
The Mixed Blessings of Self-Knowledge in Behavioral Prediction: Enhanced Discrimination but Exacerbated Bias

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Four experiments demonstrate that self-knowledge provides a mixed blessing in behavioral prediction, depending on how accuracy is measured. Compared with predictions of others, self-knowledge tends to decrease overall accuracy by increasing bias (the mean difference between predicted behavior and reality) but tends to increase overall accuracy by also enhancing discrimination (the correlation between predicted behavior and reality). Overall, participants' self-predictions overestimated the likelihood that they would engage in desirable behaviors (bias), whereas peer predictions were relatively unbiased. However, self-predictions also were more strongly correlated with individual differences in actual behavior (discrimination) than were peer predictions. Discussion addresses the costs and benefits of self-knowledge in behavioral prediction and the broader implications of measuring judgmental accuracy of judgment in terms of bias versus discrimination.

Keywords: accuracy; bias; prediction; calibration; discrimination

Echoing what is likely the consensual confidence in the importance of self-knowledge, C. S. Lewis (1952) wrote,

There is one thing, and only one, in the whole universe which we know more about than we could learn from external observation. That one thing is ourselves. . . . In this case we have, so to speak, inside information; we are in the know. (p. 33)

Without question, most people feel they are in the know about themselves, particularly when it comes to predicting their future outcomes and achievements (Dunning, 2005).

Although self-knowledge serves as an obvious guide to predictions of future behavior, its correspondence with reality can be surprisingly tenuous. People's beliefs about their traits and abilities often correlate modestly, if at all, with objective measures (Dunning, Heath, & Suls, 2004; Hansford & Hattie, 1982; Mabe & West, 1982). Similarly, people's predictions of their own behavior are sometimes less accurate than predictions made by others. Compared with predictions from peers, people are less able to predict whether they will be promoted into a leadership position (Bass & Yammarino, 1991), score high on a test of surgical skill (Risucci, Tortolani, & Ward, 1989), or suffer a break-up of their current romance (MacDonald & Ross, 1999). Although it would seem that people acquire large amounts of diagnostic information about themselves, this information does not necessarily result in more calibrated predictions about the future.

This difficulty in accurately predicting one's own behavior—but relative accuracy in predicting others' behavior—is best illustrated in expectations concerning

Authors' Note: This research was supported financially by National Science Foundation Grant SES0241544 awarded to Epley and National Institute of Mental Health Grant RO1 56072 awarded to Dunning. We thank Sabiha Barot, Celeste Beck, Ecaterina Burton, David Chen, Kevin Dugan, Samantha Franklin, Lydia Gardiner, Richard Lonsdorf, Erin Rapien, Aram Seo, Regina Slejko, and Seema Saiffee for assistance conducting these experiments. Correspondence concerning this article should be addressed to Nicholas Epley at the University of Chicago, 5807 South Woodlawn Avenue, Chicago, IL 60637; e-mail: epley@chicagogsb.edu.

PSPB, Vol. 32 No. 5, May 2006 641-655

DOI: 10.1177/0146167205284007

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TABLE 1: Illustration of Discrimination and Calibration in Predicted Versus Actual Completion Times of Five Separate Tasks by Two Hypothetical Predictors

Task	John		George	
	Predicted Days	Actual Days	Predicted Days	Actual Days
Task 1	24	20	5	20
Task 2	24	20	5	20
Task 3	22	25	10	25
Task 4	21	25	10	25
Task 5	26	30	15	30
Discrimination	$r = .21$		$r = 1$	
Bias	Mean difference = .6 days		Mean difference = 10 days	

NOTE: In this example (adapted from Campbell & Kenny, 1999), two predictors (John and George) have five separate tasks they are supposed to complete in the upcoming month and both John and George predict how many days it will take them to complete each task. The correlation between predicted and actual completion times of these tasks is an index of discrimination, and George shows considerably higher discrimination than John (with a perfect 1.0 correlation between predicted and actual completion times compared against a correlation of .21). The average simple difference between predicted and actual completion times, in contrast, is an index of bias. And here, John is clearly less biased than George (overly optimistic by an average of 1 day rather than 10 days).

socially or morally desirable behavior. People tend to overestimate, for example, how likely they are to donate time or money to charitable causes, complete important tasks ahead of schedule, and maintain their current romantic relationship (Buehler, Griffin, & Ross, 1994; Epley & Dunning, 2000; MacDonald & Ross, 1999). In each case, people believe that they were more likely than others to behave in an ethical or desirable fashion, but predictions of others' behavior were consistently more accurate than people's predictions about their own behavior. These results suggest that the increased information people have about themselves compared with others may have a perverse impact on their ability to forecast their futures, decreasing rather than increasing the accuracy of self-predictions. In this case, people appear to know others better than they know themselves.

These research findings clearly contradict people's intuitions that they know themselves better than other people do, and this research was designed, at least in part, to reconcile this contradiction between intuition and the empirical data about self-prediction. We suggest that people's intuitions about the accuracy of self-assessments and the existing empirical research appeal to two very different, but commonly confused, forms of accuracy (Green & Swets, 1966; see also Murphy, 1973; Yaniv, Yates, & Smith, 1991).¹ One form is discrimination—the extent to which predictions accurately discriminate between who is likely to engage in a particular behavior and who is not—and would be indexed by the correlation between predicted behavior and actual behavior. For example, discrimination accuracy would index the extent to which predictions of whether a particular person will vote in an upcoming election correlates with whether that individual actually votes. The second form is bias—the extent to which the average prediction corresponds

to the average of actual behavior. For example, bias would arise if the overall percentage of people who predicted that they would vote over- or underestimated the overall percentage who actually do vote. This critical distinction between discrimination and bias is further clarified in Table 1.

Although both discrimination and bias are indexes of accuracy, they measure accuracy of very different sorts. As shown in Table 1, discrimination and bias can be quite discrepant within any particular set of predictions (Epley, Savitsky, & Gilovich, 2001; Gagné & Lydon, 2004; Gilovich, Medvec, & Savitsky, 2000; Kenny & DePaulo, 1993) and are statistically independent such that the magnitude of discrimination can be unrelated to the magnitude of bias (Funder & Colvin, 1997).

We propose that self-knowledge tends to simultaneously increase both discrimination (and thus accuracy) and bias (and thus inaccuracy) in behavioral prediction. Self-knowledge therefore provides both benefits and costs to the overall accuracy of predictions compared to predictions about others. This proposal helps to reconcile people's intuitions about the validity of their self-knowledge with the scientific research that suggests major flaws in self-knowledge because we suspect that people's intuitions appeal to discrimination accuracy, whereas scientific research has typically addressed bias. In addition, this proposal helps to reconcile more general scientific and social debates about the overall accuracy of human judgment (Krueger & Funder, 2004). Although psychologists have known for some time that the accuracy of any particular judgment may be measured in a variety of different ways (Cronbach, 1955), many experimental investigations report only one measure of accuracy, even when multiple measures could be calculated. Such simple treatments that highlight one

measure of accuracy and overlook others may not provide a full account of the accuracy of human judgment. As we will report, circumstances that promote one form of accuracy can simultaneously detract from another form. In the realm of self-predictions, whether people's judgments appear fundamentally accurate or fundamentally flawed depends in large part on how accuracy is measured.

*The Costs of Self-Knowledge:
Bias in Self-Prediction*

There are at least two major reasons that self-knowledge would increase bias in behavioral prediction. First, self-knowledge provides case-based (or individuating) information that leads predictors to disregard population base rates that would otherwise produce less-biased predictions. Second, self-knowledge is often optimistically biased, such that the individuation information people consult when predicting their own behavior has been enhanced in ways that lead to optimistically biased predictions. We address each of these reasons in turn.

Case-based information. As Kahneman and Tversky (1979) noted in their analysis of behavioral forecasting, people generally have two types of information on which to base a future prediction: case-based and distributional. Case-based information involves evidence relevant to the specific actor or action being predicted, whereas distributional evidence involves information about the long-run distribution of behavior (i.e., base rates about the actor's behavior over time or the frequency of actions across the population). Judgments that utilize both types of information tend to be more accurate than those that utilize only one (Dunning, Griffin, Milojkovic, & Ross, 1990; Kahneman & Tversky, 1973). However, people have an overwhelming preference to base their predictions on case-based evidence when they have it (Buehler et al., 1994; Kahneman & Tversky, 1979; Koehler, 1996). This preference exists despite people's well-documented ability to accurately code both the frequency as well as the underlying distribution of behaviors in the population (Hasher, Zacks, Rose, & Sanft, 1987; Nisbett & Kunda, 1985).

There is, of course, a fundamental asymmetry between the kind of information people possess about themselves and others that may explain why people can sometimes predict others' behavior better than their own. People have a wealth of case-based information about themselves, but they have only automatically encoded base rates when considering unknown others—general intuitions about how most people behave in a given situation. This asymmetry means that self-predictions are more likely to be guided by case-based evidence than by

base rates, whereas predictions of others are more likely to be guided by intuitive base rates than by case-based evidence (Buehler et al., 1994; Epley & Dunning, 2000). Self-knowledge may therefore lead people to ignore useful distributional information that they utilize when predicting others' behavior.

Optimistic biases. An excessive focus on case-based information in self-predictions would not be problematic if such information was unbiased, but self-knowledge is rarely generated dispassionately. Instead, self-knowledge is often massaged or molded in just the right ways to maintain positive images of the self (Dunning, 1999; Kunda, 1990; Taylor, 1989). As a consequence, the case-based information people use to make self-predictions is often optimistically distorted. This distortion would obviously leave the individual with information that would mislead self-predictions. The same information applied to others is unlikely to be colored by the same kind of optimistic distortions, meaning that predictions about random others are less likely to be optimistically biased (Epley & Dunning, 2000).

Implications. A preference for case-based information coupled with selective self-enhancement makes people's ability to more accurately predict others' behavior than their own somewhat clearer. When predicting a random stranger, people rely on intuitive base rates for the relevant behavior. Because these intuitive base rates tend to be at least reasonably calibrated, people's predictions are also reasonably calibrated. When predicting the self, however, the combination of case-based knowledge and the desire to maintain positive self-images leads people to give little, if any, weight to distributional information. These two factors together leave self-predictions more prone to optimistic biases in comparison to reality than peer predictions.

*The Benefits of Self-Knowledge:
Discrimination in Self-Prediction*

The preceding description of self-knowledge paints a rather dim picture of people's ability to "know themselves," but it does so only with respect to bias. A considerably different picture is likely to emerge when accuracy is measured via discrimination. After all, people's self-knowledge is likely to increase discrimination accuracy to the extent that this individuating information is diagnostic of actual behavior. Indeed, self-predictions often contain just as much discriminant accuracy as objective measures (e.g., test scores) when predicting performance across a number of different domains, including intellectual achievement, vocational choice, and future preferences (Shrauger & Osberg, 1981, 1982). Predictions of others, in contrast, are likely to show little

discrimination due to the absence of diagnostic individuating information.

Overview of Studies

We therefore predicted that self-knowledge would confer both costs and benefits to behavioral predictions. Self-predictions would show better discrimination than peer-predictions but would simultaneously show more bias as well. We tested this predicted pattern of discrimination and bias in four experiments, the first two involving predictions of voting and the last two involving predictions of the longevity of romantic relationships.

Studies 2 through 4 also allowed us to explore the mechanisms by which self-prediction differs from social prediction. Because self-knowledge is difficult to manipulate, Studies 2 through 4 instead manipulated the kind of information people had about others. This allowed us to test our model of the costs and benefits of self-knowledge in prediction by testing whether gaining knowledge about another person produced costs and benefits similar to those we attribute to self-knowledge. We predicted that providing participants with relevant information about another person would increase discrimination (Study 2) but lead people to disregard relevant base rates that they otherwise would attend to in the absence of individuating information (Study 3), producing bias when the relevant information is construed optimistically (Study 4).

STUDY 1

Approximately 1 month before the 2000 U.S. presidential election, participants predicted whether they and a randomly selected student from their class would vote. Two days after the election, these participants were contacted again and asked whether they actually voted. We expected to observe greater discrimination as well as bias in self-predictions than peer predictions. In addition, participants were given a small amount of individuating information about another person in the experiment and were asked to predict his or her behavior as well. This prediction target allowed us to begin exploring the effects of individuating information per se on discrimination and bias.

Method

One-hundred ninety Cornell undergraduates were told that they would be asked to think about their own and others' behavior in an upcoming event. Before doing so, participants were asked to provide a short self-description that they were told would be used later in the experiment. This self-description served as the individuating information that would later be provided to another participant in the experiment, and it required

them to write five words that best described their personality as well as a short description of "who they are." When finished, the experimenter exchanged the participants' self-description with a description completed by another participant. They were told to read this new self-description carefully because they would be asked to make some predictions about this person's behavior later in the experiment.

After several minutes, the experimenter gave participants a questionnaire that included a reminder of the upcoming election and asked them to predict whether they, the participant they received information about (hereafter referred to as the individuated peer), and a randomly selected person from this experiment (hereafter referred to as the random peer) would vote in the upcoming election. The order in which participants predicted the different targets was counterbalanced in a Latin-square design.

Participants were contacted again 1 day following the election by e-mail (or telephone, if necessary) and were asked whether they were eligible to vote in the election and, if so, whether they voted.

Results and Discussion

Participants were not screened prior to the experiment to determine whether they were eligible to vote. Because participants were predicting the behavior of another participant in the experiment, some predicted the behavior of an ineligible voter. Ineligible voters, or participants who were considering ineligible voters, were therefore excluded from the following analyses. Participants who could not be contacted after the election, or who were predicting someone who could not be contacted, also were excluded. This left 104 participants with complete data. Including participants with incomplete data, however, does not alter the significance levels of any of the following analyses.

As seen in Table 2, participants predicted that they were more likely to vote than both the randomly selected and individuated peer, paired $t(103) = 3.28$, $p < .01$, $d = .65$. This difference reflected bias in self-predictions. Participants overestimated the likelihood that they would vote, $t(103) = 7.28$, $p < .01$, $d = 1.43$, but were reasonably calibrated when predicting both the individuated and random peer, $t_s(103) = 1.35$ and $.21$, both p s $> .17$, d s = $.27$ and $.04$.

As predicted, this increased bias in self-predictions was offset by increased discrimination. Overall, 75% of participants correctly predicted their own behavior, whereas participants would have been right only 65% of the time if they had been predicting themselves randomly (based on base rates of predicted and actual behavior). Only 61% and 60% were correct when predict-

TABLE 2: Predicted Versus Actual Voting Behavior for the Self, Individuated Peer, and Random Peer (Study 1)

Target	Percentage Voting		% Accurate Predictions
	% Predicted	% Actual	
Self	90	69	75
Individuated peer	70	70	61
Random peer	75	69	60

NOTE: Actual behavior for the individuated peer varies because a small number of participants were predicted multiple times.

ing the individuated and random peer, respectively, with the associated chance accuracy levels for the individuated group of 58%.

Of course, these hit rates are influenced by the actual (high) base rate of voting and so simply predicting that any person would vote also would increase one's hit rate without actually increasing discrimination. The better measure of discrimination is therefore the correlation between predicted and actual behavior. This correlation shows that self-predictions were significantly related to actual voting behavior, $\phi = .35, p < .001$, whereas individuated peer predictions were not, $\phi = .11, p = .18$. The difference between correlations is marginally significant, $z = 1.81, p = .07$. Furthermore, logistic regressions indicated that participants who predicted they would vote were more likely to do so ($M = 74.47\%$) than were those who predicted they would not vote ($M = 20\%$), $\beta = 2.45, p < .01$. In contrast, individuated peers who were predicted to vote were not more likely to do so ($M = 69.86\%$) than were those who were predicted not to vote ($M = 61.29\%$), $\beta = .38, ns$.

That discrimination was somewhat lower for individuated peer predictions suggests that the individuating information participants received did not provide the same discriminant accuracy as self-knowledge. This is not very surprising because participants received no individuating information relevant to the likelihood of voting. These results suggest that it is not the mere presence of case-based information that produces the patterns of discrimination and bias observed in self-predictions but rather the quality of that information. We explored this issue further in Study 2.²

STUDY 2

Participants in Study 1 demonstrated both greater discrimination and greater bias when predicting their own behavior than when predicting randomly selected others. We predicted this pattern would arise because self-knowledge contains at least some relevant and diagnostic information that increases discrimination, but with a

cost of leading people to ignore relevant distributional information. Study 2 addressed this explanation more directly by providing participants either relevant or irrelevant case-based information about one of their peers. If self-knowledge increases discrimination because it contains relevant diagnostic information, then providing relevant (and diagnostic) information about another person, as opposed to irrelevant information, should increase discrimination accuracy.

We predicted that people are less biased when predicting others' behavior in the absence of relevant individuating information, however, because they are more likely to utilize relevant distributional evidence than when predicting one's own behavior. To test this idea directly, Study 2 also manipulated the distributional evidence available to participants. We expected that participants' predictions of others' behavior would be strongly influenced by this information when they did not possess relevant case-based information (i.e., when predicting a random peer or an irrelevant individuated peer), whereas participants' predictions of their own or the relevant individuated peer's behavior would not.

Finally, Study 2 included two important methodological improvements. First, participants made their predictions on a continuous as well as a dichotomous measure. This was done to rule out concerns that the dichotomous measure used in Study 1 was too insensitive to detect subtle differences in accuracy. Second, Study 2 included a no-prediction control group to address concerns that predicting one's own behavior may alter the behavior being predicted (Sherman, 1980).

Method

Participants. One hundred and thirty-eight Harvard University undergraduates approached in one of several campus dormitories received \$5 for their participation. Efforts were made by the experimenters to target students who appeared to be U.S. citizens to reduce the number of ineligible voters in the sample.

Procedure. All participants were told that this experiment investigated predictions of one's own and others' behavior and that this experiment would require completing a series of questionnaires as well as responding to a brief e-mail questionnaire approximately 1 month later. All participants agreed to answer the e-mail questionnaire.

Participants were next told that we needed to collect some background information and were given two questionnaires. One included five items directly relevant to the upcoming presidential election, whereas the other included five items that were relatively irrelevant. For instance, the relevant questionnaire asked, "How interested would you say you are in the upcoming presiden-

TABLE 3: Predicted Likelihood of Voting Versus Actual Voting for the Self, Individuated Peer, and Random Peer Among Participants Provided With High Versus Low Base Rate Information (Study 2)

Target	Base Rate Condition		Difference	Actual	r (Prediction/Actual)
	High	Low			
Self	89%	90%	-1%	66%	.51*
Individuated peer					
Relevant information	68%	65%	3%	61%	.48*
Irrelevant information	75%	51%	24%*	69%	.07
Random peer	76%	53%	23%*	66%	—
Control (no prediction)				69%	

NOTE: Participants predicted the behavior of three targets: self, a randomly selected peer, and an individuated peer about whom they received either relevant or irrelevant information. Actual behavior varies because a small number of participants were predicted multiple times in the individuated peer predictions.

* $p < .05$.

tial election?" and "How pleased do you think you will be if your preferred candidate wins the presidential election?" whereas the irrelevant questionnaire asked, "How interested would you say you are in modern art?" and "How pleased do you think you would be if you won an all-expenses paid trip for 1 week to Florida?" Control participants were then excused from this first phase of the experiment.

Participants in the prediction conditions then received either the relevant or irrelevant information questionnaire completed by another participant in the experiment, along with the questionnaire asking them to predict their own and others' behavior. The first page began with a sentence noting the upcoming presidential election and continued with some ostensible background information about the typical percentage of student voters from Ivy League universities—a relevant comparison group for these Harvard University students. Participants in the low base rate condition read that "voting among Ivy League college students has been historically quite low, with only 15% of students enrolled in Ivy League colleges voting, on average, in the presidential election over the last 30 years." Participants in the high base rate condition, in contrast, read that "voting . . . has been historically quite high, with 70% of students . . . voting . . . over the last 30 years."

Participants in the prediction conditions were then asked to predict whether they, a randomly selected Harvard student, and the individuated peer would vote in the upcoming election (yes or no) as well as the likelihood that each of these targets would vote on a scale ranging from 0% (*not at all likely*) to 100% (*absolutely certain*). The order of these predictions was counterbalanced in a Latin-square design. All participants were contacted again 2 days after the election by e-mail and asked to indicate whether they had voted in the presidential election and whether they were U.S. citizens (to determine their voting eligibility).

Results

Participants who were ineligible to vote or who were predicting the behavior an ineligible voter were removed from the analyses. This left 131 participants in the final analysis (105 in the prediction conditions and 26 in the control condition). Including the partial data from excluded participants does not alter the significance levels of any of the following analyses.

Participants predicted their own and others' voting behavior once as a dichotomous judgment and once as a continuous judgment. Not surprisingly, these measures were largely redundant. To highlight the unique contributions of Study 2 and to simplify presentation, we discuss only results from the continuous likelihood judgments below.

Accuracy. All relevant means and correlations for behavioral predictions and actual voting behavior are presented in Table 3. As in Study 1, participants predicted that they would be more likely to vote ($M = 89.9\%$) than either their individuated ($M = 64.9\%$) or random peers (64.8%), paired $t(104) = 9.17$ and 9.68 , respectively, $ps < .001$, $ds = 1.80$ and 1.90 . This reflected significant bias in self-prediction because participants significantly overestimated the likelihood that they would vote, paired $t(104) = 5.82$, $p < .001$, $d = 1.14$. The actual rate of voting observed in these prediction conditions did not seem to be influenced by the act of making a prediction because the voting rate in the no-prediction control was statistically identical to the prediction conditions, $\chi^2 < 1$.

As in Study 1, the increase in bias for self-predictions compared to peer predictions was offset by a corresponding increase in discrimination. As seen in Table 3, there was a significant positive correlation between predictions and reality for self-predictions and also for relevant individuated peer predictions. These correlations were both significantly higher than the analogous (non-significant) correlation observed for irrelevant peer predictions, $zs = 2.91$ and 2.23 , respectively, both $ps \leq .01$.

TABLE 4: Correlations Between Individuating Background Information for Predictions of Self and Individuated Peer (Study 2)

Target	Background Information	
	Relevant Information	Irrelevant Information
Self	.51**	.15
Individuated peer		
Relevant information	.66**	(.09)
Irrelevant information	(.11)	.09

NOTE: Participants completed both relevant and irrelevant background information, meaning that correlations can be calculated for both kinds of information on self-predictions. However, participants received only relevant or irrelevant information about an individuated peer. Correlations for individuated peers presented in parentheses are with information participants did not receive.

* $p < .01$.

There are two interesting points worth noting. First, discrimination for the relevant individuated peer prediction was not only higher than it was for the irrelevant peer prediction but it also was just as high as discrimination in self-predictions. Self-knowledge provided benefits to discrimination that were relatively easy to mimic in predictions of other individuated peers. Second, the most accurate predictions overall—that is, with the most discrimination and least bias—were for the relevant individuated peer. These predictions contain the same kind of diagnostic information as self-knowledge without the accompanying optimistic bias, exactly as our theory would predict.

Use of distributional evidence. Table 3 also shows that participants' self-predictions were not significantly influenced by the base rates of voting behavior we provided, and neither were predictions of the individuated peer when we provided relevant information, both $t_s < 1$. The base rate information did, however, significantly influence predictions of the random peer, $t(103) = 7.23$, $p < .001$, $d = 1.42$, and of the individuated peer with irrelevant information, $t(54) = 4.63$, $p < .001$, $d = 1.26$. Because the relevant versus irrelevant information conditions applied only to predictions of the individuated peer, we tested this overall pattern of results in two separate ANOVAs. The first compared the effect of the base rate manipulation on predictions of self and the random peer in a 2 (base rate: high vs. low) \times 2 (target: self vs. random peer) mixed-model ANOVA with repeated measures on the last factor. This analysis yielded the predicted main effect for target, $F(1, 103) = 118.35$, $p < .001$, $\eta^2 = .53$, qualified by the predicted interaction, $F(1, 103) = 27.24$, $p < .001$, $\eta^2 = .21$. This indicated that the base rate manipulation influenced random peer predictions but not self-predictions. The second ANOVA tested the im-

pact of background information and base rates on predictions of the individuated peer only in a 2 (base rate: low vs. high) \times 2 (background information: relevant vs. irrelevant) ANOVA. This analysis yielded a significant main effect of base rate, $F(1, 101) = 10.66$, $p < .001$, $\eta^2 = .10$, again qualified by the predicted interaction, $F(1, 101) = 6.35$, $p < .05$, $\eta^2 = .06$. This indicates that the base rate information influenced predictions of the individuated peer only when provided with irrelevant individuating information, consistent with our theoretical predictions.

Use of case-based information. Instead of using distributional evidence, participants used relevant individuating case-based evidence to predict their own and the relevant individuated peer's behavior. As shown in the first row of Table 4, the relevant individuating information about political interests was significantly correlated with participants' own predicted likelihood of voting, whereas the correlation with irrelevant information about personal interests was not. The difference between these two correlations was significant, $z = 2.94$, $p < .01$. A similar pattern emerged for predictions of the individuated peer, with a significant correlation observed between the individuating information and the likelihood of voting for the relevant individuated peer, but not for the irrelevant individuated peer. Again, the difference between these two correlations was significant, $z = 3.47$, $p < .001$.

Summary. Overall, these results are consistent with our analysis that participants disregard distributional evidence when relevant case-based evidence is available, increasing discrimination but decreasing the tendency to consider relevant base rates that could reduce bias. These results make it clear that participants are not simply using whatever information is deliberately provided to them but are using it selectively. Participants utilized relevant case-based information when they had it to make their predictions and relied on base rates when they did not. Discrimination accuracy can be enhanced by attending to relevant case-based information, whereas bias can be reduced by attending to relevant base rates.

STUDY 3

The main goal of Study 3 was to extend the results of Study 2 to a different domain where predictions of the future are of obvious practical importance. In particular, we investigated predictions of the longevity of romantic relationship by asking participants to predict the likelihood that their own and others' current romantic relationships would be intact 1, 3, and 6 months into the future.

In contrast to Study 2, predictors in this experiment were not asked to provide the relevant and irrelevant individuating information before making their prediction to control for an alternative interpretation that doing so altered participants' behavior and artifactually increased discriminant accuracy (Sherman, 1980). Instead, relevant and irrelevant individuating information was collected from a different set of participants who served as a behavioral baseline for these individuated peer predictions.

Method

Participants. Sixty-four Harvard University undergraduates involved in a dating relationship received \$6 in exchange for their participation. Of these, 22 served as a behavioral baseline for the individuated peer predictions. The remaining participants were in the prediction condition. Participants were recruited in groups of up to three but completed all materials in private cubicles. All participants completed this experiment during a 3-week period, but participants in the baseline condition were run first to keep participants in the prediction condition from believing they were participating simultaneously (and therefore potentially knew) with the targets who completed the relevant and irrelevant information questionnaires.

Procedure. As part of an unrelated experiment, participants in the baseline behavior condition were asked to provide both relevant and irrelevant information about their dating relationship that would later be used by prediction participants. The relevant information questionnaire asked participants to indicate the extent to which five adjectives described their current dating relationship—*honest*, *trusting*, *compatible*, *exciting*, and *enjoyable*—and to answer three open-ended questions—"How many hours per week would you say you spend together?" "How many arguments would you estimate you have each week (and what is the most common cause of them)?" and "What hobby or activity do you and your partner most enjoy doing together (and how often do you engage in this activity)?" The irrelevant information questionnaire followed the same format but asked about information that was transparently irrelevant to the longevity of the relationship. Participants were asked to indicate the extent to which five irrelevant adjectives described their relationship—*athletic*, *intellectual*, *musical*, *artistic*, and *creative*—and to answer three open-ended questions—"Have you, at any point in the last year, run together in a competitive race?" "Have you, at any point in the last year, worked together in a staff position at a public library?" and "Do you think you will, at any point in the upcoming year, have dinner together in a restaurant?"

Participants in the prediction conditions, in contrast, were told upon arrival to the lab that this study would require them to make some predictions about their own and others' future behavior. Participants were then given either a relevant or irrelevant background questionnaire completed by one of the participants in the baseline condition, were told that they would be asked to make some judgments about this person later in the experiment, and were given several minutes to look over the questionnaire.

When finished, participants received a questionnaire informing them that they would be asked to make some predictions about their own and others' dating relationships at several points in the future. Participants read that they were to provide their most accurate predictions, rather than their most hopeful or optimistic, and were told that their responses would remain strictly confidential. The first page of this questionnaire also included a base rate manipulation similar to that used in Study 2. In particular, participants in the low base rate condition read that "a survey conducted on campus last year indicated that Harvard dating relationships last, on average, approximately 2 months." Participants in the high base rate condition read that "... relationships last, on average, approximately 8 months."

All participants then predicted (by checking yes or no) whether they, a randomly selected participant in the experiment, and the person about whom they received some information would be dating their current partner 1, 3, and 6 months into the future.

One, 3, and 6 months after this initial session, all participants were contacted again by e-mail and asked if they were currently involved in the relationship they considered during the initial session (yes or no). Participants who could not be contacted at one of these points were asked to recall whether they were still dating at the previous time interval. One participant in the baseline condition and 3 participants in the prediction condition could not be contacted at any time after the initial session, and data involving these participants are therefore missing from the following analyses.

Results

Participants were less optimistic in their predictions as the length of the relationship increased, but optimism waned much faster in predictions of others' relationships (see Table 5). More important, pessimistic base rates were utilized only when predicting targets about whom little was known—the irrelevant individuated and randomly selected peer. Base rates were completely neglected when participants predicted their own and the relevant individuated peer's relationship.

We submitted participants' predictions to a 4 (target: self, relevant individuated peer, irrelevant individuated

TABLE 5: Predicted Percentage of Intact Relationships for the Self, Random Peer, and Individuated Peer at 1-, 3-, and 6-Month Time Periods for Those Provided Low (2-Month Average) Versus High (8-Month Average) Base Rates (Study 3)

Predicted	Time		
	1 Month	3 Months	6 Months
Self			
Low base rate	91%	75%	75%
High base rate	95%	90%	76%
Relevant individuated			
Low base rate	100%	80%	55%
High base rate	95%	82%	55%
Irrelevant individuated			
Low base rate	90%	55%	15%
High base rate	95%	64%	45%
Random peer			
Low base rate	95%	20%	0%
High base rate	95%	64%	41%

peer, random peer) \times 3 (time: 1, 3, and 6 months) \times 2 (base rate provided: 2 months vs. 8 months) ANOVA with repeated measures on the first two factors. This analysis uncovered significant main effects for time, $F(2, 32) = 7.67, p < .05, \eta^2 = .32$, and target, $F(3, 31) = 7.67, p < .05, \eta^2 = .43$, qualified by three interactions. A Time \times Target interaction indicated that participants' predictions became more pessimistic about random and irrelevant individuated peers as time increased, $F(6, 28) = 4.66, p < .05, \eta^2 = .50$, and a Time \times Base Rate interaction indicated that base rates influenced predictions more strongly as time increased, $F(2, 32) = 3.81, p < .05, \eta^2 = .19$. More important, a Base Rate \times Target interaction indicated that participants completely ignored base rates when they possessed relevant case-based information, $F(2, 32) = 3.06, p < .05, \eta^2 = .16$. As can be seen in the far right column of Table 5, 6-month predictions showed no impact of the base rate manipulation for either participants' own or the relevant individuated peer's relationship, both $t_s < 1$, both $p_s > .9$, but showed significant effects for predictions of both the irrelevant individuated and random peer's relationships, $t_s(40) = 2.20$ and 3.63 , respectively, both $p_s < .05$, $d_s = .70$ and 1.15 . Had these base rates actually been accurate, participants would have again been much more calibrated predicting the behavior of complete strangers than predicting one's own behavior. In reality, 58% of participants who predicted their own behavior were still dating after 6 months, as were 62% of relevant individuated peers and 53% of irrelevant individuated peers.

Although optimistically biased about the longevity of their relationships, Table 6 indicates that discrimination was again increased by relevant individuating information. Predictions of participants' own and the relevant individuated peer's behavior correlated more strongly

TABLE 6: Percentage of Correct Predictions for the Self, Relevant Individuated Peer, and Irrelevant Individuated Peer for 1-, 3-, and 6-Month Time Periods (Study 3)

Target	Time		
	1 Month	3 Months	6 Months
Self	85%	82%	64%
Relevant individuated peer	93%	69%	62%
Irrelevant individuated peer	87%	58%	42%

with actual behavior than predictions of the irrelevant individuated peer's relationship. To test the statistical significance of these patterns, we created a new variable that coded a correct prediction as 1 and an incorrect prediction as 0 for each target at each time period. These hit rates were submitted to a 3 (target: self, relevant individuated peer, irrelevant individuated peer) \times 3 (time: 1, 3, and 6 months) \times 2 (base rate provided: 2 months vs. 8 months) ANOVA with repeated measures on the first two factors. This analysis yielded only a marginally significant main effect for target, $F(2, 32) = 3.13, p = .06, \eta^2 = .16$, and a significant main effect for time, $F(2, 32) = 18.31, p < .001, \eta^2 = .53$, qualified by the predicted Target \times Time interaction, $F(4, 30) = 4.51, p < .01, \eta^2 = .38$. Discriminant accuracy was lowest for predictions involving the irrelevant individuated peer, $\phi = -.14, ns$, for 6-month predictions. As in Study 2, providing relevant information about another person increased discrimination to levels identical to self-predictions, $F(1, 34) < 1, p > .5, \phi_s = .29$ and $.23$, both ns , two-tailed, for self-predictions and relevant information predictions at 6 months, respectively.

As in the previous studies, discriminant accuracy increased with the presence of relevant individuating information and decreased with its absence. Of interest, across Studies 2 and 3, we find that peer predictions with relevant information are just as accurate as self-predictions. Overall, peer predictions with relevant information were 68% accurate—the exact rate achieved by self-predictions (and in contrast to the rate of 50% achieved by peers with irrelevant information). Expressed in terms of effect size, the discrimination achieved across both studies by self-predictions, $r = .40$, was only slightly higher than that achieved by peers with relevant information, $r = .37$. Peer predictions with irrelevant information showed no such discrimination, $r = -.04$. The discrimination effect size of irrelevant peer predictions was significantly lower than self-predictions and relevant information ones, both $Z_s > 2.9, p < .01$.

STUDY 4

Studies 2 and 3 provide an explanation for the observed patterns of discriminant accuracy in predictions

of the self and undifferentiated others—self-knowledge contains diagnostic accuracy that increases discrimination compared against predictions of typical others. They do not, however, fully explain why self-predictions, at the same time, tend to be optimistically biased compared to predictions of others. We have argued that this bias occurs because self-knowledge is optimistically biased (Dunning, 1999; Kunda, 1990; Taylor, 1989) and attention to this individuating information leads people to disregard an intuitive assessment of base rates that would otherwise debias their predictions. Such an optimistic construal of relevant data would likely lead to accurate discrimination but optimistic bias compared to predictions of others. We tested this hypothesis in Study 4.

Participants in this experiment were again asked to predict the longevity of dating relationships, but this time only others' relationships and not their own. Participants received information about another's relationship, either relevant to its longevity or irrelevant as in Study 3. To mimic the optimistic bias that we believe permeates self-prediction, some participants were asked to interpret this information in the best possible light, construing the information as optimistically as they could without knowingly disregarding or blatantly distorting information. Other participants were asked to interpret this information as objectively as possible. We made two predictions. First, discriminant accuracy would be higher for participants who received relevant, as opposed to irrelevant, individuating information, regardless of their construal condition. Second, and more important, that optimistic biases would arise in only one of the four experimental conditions—participants asked to optimistically interpret relevant individuating information.

Method

Participants. One hundred thirty-two Harvard University undergraduates participated in this experiment in exchange for either extra course credit in their psychology courses or \$6. All of these participants predicted the longevity of another person's relationship, and these targets included the 22 baseline behavior participants from Study 3 plus an additional 11 participants who provided the same information shortly after Study 3 was completed and were also contacted 1, 3, and 6 months after the initial session to assess the status of their relationship.

Procedure. All participants completed the prediction questionnaires individually. Because participants were not predicting their own relationships in this experiment, participants did not need to be currently involved in a dating relationship.

Participants were told that they would receive some information about another person's dating relationship

and then make some predictions about whether this person would still be dating his or her partner 1, 3, and 6 months from the time this information was collected. Participants were then given a questionnaire containing the optimistic versus objective construal manipulation, the individuating information questionnaires completed by previous participants, and the prediction measures.

All participants read, "As with any information, it is possible to interpret the relationship description you are about to read in a variety of different ways." Participants in the optimistic condition then read,

One possibility is to interpret the description in an optimistic light, looking for the most positive spin on the information as it relates to the quality and likely longevity of this person's dating relationship. Putting a positive spin on the information does not mean knowingly ignoring or misrepresenting the information you are given but rather interpreting the information in the most positive way you plausibly can—something similar to a "best-case scenario."

In contrast, participants in the objective condition read,

One possibility is to interpret the description in an objective light, trying to interpret the information presented in the description as objectively and rationally as you can. This does not mean interpreting information in a negative light or ignoring feelings and emotions presented in the description but rather interpreting the description as realistically as you possibly can—something similar to a "most likely scenario."

All participants then read either relevant or irrelevant individuating information about another person's dating relationship using the materials as in Study 3. Finally, participants predicted whether their target would still be involved in his or her dating relationship 1, 3, and 6 months from the point at which the individuating information was provided.

Results and Discussion

Participants in this experiment received either relevant or irrelevant information about a target that they were asked to construe in either an optimistic or objective fashion. Four separate participants—one in each of the experimental conditions—therefore made predictions about each target. However, because the relevant and irrelevant information differed so dramatically for each target, we opted for a more conservative approach and analyzed all responses at the level of the individual participant rather than the target. One target, as mentioned in Study 3, could not be contacted after the initial experiment. Predictions involving this target are

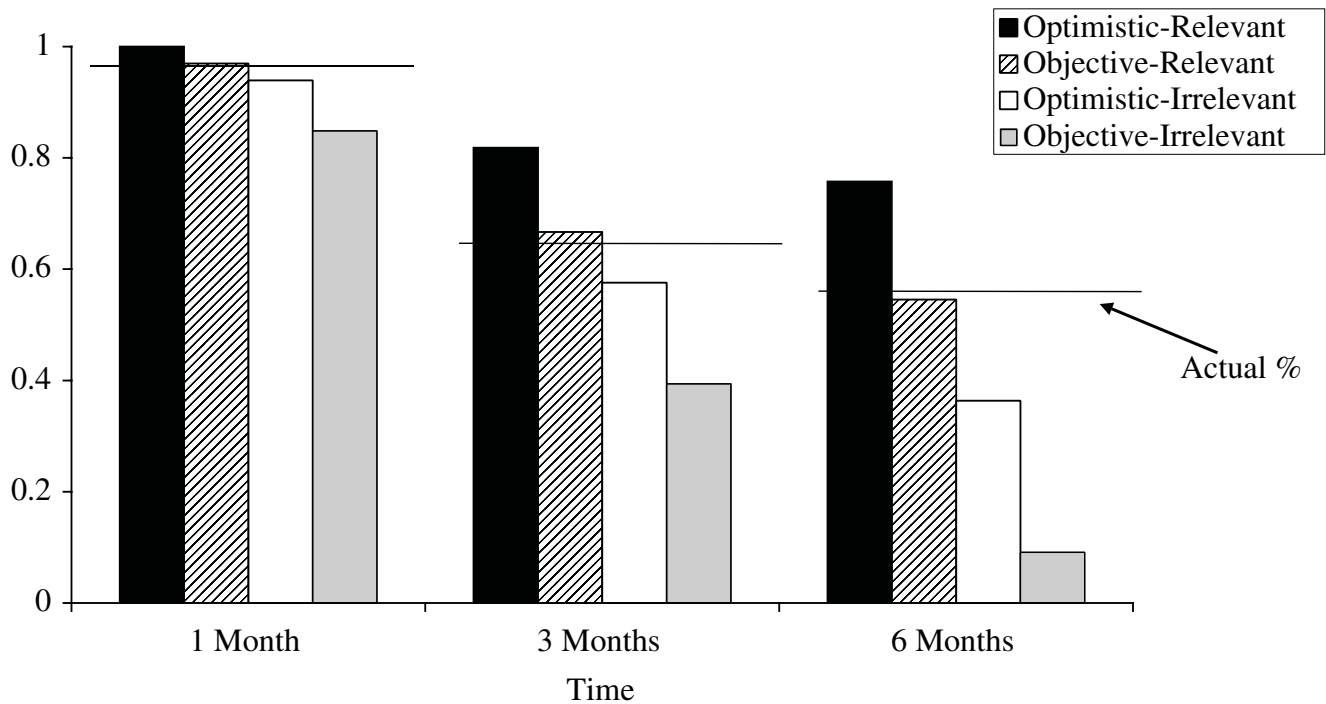


Figure 1 Predicted versus actual percentage of intact relationships (i.e., calibration) among participants who receive relevant or irrelevant individuating information that they interpret optimistically or objectively (Study 4).

retained in the following analyses but are missing from all analyses involving comparisons with actual behavior.

Two main effects emerged from participants' predictions (see Figure 1). First, participants asked to construe the individuating information optimistically made more optimistic predictions about the target's relationship than those asked to construe the individuating information objectively. Second, participants given relevant individuating information about the target's relationship were more optimistic than those given irrelevant information, replicating a similar effect observed in Study 3. As predicted, only participants who construed relevant individuating information optimistically were optimistically biased. In fact, 76% of participants believe the target would still be dating their current partner 6 months later, the very same percentage as participants predicted for their own relationships in Study 3. Asking participants to interpret relevant individuating information positively made their prediction look exactly like those based on self-knowledge.

To analyze the statistical significance of these responses, predictions were submitted to a 3 (time: 1, 3, and 6 months) \times 2 (information: relevant vs. irrelevant) \times 2 (construal: optimistic vs. objective) ANOVA with repeated measures on the first factor. All three main effects in this analysis were significant. Participants predicted

that relationships were more likely to break up (a) as time passed, $F(2, 127) = 74.22, p < .05, \eta^2 = .53$, (b) when they received irrelevant as opposed to relevant individuating information, $F(1, 128) = 24.29, p < .001, \eta^2 = .16$, and (c) when they interpreted the individuating information objectively rather than optimistically, $F(1, 128) = 8.98, p < .01, \eta^2 = .07$. These main effects were qualified by a significant Time \times Information interaction, $F(2, 127) = 8.52, p < .05, \eta^2 = .12$, indicating that predicted likelihood of a break-up increased faster over time when participants received irrelevant individuating information, $F(2, 130) = 64.03, p < .001, \eta^2 = .50$, than when they received relevant individuating information, $F(2, 130) = 23.70, p < .001, \eta^2 = .27$. Finally, a marginally significant Time \times Construal interaction, $F(2, 127) = 2.47, p = .09, \eta^2 = .04$, indicated that the predicted likelihood of break-up also increased faster over time when participants interpreted the individuating information objectively, $F(2, 130) = 54.25, p < .001, \eta^2 = .45$, than when they interpreted it optimistically, $F(2, 130) = 28.77, p < .001, \eta^2 = .31$. No other interactions were significant (all F s < 1).

A secondary prediction was that participants' discriminant accuracy would show a somewhat different pattern, showing an increase in accuracy only for relevant information. To test this prediction, we calculated whether each prediction was accurate and submitted

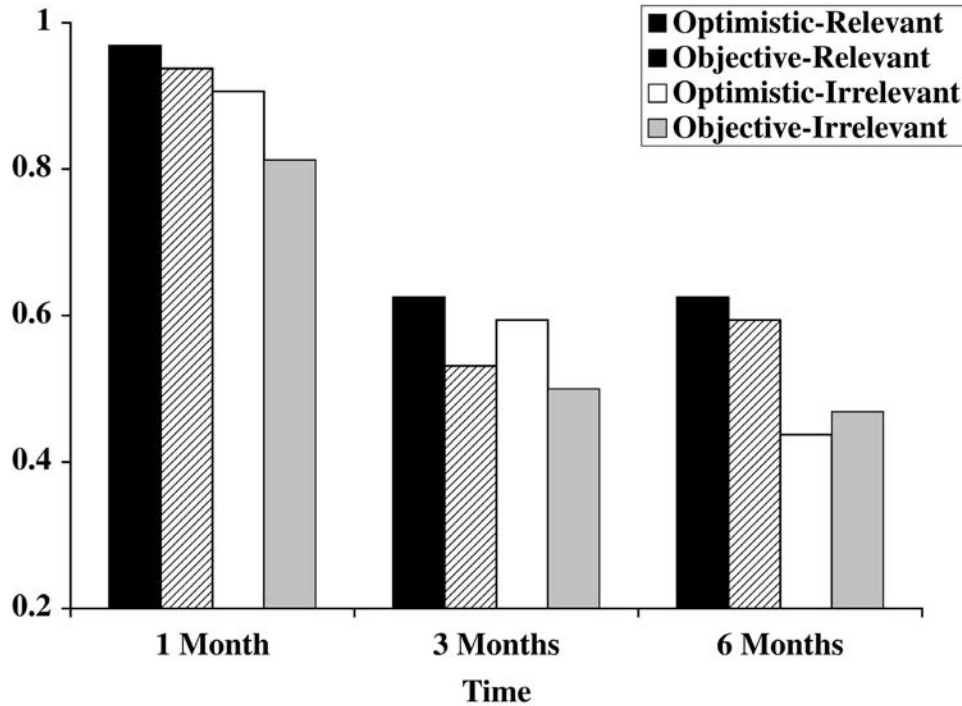


Figure 2 Percentage of correct predictions (i.e., discrimination) among participants who receive relevant or irrelevant individuating information that they interpret optimistically or objectively (Study 4).

these scores to a 3 (time: 1, 3, and 6 months) \times 2 (information: relevant vs. irrelevant) \times 2 (construal: optimistic vs. objective) ANOVA with repeated measures on the first factor. This analysis revealed a significant main effect for time, indicating that discriminant accuracy decreased as the length of prediction increased, $F(2, 127) = 30.52$, $p < .01$, $\eta^2 = .32$. In addition, a marginally significant main effect for information indicated that participants who received relevant information were somewhat more accurate than were participants who received irrelevant information, $F(1, 124) = 2.84$, $p = .09$, $\eta^2 = .02$. As can be seen in Figure 2, participants provided with relevant information tended to be more accurate than those provided with irrelevant information, especially as the length of time involved in the prediction increased. In contrast, an optimistic versus objective construal had no influence on discrimination accuracy, $F < 1$.

These results are consistent with Studies 1 through 3 and provide further evidence that discrimination is a function of the diagnosticity of relevant information. Bias, in contrast, appears to be a function of the way that information is construed. Participants in this experiment asked to interpret relevant information optimistically were biased to the same degree, and in the same direction, as self-predictions in Study 3. Self-knowledge provides a mixed blessing, increasing discrimination but also bias in predictions of ethical or desirable behavior.

GENERAL DISCUSSION

Predictions of the future are important because they motivate action and influence decisions. At least in part, people choose to marry because they believe their current feelings will be long lasting, change careers because they believe their life will improve, or tackle projects because they seem manageable. Making these predictions accurately is therefore a critical prerequisite for making a variety of good decisions. Despite this importance, many predictions contain reliable biases. In short, there is ample confirmation of Yogi Berra's hypothesis that predictions are difficult to make, especially about the future.

The research reported in this article explores one reason why, at times, predictions are difficult to make, especially about the self. This reason focuses on the approach people take when predicting their own versus others' behavior. When predicting one's own behavior, people seem to rely on specific self-knowledge they possess about themselves, leading them to disregard intuitive assessments of population base rates that might otherwise enhance the accuracy of their predictions. The opposite happens, however, when predicting random others simply because no case-based evidence is available. This predicts that self-assessments will sometimes be less accurate, by exhibiting more mean-level bias, than peer-

predictions. This prediction was confirmed in Studies 1 through 3, in which participants' self-predictions were optimistically biased when compared to actual behavior. Peer predictions, in contrast, were unbiased. In this respect, people appear to have considerably more calibrated insight into others' behavior than into their own. But this research also suggests that the relationship between self-knowledge and accurate predictions is somewhat complicated. Although self-knowledge may be reliably biased, it may still afford the ability to discriminate between likely and unlikely behavior at the individual level. This discriminant accuracy would by definition be nonexistent when predicting random others for which no case-based information is available. Studies 1 through 3 also found evidence for this relative difference in discriminant accuracy. Despite optimistic biases overall, participants were more accurate predicting their own behavior than predicting a random other as well as more accurate than a simple base rate prediction would have produced. Evidence consistent with this analysis also comes from the individuated participants in both Studies 1 and 2. Providing people with inside information about another person increased accuracy only when the information was directly relevant to the prediction. Indeed, peer predictions involving relevant information became roughly as accurate as self-predictions. The reason it did not simultaneously produce the same kinds of biases as self-knowledge, we suspect, is because it was not as optimistically biased as self-knowledge in these domains.

Beyond providing a clearer account of accuracy in self- and social predictions, the findings reported in this article also help to bring together two lines of research that have long operated in relative isolation. On one side are researchers primarily interested in the determinants of accurate social judgments. This interest goes back at least as far as Darwin, who ignited research in emotion recognition that has continued ever since (Zajonc, 1998). The interest in accuracy has expanded to include everything from judgments about clinical treatment (Dawes, Faust, & Meehl, 1989) to self-presentation (Kenny & DePaulo, 1993) to sexual orientation (Ambady, Hallahan, & Conner, 1999). Generally, the methods used in this research are correlational and investigate whether variability in the world is tracked by the variability in intuitive judgments.

On the other side are researchers generally interested in the determinants of biases in social judgment. This research began in earnest with a monograph by Icheiser (1949) that foreshadowed the development of the heuristics and biases approach to social judgment (Gilovich, Griffin, & Kahneman, 2002; Kahneman, Slovic, & Tversky, 1982; Ross, 1977). This research was less focused on whether judgments tracked the variability

in real life but rather how any one judgment matched up with reality, often indexed as a difference score. Psychologists in this tradition learned, among many other things, that people are prone to overestimate the power of dispositions in causing behavior (Gilbert & Malone, 1995), to reason egocentrically (Nickerson, 1999), and to utilize simple rules and shortcuts that occasionally lead to systematic errors (Kahneman et al., 1982). Although this research was (and is) motivated by an interest in the underlying mechanisms that guide human judgment rather than a crusade in pursuit of error and human shortcomings (Krueger & Funder, 2004), these mechanisms are generally revealed only through the demonstration of predictable biases in judgment.

At first glance, these two literatures seem diametrically opposed—either judgments are right or they are wrong and the study of accuracy may bear little on the study of error. However, the two are often close traveling companions, and the findings presented here suggest that whether researchers uncover a picture of accuracy or error often depends on how they look. These results demonstrate that the same information may produce, at the same time, both accuracy and error for different but related reasons. We suspect similar mechanisms underlie other observations of correlational accuracy in the face of overall error or bias, including those involving perceptions of others' impressions (Epley et al., 2002; Savitsky, Epley, & Gilovich, 2001), affective forecasting (Wilson & Gilbert, 2003), and the planning fallacy (Buehler et al., 1994). Although the common trajectory of ideas in science is toward ever-finer distinctions and specializations, we think the study of accuracy and error in human judgment is ready to move in reverse, bringing these separate camps under the same umbrella and commencing integration.

The research reported here suggests that a central component of this integration may involve simultaneously studying multiple indexes of accuracy. Researchers cannot examine only one form of accuracy (e.g., a correlation coefficient) and then assume that the accuracy displayed by that one indicator is an adequate proxy for all. Instead, researchers must think through the various forms of accuracy that might be relevant to the circumstances being studied. We have focused in this research on two forms (discrimination and bias), but others have described additional variants of accuracy that may be important to consider as well. Cronbach (1955), for instance, described four different measures of accuracy in his classic article. In more recent work, Kenny (2004) has described how accuracy in social judgment can be measured from the perspective of the perceiver, the perceived, and the interaction between the two. Thus, the findings described herein suggest that

future researchers interested in accuracy and error should be mindful of the specific forms of accuracy they are measuring and whether they are being comprehensive in their treatment of the concept.

One major issue facing this integration, however, that the present research leaves unaddressed is the functional benefit of different forms of accuracy in daily life. Patterns of accuracy may differ between self-versus social predictions because they serve different functions. Self-predictions may serve to regulate moods, enhance creativity, or facilitate goal attainment, and optimistic biases constrained by discrimination accuracy may prove the most beneficial in satisfying these functions (e.g., Taylor, 1989). Peer predictions, however, may serve to anticipate others' actions as accurately as possible, and unbiased estimates may prove to be the most beneficial in the absence of any other information. However, the actual functional benefits of these patterns of accuracy remains largely unexplored and this issue deserves further study. Whether people are truly benefited by optimistic distortions about the self but unbiased assessments of others remains to be seen (Dunning, 2005).

Regardless of the adaptive consequences of different forms of accuracy in self versus social predictions, our research suggests several practical strategies for those interested in accurately predicting future behavior. A person interested in accurately predicting how a group of people will respond overall to a social event, such as a charity drive or an upcoming election, would be well advised to ask people to predict how others would behave. A person interested in identifying how specific groups of individuals will behave relative to other groups, however, should ask people to predict their own behavior. No person will ever be able to predict the future as accurately as they can report on the present, but being mindful of the two forms of accuracy studied here, and the extent to which self- versus social predictions contain each type of accuracy, will make the future as clear as it can possibly be.

NOTES

1. What we call "discrimination" also has been referred to as both "resolution" (e.g., Brier, 1950; Liberman & Tversky, 1993; Murphy, 1973) and simply "accuracy" (e.g., Ambady, Bernieri, & Richeson, 2000; Gagné & Lydon, 2004; MacDonald & Ross, 1999). The latter term is unfortunate because accuracy in everyday discourse is used to describe both high levels of discrimination and low levels of bias, rather than the precise statistical definitions used here.

2. Our hypotheses required a longitudinal design comparing predictions of self and others to actual behavior and therefore introduced the potential problem that predicting one's behavior may lead people to behave in a manner consistent with their prediction (Greenwald, Carnot, Beach, & Young, 1987; Sherman, 1980). We took two steps to address this influence. First, predictions were made far in advance of actual behavior to diminish the likelihood of contamination. Second, a supplemental study allowed us to investigate directly the extent to which predictions might have influenced behavior in Studies 1 and 2.

One month before the 2000 presidential election, 141 eligible voters in an introductory psychology class were asked to predict whether they would vote. Although 85% predicted they would vote, only 64% reported voting 2 days after the election. An additional 32 eligible voters, who for whatever reason did not provide predictions, also reported whether they voted after the election. Of these, 62% voted in the election, a figure that does not differ statistically from the percentage of people who voted after predicting their behavior, $\chi^2 < 1$.

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Received April 13, 2005

Revision accepted August 25, 2005