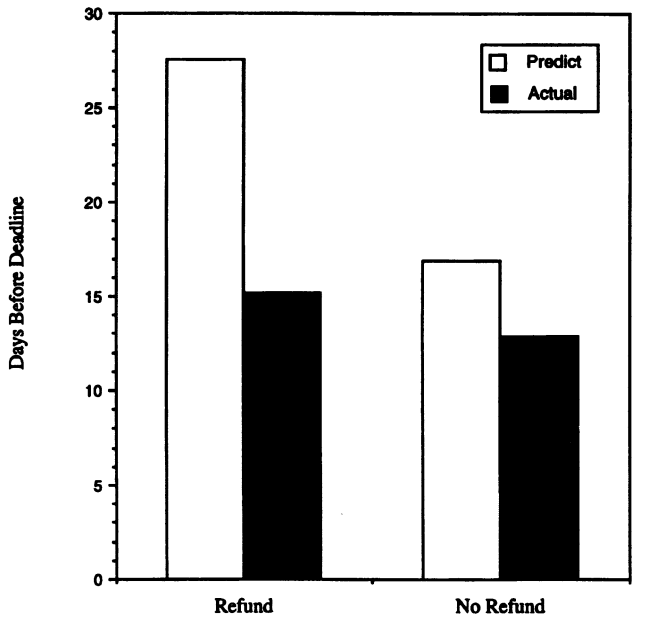

Figure 1 Predicted and actual days before deadline by refund condition, Study 1.

expectations (Ms = 15.16 and 12.89, respectively), $t(77) < 1$. Consequently, hopes of a refund led to greater optimistic bias: The difference between predicted and actual completion times was greater for participants expecting a refund than those not expecting a refund (M differences were 12.39 and 4.02, respectively), $t(77) = 2.11$, $p < .04$. The optimistic bias—again defined in terms of the difference between predicted and completed times—was significant in the refund group, $t(43) = 4.44$, $p < .001$, but not in the no-refund group, $t(34) = 1.48$, $p > .10$. These results are summarized in Figure 1.

The results presented so far offer strong support for our central hypothesis: As expected, individuals with a motivation to complete the task quickly were more optimistically biased than individuals without such a motivation. However, due to the nonexperimental nature of this study, there is the possibility of alternative explanations for these findings. Are the people in the refund group somehow different—more abstemious, more budget minded, or even in different vocations—from those in the no-refund group? Although we cannot rule out this possibility, there are a number of clues that suggest the two groups were equivalent on some important variables. First, individuals in the two groups reported very similar past experiences (typically completing their tax form 16.79 days before the deadline if they now expected a refund vs. 12.57 days if they did not, $t < 1$); and second, as noted above, the two groups completed the tax forms at essentially the same time.

Nonetheless, it is useful to control these two variables more stringently using a hierarchical regression approach. That is, by entering both past experiences and actual completion times as control variables in a multiple regression equation with predictions as the dependent variable, we can ask the question, If two people reported the same past experiences with tax forms and completed their current tax forms on the same day, would the incentive variable still explain the variations in their predictions? Essentially, this is a multiple regression test of prediction bias, in which prediction bias is defined as that part of the variance in predictions that is not related to actual outcomes or past experience. In general, the multiple regression approach is the most sensitive test of prediction bias, as it takes into account the precise relation between predictions and actual outcomes.

The regression analysis proceeded in three steps. In the first step, predicted completion times were regressed on self-reported past behavior and the dichotomous incentive variable; in a second and related step, an interaction term representing separate slopes in the two groups was added to test our secondary hypothesis that the relation between past experiences and predictions would be weaker for those with an incentive for speed. Supporting this hypothesis, the interaction term was highly significant ($\beta = .58$, $p < .01$), as were both main effect terms tested in Step 1 (past behavior $\beta = .36$, $p < .001$; incentive $\beta = .32$, $p < .001$). The main effects indicate that both past behavior and the refund incentive were strong determinants of prediction; the interaction implies that the respondents expecting a refund were less inclined than their counterparts to use the past as a basis for prediction (relevant zero-order correlations were .38 for those expecting an incentive and .60 for those without such an expectation). In the third step, the actual outcomes were added as an additional control variable. Supporting our central hypothesis, the incentive variable (a dichotomy) was still significantly related to the predictions ($\beta = .49$, $p < .001$), above and beyond the effects of the two control variables. That is, even correcting for the (nonsignificant) tendency for those with an incentive to actually finish earlier, there was still a highly significant tendency for those with an incentive to make earlier (and therefore more biased) predictions.

There is one other rather obvious alternative explanation for these findings: Those predictors who were motivated to finish their tax forms early may have been more likely to give a prediction that represented their "hoped-for" rather than their "best-guess" date. According to this logic, the target dates representing hoped-for outcomes should have been expressed with lower confidence than those dates representing actual best-guess predictions. A comparison of respondents' confidence judgments across the two groups offers no support for this differential certainty hypothesis: Individuals who were expecting a refund were just as confident that they would mail in their tax forms by their predicted date ($M = 88.0$) as those without such an expectation ($M = 88.1$).[2]

STUDY 2

The results of Study 1 are consistent with our general hypothesis that an incentive to finish a task promptly tends to increase the optimistic bias in task prediction. Furthermore, they imply that this motivation also increases the tendency to underweight past experiences. In Study 2, we attempted to draw a more direct link between participants' motivation to finish quickly, the content of their thoughts during prediction, and the predictions they generate. After participants were given experience with a task (solving word puzzles), the strength of their desire to finish the task quickly was manipulated using monetary incentives for speed. We examined the impact of this speed incentive on prediction, behavior, and optimistic bias, and we collected verbal protocols of participants' thoughts during their task predictions to pinpoint the cognitive mediators of the motivational effects. We expected that a stronger speed incentive would lead to more optimistically biased predictions, reduced attention to the past, and increased attention to detailed future plans.

In addition, we added an accuracy manipulation to create a crossed speed incentive by accuracy incentive design. What happens to people's thoughts when they are motivated to be both fast and accurate? Our tentative hypothesis was that the accuracy incentive would lead to an increased focus on past experiences and hence a reduction in the usual optimistic bias.

Method

Participants. Participants were 60 undergraduate students who received either course credit or a payment of $5 for participating.

Procedure. Participants were recruited for a study of verbal problem solving and took part individually. They were instructed that their first task, solving a series of anagram-like word puzzles, was being pretested for use in subsequent research. On each trial participants were given a sheet of paper containing five long root words (e.g., *histogram, roustabout, cosmopolitan, comparison, novitiate*) and asked to list five shorter words that could be derived from the letters in the root word. For example, one set of smaller words using the letters in *histogram* would be *gram, trim, grit, toga,* and *mist.* Additional rules for the task were that each solution word must be at least four letters long, each solution word could use a letter in the root word only once, and the solution words could

not rhyme. Participants were told that a trial was complete when they had solutions for three out of the five words they were given. Pretesting indicated that each trial took approximately 5 to 7 min to complete.

Participants were given a practice trial to ensure that they understood the rules and then were asked to complete three more trials for the experiment. They were informed that the root words were randomly distributed across the three trials, and therefore the trials should not differ systematically in their level of difficulty. Consistent with this instruction, three different word lists were counterbalanced across the three experimental trials.

Participants then began the experimental trials. They were instructed to complete each trial as quickly as possible and were timed by the experimenter. After each of the first two trials, the experimenter gave participants a feedback slip indicating the length of that trial. The third trial served as the target for prediction. After the first two trials were completed, the motivational manipulations were introduced, and participants were asked to predict as accurately as possible how long it would take them to complete this target trial.

The strength of participants' motivation to finish the task quickly and their motivation to make accurate predictions were varied independently using monetary incentives. Participants in the speed-incentive condition were offered a $2 reward for finishing 1 min faster than they had on the previous trials and a $4 reward for finishing 2 min faster. The remaining participants were simply instructed to finish as quickly as possible. Participants in the accuracy-incentive condition were offered a $2 reward for predicting their completion time within 1 min of the actual time and a $4 reward for predicting it within 30 s. The remaining participants were simply instructed to make their predictions as accurately as possible. These incentive manipulations were crossed in a 2 (Speed Incentive) × 2 (Accuracy Incentive) factorial design, and 15 participants were randomly assigned to each condition.

After receiving the instructions for the third trial, participants predicted how long it would take to complete and went on to perform the trial. Participants were then asked to describe in writing the thoughts that went through their heads while they were making their prediction. Finally, participants received the payments promised to them and were fully debriefed.

Results and Discussion

Predicted and actual times. Initially, we performed 2 (Speed Incentive) × 2 (Accuracy Incentive) ANOVAs to examine the effects of the motivational manipulations on both predicted and actual completion times. Means for these analyses are presented in Figure 2. As expected, participants with the incentive for speed predicted

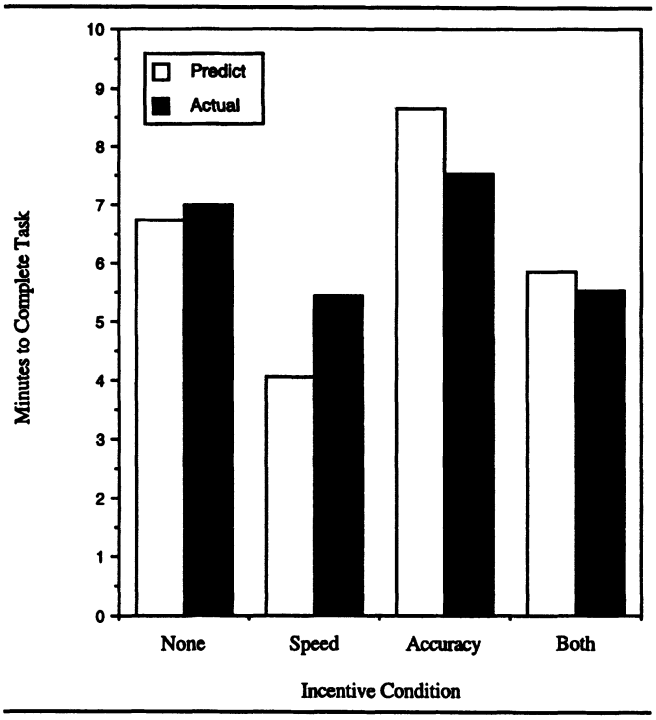

Figure 2 Predicted and actual time to complete task by incentive condition, Study 2.

shorter completion times (M = 4.95) than participants without the incentive (M = 7.69), $F(1, 56) = 9.13$, $p < .005$. Participants with the accuracy incentive predicted longer completion times (M = 7.24) than participants without the incentive (M = 5.40), $F(1, 56) = 4.10$, $p < .05$. There was no interaction between the two incentive manipulations.

Interestingly, the speed incentive affected participants' solution times as well their predictions. Participants given the incentive for speed actually completed the task in less time (M = 5.48) than those without the speed incentive (M = 7.27), F (1, 56) = 4.32, $p < .05$. Neither the accuracy incentive nor the interaction of the two manipulations affected participants' actual completion times (Fs < 1).

Given that speed incentive affected both predictions and behavior, we next examined whether prediction bias itself was affected by the two contrasting manipulations. As expected, when participants' past experiences and actual completion times were statistically held constant, both the speed incentive (standardized regression coefficient = .22), $t(52) = 2.85$, $p < .01$, and the accuracy incentive (standardized regression coefficient = –.14), $t(52) = 2.00$, $p < .06$, independently accounted for residual prediction bias. That is, the degree of optimistic bias in prediction (relative to actual completion times) was increased by the speed incentive and was decreased by the accuracy incentive. The interaction effects were not

significant. Consistent with our primary hypothesis, then, the speed incentive increased optimism, whereas the accuracy incentive reduced optimism.

Although this multiple regression analysis provides the most powerful and statistically appropriate test of our hypothesis concerning prediction bias (e.g., Cohen & Cohen, 1983), we also examined the signed difference scores between predictions and actual completion times. These differences were not large in any condition, but they were ordered in the expected direction. That is, the speed-incentive-only group showed a modest optimistic bias ($M = -1.36$, $t = 1.96$, $p < .03$, one-tailed); the control group and the combined-incentive groups showed no bias at the mean level (Ms = –.27 and .30, respectively, ps > .50); and the accuracy-incentive-only group showed a modest pessimistic bias ($M = 1.11$, $t = 1.61$, $p < .12$).

Temporal focus. Next, we assessed whether the motivational manipulations affected the focus of participants' thoughts while they generated their predictions. We expected that the speed incentive would affect (a) the observed correlation between past experiences and time predictions and (b) the specific content of participants' thoughts while they made these predictions.

First, we expected that the speed incentive would decrease the weight that participants gave to past experiences when making their predictions. Consistent with this logic, participants given only an incentive for speed were less inclined than participants in the other conditions to base their predictions on previous experience ($r = .34$ compared with rs of .78, .92, and .94 for the mixed-incentive, accuracy-incentive, and no-incentive groups, respectively). An ANOVA on these correlations (using the Fisher z transformation, Rosenthal & Rosnow, 1985) revealed a highly significant main effect of the speed incentive, $z = 3.31$, $p < .001$, and no other significant effects. In contrast, the link between past experiences and actual completion times was strong in every cell (ranging from .70 in the speed-incentive condition to .86 in the no-incentive condition), and the ANOVA on the transformed correlations revealed no significant effects (all zs < 1).

Participants' thought-listing responses provided further insights into the cognitive determinants of their predictions. Again, we were interested primarily in the extent to which participants focused on their past experiences versus planning their specific strategies for the upcoming task. Three independent judges partitioned participants' responses into distinguishable thought units and then assigned each unit (when possible) to one of four categories. Two categories identified references to the previous trials. One of these categories (*using past*) contained statements indicating that participants were using their past trials as the basis for predicting their completion time (e.g., "My first time was longer than the second, so I chose a time half way between them"). The other category (*discounting past*) contained statements in which participants considered the past trials but explained why the upcoming trial would be different from the previous ones (e.g., "I looked at my last time score but decided that I would probably do better because of practice"). Two categories were included for statements concerning the upcoming trial. One of these categories (*future planning*) contained references to plans and strategies for completing the upcoming trial (e.g., "Next time I'll look for e's"). The second category (*future impediments*) contained references to problems or impediments that might be encountered with the upcoming trial (e.g., "The next set of words might be more difficult"). For all categories the interrater reliability was high (alphas ranged from .77 to .94). The category counts were converted into proportions and then averaged across the three raters.

We hypothesized that the speed incentive would result in fewer thoughts about using the past as a basis for prediction, fewer thoughts about potential problems, more thoughts designed to deny the relevance of the past trials, and more thoughts about future plans or strategies. Because these thought categories were intercorrelated, we assessed the effect of our motivational manipulation on the four categories using a 2 (Speed Incentive) × 2 (Accuracy Incentive) MANOVA. This analysis revealed a significant effect of the speed incentive across the four measures of temporal focus, multivariate $F(4, 51) = 3.14$, $p < .03$. No other effects were significant (Fs < 1). Each of the four indicators of temporal focus showed the hypothesized effect: The speed incentive led participants to report fewer thoughts about using the past (Ms = .36 vs. .55), univariate $F(1, 54) = 6.26$, $p < .02$; more thoughts designed to discount past experiences (Ms = .34 vs. .16), univariate $F(1, 54) = 7.40$, $p < .01$; more thoughts centered on future plans (Ms = .20 vs. .11), univariate $F(1, 54) = 2.53$, $p < .12$; and fewer thoughts about future impediments (Ms = .10 vs. .16), univariate $F(1, 54) = 3.52$, $p < .07$. These results are consistent with our hypothesis that participants given an incentive for speed would focus more narrowly on their plans for the upcoming task at the expense of the consideration of past experiences than would participants without such an incentive.

The mediating role of temporal focus. Our hypothesis was that motivational effects on predictions are, in many cases at least, caused by a shift in temporal focus brought about by the motivation. In other words, our logic implied that the effect of motivation on prediction bias should be mediated by subjects' thought focus. This mediational hypothesis (Baron & Kenny, 1986) was tested with a hierarchical regression analysis in which participants' predicted completion times were first re-

gressed on the main effects and the interaction of the motivational manipulations (along with the actual completion times and past completion times as control variables) and then regressed onto the measures of temporal focus as well. Mediation would be supported if (a) the main effect of the speed incentive disappeared when the mediators (measures of thought focus) were entered and (b) the thought focus measures were significant predictors even when the incentive manipulations were held constant. Both requirements were met. When the four temporal focus measures were entered as a block, the standardized regression coefficient for the speed incentive was reduced from .22 ($p < .01$) to .14 ($p < .07$). Also, the four measures of temporal focus remained significant when assessed as a block, R^2 change = .06, $F(4, 45) = 3.21$, $p < .03$, even when the speed incentive was included in the equation. These results are consistent with a partial mediating model: It seems that part, but possibly not all, of the observed effect of the speed incentive on prediction bias can be accounted for by our (imperfect) measures of these cognitive processes.

It is worth noting that, unlike previous research using lengthy, real-world tasks (Buehler et al., 1994), there was not a marked tendency to underestimate actual completion times for this brief laboratory task. Indeed, participants with an incentive for accuracy tended to overestimate rather than underestimate their actual times. Perhaps one reason why this laboratory task revealed only modest judgmental biases is that the participants were isolated from any external distractions or interruptions. Presumably, individuals would more often meet their real-world forecasts too if they were isolated from all unexpected interruptions and competing demands. Despite the absence of a pronounced optimistic bias, the present study revealed that the degree of optimism (or pessimism) in participants' predictions was influenced by motivational manipulations and that these effects were mediated by the cognitive processes we assessed.

GENERAL DISCUSSION

Motivation and Prediction

The findings of both studies supported our primary hypothesis concerning the effects of motivation on time predictions. The predictions offered by our participants, like Napoleon's fateful estimate that introduced this article, appeared to be contaminated by their hopes and desires. In Study 1, the hopes of receiving an early tax refund led individuals to predict that they would file their tax forms expeditiously. In Study 2, the chance to win a cash prize for solving a puzzle quickly led participants to expect that they would overcome this challenging task. In each case, however, the incentives to finish a task quickly appeared to have a stronger impact on participants' predictions than on their actual behaviors. That is, the optimistic bias in prediction was most pronounced when individuals had an incentive to finish early.

The effects of accuracy motivation on prediction were also generally consistent with our hypotheses. We anticipated that accuracy incentives would counteract the optimistic bias in prediction. In Study 2, providing financial incentives for accurate predictions not only eliminated people's tendency to be overly optimistic but actually appeared to produce a slight pessimistic bias. These findings imply that the usefulness of offering financial incentives for realistic predictions may depend on the relative importance of avoiding underestimation or overestimation. Inducements for accuracy may be most appropriate when it is better to err on the side of caution.

An important issue for both studies is the relation among self-set goals (e.g., I hope to finish by Wednesday at noon) and self-predictions (e.g., I predict that I will finish by Wednesday at noon) (for a related discussion, see Henry, 1994; Henry & Sniezek, 1993). Conceivably, instead of reporting their predictions of when they will finish an upcoming task, participants reported when they hoped to finish it. There are a number of reasons why this alternative interpretation does not seem plausible. First, we took great care to ensure that participants did not merely report their goals. Participants were assured of the anonymity of their responses and were carefully instructed to make their predictions as accurately as possible. Second, in the initial tax-prediction study, respondents reported very high levels of confidence in their predictions, and the confidence levels did not differ among individuals who differed in incentive level.

Motivated Reasoning

Results were also consistent with our hypotheses concerning the mediating role of cognitive processes. Importantly, we found little evidence of unconstrained, mindless optimism. In spite of their desire to obtain a refund cheque, for example, few respondents simply reported they would rush out and immediately file their taxes. Indeed, people's forecasts appeared to be rather firmly grounded in reality. In both studies, the predictions were correlated both with reports of previous experiences and with actual completion times for the target task. Speed incentives attenuated but did not eliminate these associations. Consistent with the motivated reasoning perspective, then, individuals' predictions seemed to be constrained by the dictates of rationality. Presumably, individuals were only willing to venture an optimistic prediction to the extent that it

could be justified reasonably with the information at their disposal (Kunda, 1990).

If people's hopes and desires were not translated directly into predictions, then how did they affect prediction? Again consistent with the motivated reasoning perspective, the incentives appeared to influence people's predictions indirectly by determining the cognitive strategies that were adopted. Specifically, incentives to finish tasks promptly led individuals to focus more narrowly on their future plans and to pay less attention to possible future impediments or past experiences (which would have implied a more pessimistic forecast). In other words, the speed incentive appeared to prompt the very pattern of cognitive processes that constitute the planning fallacy—a focus on singular information (optimistic future scenarios) at the expense of relevant distributional information (past experiences). By identifying specific cognitive mechanisms that link motivation to judgment, the present studies lend support to theories suggesting that people's motives affect judgment by determining the nature of the information processing that takes place (Ditto & Lopez, 1992; Kunda, 1990; Kruglanski, 1989, 1990; Pyszczynski & Greenberg, 1987).

Interestingly, none of the indicators of cognitive process that we measured showed any effect of the accuracy manipulation. Thus, although our results did not support the notion of mindless optimism, they may be consistent with the operation of mindless pessimism.

Motivation and Behavior

Does a desire to finish tasks early have any impact on people's actual completion times? The results of the present studies were mixed. In Study 1, the hopes of receiving an early tax refund did not prompt people to finish their taxes earlier than those lacking this incentive. In Study 2, however, the speed incentive did significantly reduce the time required to solve a word puzzle (although not as much as motivated participants expected it would). Quite possibly, the key distinction between the two studies is the amount of time that elapsed between the participants' predictions and their actions—and, consequently, the possibility for the "world to intervene" in their plans. Although a desire to finish early (and the associated plans and predictions) may have facilitating effects on behavior, these effects will be limited by the contingencies of daily life. We are currently conducting research to examine more directly the consequences of making optimistic time forecasts. We suspect that optimistic predictions can provide the impetus to get action started, but these effects then dissipate over the course of extensive, long-term projects (e.g., preparing income tax returns).

The present findings also imply that mental simulation and planning exert a greater impact on prediction than on actual behavior. The very individuals who were most likely to engage in these "forward" mental processes (i.e., those with a speed incentive) were also most likely to underestimate their completion times. This finding seems interpretable when we consider the fragile links between thoughts and action: The link between planning and prediction is straightforward; the link to action is more tenuous. Thus despite the popular notion that we should plan our projects carefully in advance, this sort of forward planning may sometimes reduce rather than increase the accuracy of our time predictions. Ironically, there may sometimes be a cost to the judgmental effort associated with careful future planning.

NOTES

1. For the sake of brevity, we do not report parallel analyses for the measures of when the tax forms were filled out. These form-completion measures were correlated very highly with the mailing-time measures, and the pattern of results was the same as that reported for mailing times.

2. We also examined the outcome of each participant's tax assessment as reported at the follow-up interview. Importantly, participants' initial expectations turned out to be quite realistic. Of the 44 respondents who had expected a refund, fully 40 (91%) were correct; of the 35 respondents who did not anticipate a refund, 27 (77%) were correct. Furthermore, if the respondents whose expectations were not confirmed are excluded from the data analyses, the pattern of differences between groups remains unchanged. For example, the participants who correctly anticipated a refund were more optimistically biased than those who correctly expected no refund (M differences = 12.90 and 4.59 days), $t(65) = 1.97$, $p < .05$. These additional analyses help to rule out two possible alternative explanations for the group differences that we obtained. First, they indicate that the participants who initially expected a refund were not simply unrealistic optimists, and thus help to rule out the possibility that group differences in dispositional optimism accounted for the effects. Second, they rule out the possibility that participants who initially anticipated a refund took longer than they anticipated to mail their forms simply because they discovered they would not receive a refund.

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Received November 1, 1995
Revision accepted April 15, 1996