Feeling the Future: The Emotional Oracle Effect

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Eight studies reveal an intriguing phenomenon: individuals who have higher trust in their feelings can predict the outcomes of future events better than individuals with lower trust in their feelings. This *emotional oracle effect* was found across a variety of prediction domains, including (*a*) the 2008 US Democratic presidential nomination, (*b*) movie box-office success, (*c*) the winner of *American Idol*, (*d*) the stock market, (*e*) college football, and even (*f*) the weather. It is mostly high trust in feelings that improves prediction accuracy rather than low trust in feelings that impairs it. However, the effect occurs only among individuals who possess sufficient background knowledge about the prediction domain, and it dissipates when the prediction criterion becomes inherently unpredictable. The authors hypothesize that the effect arises because trusting one's feelings encourages access to a "privileged window" into the vast amount of predictive information that people learn, often unconsciously, about their environments.

Will it rain tomorrow? Who will win *American Idol*? How high will the Dow Jones be next week? Who will be our next president? From the mundane to the phenomenal, the ability to predict what will happen in the future is among the most prized of human faculties. Those few who can are amply rewarded—from the judicious traveler who foresaw that it would be raining and packed an umbrella to the savvy investor who anticipated the imminent collapse of the housing market and "exited" before it was too late. Those who cannot, that is most of us, just have to accept the many uncertainties in life. It is because of this reality that entire professional fields—from weather forecasters to Wall Street analysts—are dedicated to forecasting a variety of future events. Given the immense potential rewards but extreme difficulty of predicting the future, it is important to investigate whether certain modes of judgment can improve people's prediction ability.

A large body of work in the clinical-versus-actuarial judgment literature has shown that across a variety of prediction tasks (e.g., university admissions, medical pathology, criminal recidivism), "actuarial" predictions based on statistical models of available data are often more accurate than subjective "clinical" predictions made by judges who are provided with the same data (Dawes 1979; Dawes, Faust, and Meehl 1989; Meehl 1954; Yaniv and Hogarth 1993). For instance, in predicting whether a given patient is neurotic or psychotic, a simple mathematical formula based on the patient's scores on the Minnesota Multiphasic Personality Inventory (MMPI) has been found to be more accurate than clinicians' assessments based on a review of the patient's full MMPI profile (Goldberg 1968). Similarly, in predicting whether potential parole-release candidates are likely to commit future crimes, linear regression models of data from

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the candidates' files tend to be more accurate than the personal assessments of parole officers who reviewed the same files (Carroll et al. 1982). In real life, however, consumers do not have the luxury of calibrated statistical models to help them make everyday predictions. They must therefore rely on their own personal predictions. Are certain modes of personal prediction more accurate than others?

Although research on judgment and decision making has historically focused on elaborate cognitive processes of judgment, a growing body of findings across disciplines suggests that people often rely on their feelings to make a variety of judgments and decisions (Bechara et al. 1997; Pham 2004; Schwarz and Clore 1996; Slovic et al. 2002). For example, consumers often make purchase decisions based on their feelings toward products and services (Pham 1998), evaluate their life satisfaction based on the pleasantness of their momentary feelings (Schwarz and Clore 1983), and assess risk based on feelings of fear and anxiety (Loewenstein et al. 2001). The pervasiveness of reliance on feelings across judgments (Greifeneder, Bless, and Pham 2011) suggests that people may rely on their feelings as well when making predictions about the future. In particular, they may make predictions based on whether certain outcomes "feel right" compared to other possible outcomes: an outcome that "feels right" will be judged as more likely than an outcome that does not. Does such a feeling-based mode of prediction help or hinder people's ability to predict future outcomes?

Centuries of Cartesian thinking have led to a long-standing belief in Western societies that, compared to the reliance on elaborate cognitive processes, which is generally regarded as "rational thinking," the reliance on feelings and emotions in judgments and decisions is mostly harmful (Elster 1999). For example, feelings and emotions are known to bias thoughts in a feeling- and emotion-congruent fashion (Isen et al. 1978; Pham et al. 2001). They also tend to trigger more impatient choices that are often against the person's long-term interests (Loewenstein 1996; Shiv and Fedorikhin 1999). However, recent research suggests that reliance on feelings may also be beneficial, at least under certain conditions and for certain types of judgments (Damasio 1994; Gigerenzer 2007; Pham 2007). For example, in a very influential series of studies, Damasio and his colleagues (Bechara et al. 1994, 1997; Damasio 1994) found that patients with emotional deficits linked to damage in the ventromedial prefrontal cortex performed more poorly in the Iowa Gambling Task, a now classic economic game, than control individuals who were presumably emotionally functional. The reliance on feelings also seems to result in more optimal offers in the classic ultimatum game (Stephen and Pham 2008) and greater post-purchase satisfaction with high-involvement products (Darke, Chattopadhyay, and Ashworth 2006). Applied studies of firefighters and military commanders also suggest an enhancement of professional predictions when based on "gut feelings" (Klein 2004). Therefore, it is possible that a reliance on feelings may improve the accuracy of predictions about future outcomes.

In this article, we report eight studies comparing people who trusted their feelings in judgments and decisions with people who did not trust their feelings in terms of their ability to accurately predict a variety of future events. In contrast with the conventional view that feelings provide a necessarily inferior basis for judgments and decisions compared to analytical processes (Elster 1999; Epstein et al. 1992), our studies show that people who trusted their feelings in judgments and decisions consistently predicted these future events more accurately than people who did not. We name this phenomenon the *emotional oracle effect*. It was observed with (*a*) predictions of the outcome of the 2008 Democratic presidential primary race, (*b*) predictions of future movie success, (*c*) predictions of the winner of the *American Idol* contest, (*d*) predictions of Dow Jones movements, (*e*) predictions of the winning team of a college football game, and even (*f*) predictions of the weather. As will be explained, the effect seemed to emerge regardless of whether the outcome to be predicted resulted from the collective behavior of a large population (studies 1–4), was determined by the performance of a specific set of actors (study 5), or was solely dictated by acts of nature (weather, in studies 6–8). Moreover, this effect held both when people were experimentally induced to trust or not trust their feelings and when their chronic tendency to trust or not trust their feelings was simply measured (see table 1). Furthermore, it appears that it is mostly high trust in feelings that improves prediction accuracy rather than low trust in feelings that impairs it. Two boundary conditions of the emotional oracle effect are identified: (1) this effect is observed only among individuals who possess sufficient background knowledge about the prediction domain; and (2) the effect dissipates when the prediction criterion becomes inherently unpredictable.

We first describe the general approach we used to manipulate participants' trust in their feelings in most of our studies. We then describe four studies that investigate the emotional oracle effect across a variety of prediction domains. Based on the results of these first four studies, we identify two potential theoretical explanations for the phenomenon. Initial tests of these two explanations are provided in the next four studies, which also clarify the boundary conditions of the phenomenon. Although further empirical investigation is needed to validate the precise theoretical explanation for the emotional oracle effect, we elaborate on a plausible explanation in the general discussion, where we discuss other potential boundary conditions of the phenomenon as well. We also discuss the relation of our results to recent work on intuition, including recent findings on the possibility of *psi*-like (i.e., "paranormal") precognition or premonition about the future (Bem 2011).

THE TRUST-IN-FEELINGS MANIPULATION

In most of our studies (1–2, 4–6, 8), participants' trust in their feelings was subtly manipulated using a procedure called the *trust-in-feelings manipulation* (TFM; Avnet 2005; Avnet, Pham, and Stephen, forthcoming; Lee, Amir, and Ariely 2009; Stephen and Pham 2008), which is based on the ease-of-retrieval effect identified by Schwarz and his colleagues (1991).

TABLE 1

SUMMARY OF STUDIES

Study	Prediction context	Prediction horizon	*n*	Trust in feelings	Prediction accuracy measure	High trust in feelings	Low trust in feelings	Effect size (Cohen's *d*)
1	Democratic nomination (2008)	6 months	229	Manipulated	0%–100% correctly predicted winner	71.9%	63.9%	.24
2	Movie box office	3–4 days	171	Manipulated	0%–100% correctly predicted rank order of three movies	47.5%	24.4%	.57
3	*American Idol* (2009)	1–20 hours	104	Measured	0%–100% correctly predicted winner	40.9%	24.2%	.30
4	Dow Jones Index	1 week	135	Manipulated	Absolute difference between predicted and actual level	480.17 points	655.18 points	.36
5	NCAA BCS championship title	2–4 days	306	Manipulated	0%–100% correctly predicted winning team	56.9%	46.8%	.30
6	Weather	2 days	52	Manipulated	0%–100% predicted correct weather condition (out of six options)	47.1%	27.8%	.60
7	Weather	2 days	116	Measured	0%–100% predicted correct weather condition (out of six options)	35.5%	17.1%	.28
8	Weather	2 days	175	Manipulated	0%–100% predicted correct weather condition (out of six options)	53.9%	21.4%	.48

NOTE.—In studies 3 and 7, high- and low-trust-in-feelings reported accuracies are based on a median split. High- and low-trust-in-feelings statistics in study 5 include only respondents who had relevant domain knowledge in college football based on a median split of domain knowledge factor scores, while those in study 8 pertain only to predictions of weather in a participant's own zip code in 2 days.

In the TFM, after receiving an explanation of the distinction between using feelings versus logical reasoning to make judgments and decisions, participants are asked to describe a number of "situations in which you trusted your feelings to make a judgment or a decision and it was the right thing to do." Participants in the high-trust-in-feelings condition are asked to describe two such situations, whereas participants in the low-trust-in-feelings condition are asked to describe 10 such situations. As shown in previous studies (Avnet 2005; Lee et al. 2009; Stephen and Pham 2008), participants in the high-trust-in-feelings condition tend to find it easy to identify two situations in which they were correct in trusting their feelings, and they therefore infer that their feelings are trustworthy. In contrast, participants in the low-trust-in-feelings condition tend to find it difficult to identify 10 similar situations, and they therefore infer that their feelings are not trustworthy (Schwarz et al. 1991). Recent studies further suggest that the TFM does not induce different moods, different levels of task involvement, different levels of confidence about task performance, or different levels of self-awareness across conditions (Avnet et al., forthcoming). Therefore, the results we are about to report cannot be attributed to differences in terms of these four constructs. Moreover, as shall be seen, similar findings are observed even when trust in feelings is simply measured as opposed to manipulated via the TFM.

STUDY 1: PREDICTING THE 2008 DEMOCRATIC PRESIDENTIAL NOMINEE

Study 1 involved predicting the outcome of a major event that was to take place several months later: the 2008 US Democratic presidential nomination. The study was conducted between February 15 and 17, 2008, which was approximately 6 months before the winner of the Democratic primary race became official (at the Democratic National Convention in August 2008). A broadly representative nationwide sample of 229 registered voters (mean age 49.8 years, 69% women) was recruited through an online panel. (We chose a relatively large sample because we expected substantial variability in the population.) Each participant was randomly assigned to either the high-trust-in-feelings or low-trust-in-feelings condition of the TFM. After completing the TFM as part of an ostensibly unrelated study, participants were asked to predict who, between Hillary Clinton and Barack Obama, would win the party nomination. They were also asked to rate their confidence in their predictions on a 1 (very unsure about the winner) to 5 (almost certain about the winner) scale. The amount of time participants took to make their predictions was recorded by the online survey program.

At the time of the study, according to conflicting national polls, the outcome of this race was far from obvious (Nagourney and Hulse 2008; Sweet 2008). For example, a Reuters–Zogby poll conducted between February 13 and 16 predicted that Obama would win (58% for Obama vs. 42% for Clinton), whereas an Associated Press–Ipsos poll conducted between February 7 and 10 predicted that Clinton would win (53% for Clinton vs. 47% for Obama). In addition, the two candidates were virtually tied in terms of number of pledged delegates (with 52% of the delegate votes pledged).

Compared to participants with lower trust in their feelings (63.9%), participants with higher trust in their feelings were marginally more likely to correctly predict that Obama would become the Democratic nominee (71.9%; $Z = 1.84$, $p < .07$). This result held both for registered Democrats ($p = .02$) and for registered Republicans ($p = .09$). However, there was no difference between low-trust-in-feelings and high-trust-in-feelings participants in terms of confidence in their predictions ($M_{\text{high-trust}} = 2.87$, $M_{\text{low-trust}} = 2.88$; $F < 1$); nor was there a difference in the amount of time that participants took to make their predictions across conditions ($M_{\text{high-trust}} = 10.97$ seconds, $M_{\text{low-trust}} = 9.41$ seconds; $F < 1$, $p = .52$). In other words, high trust in feelings appears to increase prediction accuracy without necessarily raising people's subjective confidence in their predictions or affecting the amount of time—and possibly consideration—they take to make their prediction.

It is interesting to compare the aggregate predictions of high- and low-trust-in-feelings participants to those of major prediction markets at the time of the study. Prediction markets (also known as "information markets") are speculative "futures" markets in which participants buy and sell contracts whose payments are linked to the unknown outcome of a future event (e.g., which candidate will win a particular election or which sports team will win a particular game). It has been repeatedly observed that the (aggregate) market prices of these futures contracts are very good predictors of the eventual outcomes of various events (Spann and Skiera 2003; Wolfers and Zitzewitz 2004). This finding is generally interpreted as reflecting the "market-efficiency" or collective wisdom of aggregating the "revealed" expectations of a large number of market participants who are each partially informed and have a financial incentive to be accurate. As illustrated in figure 1, the aggregate predictions of high-trust-in-feelings participants closely matched the predictions of major prediction markets at the time of the study, whereas the predictions of low-trust-in-feelings participants were substantially less accurate. In other words, a high trust in their feelings allowed participants to collectively predict the eventual outcome of the Democratic primary as well as prediction markets, which are highly regarded for their prediction accuracy.

This study provides initial evidence that higher trust in feelings may improve people's ability to predict future outcomes. While the results were not strong statistically, they are interesting in three respects. First, the outcome to be predicted was nontrivial. Second, this outcome was highly uncertain at the time of the study. And third, the prediction involved a fairly long time horizon.

Still, even though this study provided a particularly interesting setting for examining the effects of trust in feelings on the ability to predict future outcomes, three limitations need to be acknowledged. First, the findings were only marginally significant, which raises a concern as to whether the effect is reliable. Second, in this study the prediction horizon was rather long (several months before the event took place), which raises the concern of a possible "history-by-treatment interaction" (Campbell and Stanley 1963). Specifically, high-trust-in-feelings participants may have been more accurate not because of the inherent superiority of the reliance on feelings in predictions, but because of some fortuitous correspondence between the inputs that these participants relied on in this study and the eventual outcome of the election. Had the study been conducted at another point in time (e.g., after Obama received strong negative publicity), high-trust-in-feelings participants may have fared worse in terms of predicting the eventual outcome. Finally, while the results indicate that individuals induced to have higher trust in their feelings may be better able to predict future outcomes than individuals induced to have lower trust in their feelings, it is not clear whether this effect reflects an improvement of predictions among individuals with higher trust in their feelings or an impairment of predictions among individuals with lower trust in their feelings. These issues (and others) are addressed in the remaining studies.

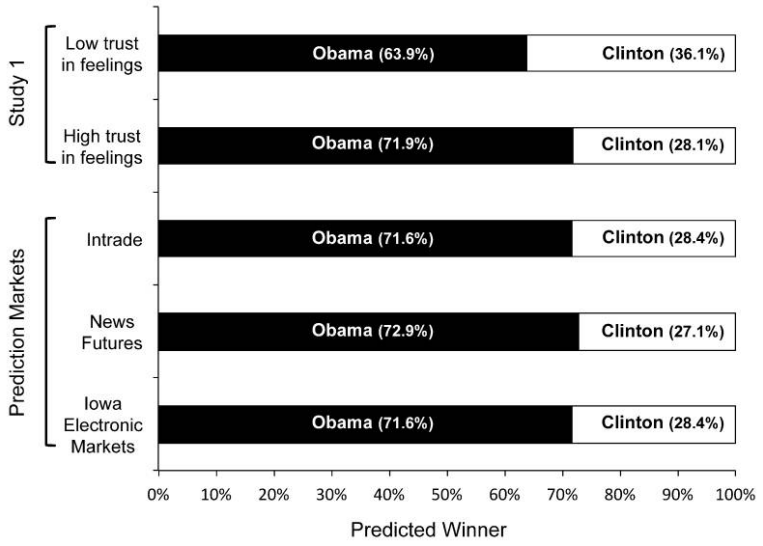
STUDY 2: PREDICTING MOVIE SUCCESSES AT THE BOX OFFICE

To investigate the reliability and generalizeability of the emotional oracle effect, in this study participants were asked to predict the outcome of a different (and more commonplace) event: the success of various movies at the box office. Unlike in study 1, participants made their predictions only a few days before the outcome was revealed, which therefore reduces the possibility of history-by-treatment interactions. Moreover, the design included two baseline conditions, allowing an assessment of whether the effects are driven primarily by an improvement of predictions under high trust in feelings or an impairment of predictions under low trust in feelings.

A total of 171 online-panel participants (mean age 31.7 years, 55% women) were randomly assigned to one of four experimental conditions. The first two conditions were the same low-trust-in-feelings and high-trust-in-feelings conditions of the TFM as in study 1. The other two conditions were baseline conditions. Participants in these baseline conditions were asked to describe either two or 10 past situations in which they had to search for information using Google, which logically should have no effect on participants' trust in their feelings. Next, in an ostensibly unrelated task, participants were given the descriptions of three movies that were to be released nationally on the coming weekend—*Clash of the Titans*, *Why Did I Get Married Too*, and *Last Song*. The description of each movie included the movie's artwork (advertising poster), a brief synopsis, its genre (e.g., comedy), the names of the main cast members, and its MPAA rating (e.g., PG-13). Participants were asked to predict these movies' opening success by rank-ordering their first-weekend box-office sales. The amount of time they took to rank-order the movies was recorded by the online survey program. They were also asked to rate how certain they were of their predictions on a 1 (not at all sure that this will be the actual rank order) to 7 (perfectly sure that this will be the actual rank order) scale, as well as how involved they were in the prediction task by indicating their agreement with four statements (e.g., "I took this prediction task seriously," "I put

FIGURE 1

PREDICTIONS OBSERVED IN STUDY 1 VERSUS MAJOR PREDICTION MARKETS



NOTE.— The predictions of the three prediction markets were those markets' most recent predictions at the time this study was conducted (February 15–17, 2008).

effort into this task"; $\alpha = .91$) on 1 (strongly disagree) to 5 (strongly agree) scales.

Prediction accuracy was operationalized as a simple 0–1 variable indicating whether each participant's predicted rank order matched the movies' actual rank order at the box office. As in study 1, the results indicated a positive effect of trust in feelings on prediction accuracy: participants in the high-trust-in-feelings condition were more likely to predict the correct rank order of the three movies (47.5%) than participants in the low-trust-in-feelings condition (24.4%; $\chi^2 = 4.14$, $p = .04$). Importantly, as illustrated in figure 2, high-trust-in-feelings participants were also more likely to predict the correct rank order of the movies than participants in the two baseline conditions (two Google searches: 26.5%, 10 Google searches: 28.9%; $\chi^2 = 3.74$, $p = .05$, pooling the two baseline conditions). Low-trust-in-feelings participants and participants in the (pooled) two baseline conditions did not significantly differ in terms of prediction accuracy ($\chi^2 = .12$, $p = .74$). Overall, the accuracy of high-trust-in-feelings participants was higher than the accuracy of participants across the other three conditions ($\chi^2 = 4.81$, $p < .03$). This pattern of results suggests that, at least in this study, it was high trust in feelings that improved prediction accuracy rather than low trust in feelings that impaired it.

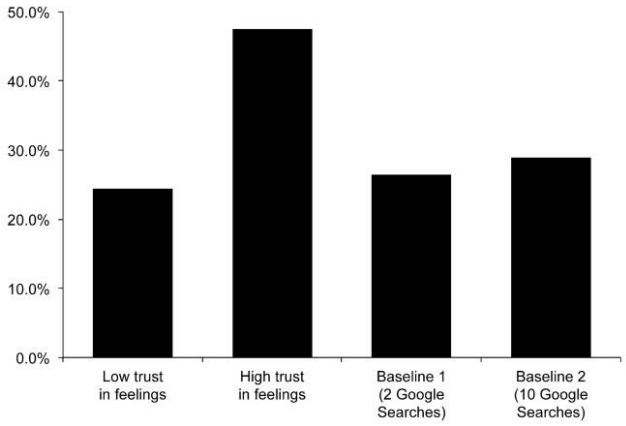
Participants' self-reported involvement ratings indicated no significant difference across conditions ($M_{\text{high-trust}} = 4.68$, $M_{\text{low-trust}} = 4.75$, $M_{\text{2-Google}} = 4.74$, $M_{\text{10-Google}} = 4.69$; $F < 1$). Again, as in study 1, there was also no significant difference in either participants' self-reported confidence in their predictions ($M_{\text{high-trust}} = 5.75$, $M_{\text{low-trust}} = 5.78$, $M_{\text{2-Google}} = 5.27$, $M_{\text{10-Google}} = 5.58$; $F(3, 167) = 1.49$, $p = .22$) or the amount of time (in seconds) they took to make their predictions ($M_{\text{high-trust}} = 35.42$, $M_{\text{low-trust}} = 32.08$, $M_{\text{2-Google}} = 34.83$, $M_{\text{10-Google}} = 32.83$; $F < 1$). The latter result suggests that participants who were induced to trust their feelings when making predictions did not necessarily rely on some immediate, "blink" responses (Gladwell 2005). Had high-trust-in-feelings participants relied on such immediate responses, they should have taken less time to make their predictions, compared to both low-trust-in-feelings participants and those in the baseline conditions.

STUDY 3: PREDICTING THE WINNER OF *AMERICAN IDOL*

The first two studies indicate across two different contexts that people with higher trust in their feelings make more accurate predictions about the outcomes of future events compared to people with lower trust in their feelings. Given that both studies relied on the same method—the TFM—to manipulate trust in feelings, one may wonder whether the results could be due to some peculiarity of the TFM. To address this issue, in study 3, instead of manipulating participants' momentary trust in their feelings using the TFM, we simply measured how much participants trusted their feelings in general when making predictions.

FIGURE 2

PROPORTION OF PARTICIPANTS WHO CORRECTLY PREDICTED RANK ORDER OF MOVIES IN STUDY 2



The outcome to be predicted was the winner of *American Idol* 2009. This popular televised singing competition runs for more than 4 months each season, culminating in a grand finale between the two final contestants. The competition's two finalists' final live performances aired on May 19, 2009. Viewers then voted for the winner in the 2 hours immediately after the show. The winner was determined by this national vote and was announced the next day, on May 20, 2009.

Study participants were 104 members (mean age 33.4 years, 70% women) of a large online panel from 36 different US states who had followed the 2009 season of *American Idol*. Only frequent viewers of the show who had watched the final performances of the two finalists were selected for the study (determined by respondents' answers to two screening questions at the beginning of the online survey). The study was conducted during the 20-hour period between the end of the May 19 episode and the start of the May 20 episode. Participants were asked to predict which of the two finalists (Kris Allen or Adam Lambert) would win. After a series of filler questions, participants were asked to rate the degree to which they agreed with the following two statements on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree): (*a*) "I trust my feelings when making predictions," and (*b*) "I rely on logic and reasoning when predicting the future." These ratings were intended to capture the degree to which participants generally trusted their feelings when making predictions about the future and the degree to which they generally trusted logic and reason when predicting the future, respectively. Participants' ratings on these two scales were weakly correlated ($r = .11$, $p = .27$).

The winner of *American Idol* 2009 was Kris Allen, which was generally unexpected (Berman 2009). Participants' predictions were coded as correct (1) or incorrect (0) and submitted to a logistic regression with two predictors: (*a*) the degree to which participants generally trusted their feelings in predictions and (*b*) the degree to which they relied on logic and reason in predictions. The results showed that the more participants generally trusted their feelings when making predictions, the more likely they were to accurately predict the winner ($\beta = .54$; $\chi^2 = 3.96$, $p < .05$). However, the degree to which participants trusted their logic and reason when making predictions was not significantly related to prediction accuracy ($\beta = .30$; $\chi^2 = 1.61$, $p = .20$).

The fact that participants' general trust in their feelings, which was simply measured here, had effects on prediction accuracy similar to the manipulation of trust in feelings suggests that the emotional oracle phenomenon is due to the effects of trust in feelings in general, as opposed to some peculiarity of the TFM in particular. Moreover, the fact that the effect was observed with an outcome that was widely unexpected suggests that the phenomenon is not limited to outcomes that could—in hindsight—be seen as likely. Finally, the fact that participants' general trust in their logic and reason did not similarly improve prediction accuracy suggests that it is people's trust in their feelings in particular that increases prediction accuracy, not people's general confidence in the basis of their judgments.

Additional results show that neither general trust in feelings ($t < 1$) nor reliance on logic and reason ($t < 1$) was predictive of the amount of time that participants took to make their prediction. This is consistent with the previous studies' results suggesting that trust in feelings improves prediction accuracy for reasons that are independent of the amount of time or effort devoted to the prediction.

STUDY 4: PREDICTING THE STOCK MARKET

In studies 1–3, the outcomes to be predicted—political-election nominee, movie successes, and singing-competition winner—could all be construed as related to popularity. This raises the possibility that the superior ability to predict future

events by people who trust their feelings is limited to events that are driven by sheer popularity. For example, it may be that people who trust their feelings are better able to empathize with the pulse of the broader population of election voters, moviegoers, and singing-competition fans than people who do not trust their feelings. The phenomenon may not hold in other domains that are less popularity-based, where logical modes of prediction might possibly be more accurate. To examine whether the emotional oracle effect would extend to prediction domains where, according to many economists, "rational thinking" should dominate, this study tests the effects of trust in feelings on the ability to predict future movements of the stock market, the alleged bastion of rationality.

In this study, participants were asked to predict future levels of the Dow Jones Industrial Average (hereafter "Dow Jones") stock market index. Participants were 135 students from two US universities who had demonstrated at least some elementary knowledge of the stock market and economics on a three-item quiz (e.g., what GDP is and what a price/earnings ratio means). The study was conducted during two separate periods: (1) at the end of March 2009, at a time when the US economy was very uncertain and the stock market quite volatile, following the financial turmoil of fall 2008, which made predicting the Dow Jones particularly difficult; and (2) in the fall of 2010, when the US economy was on its way toward recovery. (Because the pattern of results was the same across the two periods, the data were pooled in the analyses.)

Participants first completed either the high-trust-in-feelings or low-trust-in-feelings version of the TFM. Next, as part of an ostensibly unrelated study, they were asked to predict what would be the closing level of the Dow Jones 7 days from the day of the study. They were also asked to rate how confident they were of their predictions on a 1 (not at all confident) to 7 (extremely confident) scale. (The amount of time taken to make the predictions was not recorded in this study.) To assist participants with this task, some background information on the stock market and the Dow Jones was provided, including a definition of the Dow Jones, the previous day's closing level, and Dow Jones levels at different historic moments (e.g., the height of the dot-com bubble in 2000 and September 11, 2001). As an incentive, a small prize was promised to the participant with the most accurate prediction.

Prediction accuracy was operationalized as the absolute difference between each participant's predicted Dow Jones level and the actual Dow Jones level on the target day. This absolute difference was subjected to an ANCOVA with trust in feelings (high vs. low) as a single between-subjects factor, controlling for participants' major (economics vs. noneconomics) as a covariate. A main effect of trust in feelings ($F(1, 132) = 4.90$, $p < .03$) again showed that high-trust-in-feelings participants made predictions that were closer to the actual closing level of the Dow Jones ($M = 480.17$ points) than low-trust-in-feelings participants did ($M = 655.18$ points), consistent with the results of the previous studies. Again, as in the earlier studies, there was no difference in prediction confidence between high-trust-in-feelings ($M = 2.96$) and low-trust-in-feelings participants ($M = 2.94$; $F < 1$).

The results thus provide yet another demonstration of the apparent superiority of trust in feelings when predicting future outcomes. The fact that the effect was also observed with predictions of future levels of the stock market is noteworthy in several respects. First, stock market levels—unlike presidential elections, movie successes, and *American Idol* winners—are generally assumed to reflect many more influences than pure popularity. They are assumed to reflect some fundamental economic prospects of the traded companies. Second, many scholars consider stock market levels to be inherently, if not theoretically, unpredictable ("random walk"). Finally, the stock market is a domain where many people—at least many economists—would expect logical reasoning to dominate emotional feelings, if not in actual market behavior, at least in terms of predictions of market behavior. Therefore, it appears that the emotional oracle effect is quite general and not limited to sheer-popularity-based outcomes.

TWO HYPOTHESES ABOUT THE EMOTIONAL ORACLE EFFECT

Given the apparent robustness and generalizability of the emotional oracle effect observed in the first four studies, one obviously wonders, why does this effect arise? While it is beyond the scope of this article to fully investigate the theoretical explanation—something that we leave for future research—we offer two tentative hypotheses, which we attempt to separate in the remaining four studies.

The first hypothesis is that higher trust in one's feelings improves predictions through a process of *social attunement*. In the first four studies, the outcomes to be predicted all reflected aggregate consequences of human behavior. Considering the existing evidence that human behavior is often driven by feelings and emotions (Zajonc 1980), especially in domains such as movies and TV shows, which typically involve experiential motives (Pham 1998), one could argue that the outcomes to be predicted were mostly shaped by people's collective feelings and emotions. To the extent that people tend to be quite similar in terms of their feelings —more so than in terms of logic and reason (Pham et al. 2001)—encouraging forecasters to rely on their feelings may make them more attuned to the collective feelings and therefore aggregate behavior of others. This social-attunement hypothesis would account for the results of study 2, which involved predictions of movie success, and the results of study 3, which involved prediction of a singing-competition winner. It would also account for study 1's results if voting behavior in presidential elections is largely affective (Westen 2007). Finally, if stock market movements are not, as classical economists claim, driven by strictly rational agents but are also driven by collective emotions, the social-attunement hypothesis could account for the results of study 4 as well.

There is, however, another hypothesis: one that could be called the *privileged-window hypothesis*. It is now well accepted that in the course of our daily functioning, we encode a vast amount of information about our environment, most of it unconsciously (Bargh and Chartrand 1999; Hogarth 2005; Lewicki 1986). Because this information is presumably encoded continuously (Dijksterhuis 2004; Hogarth 2005), this cumulative implicit knowledge structure should tend to have a good ecological mapping with a variety of criteria, including meaningful future outcomes (Greifeneder et al. 2011). Given that subjective feelings function in part as meta-summaries of the vast amount of information that we encode consciously or unconsciously about the environment (Koriat and Levy-Sadot 1999), they may provide a privileged window into all we tacitly know about our environment (see also Lieberman 2000). By encouraging a reliance on feelings, a higher trust in feelings may facilitate access to this privileged window, thereby enhancing prediction accuracy over the reliance on logical inputs, which are necessarily more partial in their perspectives (see also Wilson and Schooler 1991).

The next four studies test these two competing hypotheses using two different approaches. First, these studies examine the emotional oracle effect in judgment domains where the outcomes to be predicted are not determined by the collective behavior of a crowd. Should the phenomenon replicate in such settings as well, one would infer that the social-attunement hypothesis is at best insufficient, which would strengthen the relative status of the privileged-window hypothesis. Second, two of these studies examine the degree to which the phenomenon is contingent on the availability of general knowledge about the prediction domain. According to the privileged-window hypothesis, the enhancement of predictive accuracy that trusting one's feelings produces results from an ability to tap into meta-summaries of one's tacit knowledge about the prediction domain. If this explanation is correct, the emotional oracle effect should be restricted to individuals who have sufficient prior domain knowledge.

STUDY 5: PREDICTING THE WINNER OF A FOOTBALL CHAMPIONSHIP

This study tests the effects of trusting one's feelings on the ability to predict the outcome of a prominent sports event: a national football game. The privileged-window hypothesis posits that the extent to which trust in feelings can improve the prediction accuracy of future events should depend on the amount of general knowledge to which one has access about the prediction domain when relying on feelings. To the extent that individuals possess sufficient background knowledge that is pertinent to the specific prediction to be made, trust in feelings should improve prediction accuracy by facilitating access to relevant meta-summaries of this knowledge. On the other hand, if knowledge is limited, then trust in feelings would not improve, and might even impair, individuals' ability to make accurate predictions. Study 5 tests this potential boundary condition of the emotional oracle effect to help tease apart the two main competing explanations for the effect.

In this study, conducted over a 3-day period (January 7–9, 2011), 306 participants (mean age 33.5 years, 68.3% women) from a large online panel in the United States were asked to predict the winner of the National Collegiate Athletic Association (NCAA) Bowl Championship Series (BCS) national championship title held in Glendale, Arizona, on January 10, 2011. (A large sample was selected in order to investigate the interaction between trust in feelings and domain knowledge.) The two competing teams —the Auburn University Tigers and the University of Oregon Fighting Ducks—entered into the championship equally matched and undefeated in the season, with the Harris Interactive Poll favoring the Auburn Tigers, and the Coaches' Poll giving the Oregon Ducks the edge 1 day before the title game (BCS Rankings, January 10, 2011, SportsIllustrated.com). Thus, in addition to examining a potential boundary condition of the emotional oracle effect, this study attempted to replicate the basic effect in yet another prediction domain that involved a highly uncertain outcome, one not driven by popularity.

Participants were randomly assigned to one of three experimental conditions. The first two conditions were the same low-trust-in-feelings and high-trust-in-feelings conditions as in the previous studies. In the third (baseline) condition, participants were asked to describe five past situations in which they had to search for information using Google. Next, in an ostensibly unrelated task, participants were asked to predict the winning team of the championship game. Additionally, they were asked to indicate (*a*) how confident they were that their prediction was correct on a 1 (not at all confident) to 7 (totally sure) scale; (*b*) how much they liked college football in general on a 1 (not at all) to 7 (very much) scale; (*c*) how familiar they were with college football in general on a 1 (not at all) to 7 (very familiar) scale; (*d*) how closely they had followed the current (2010) season of National College Football leading to the championship game on a 1 (not at all) to 7 (very closely) scale; and (*e*) whether they had a favorite team, and if so, which team it was. To objectively evaluate participants' expertise in the current season of college football, we further asked them to complete a 10-question multiple-choice trivia quiz that included questions such as, "which player won the 2010 Heisman trophy?"

To obtain an overall index of participants' level of relevant domain knowledge, we submitted their self-reported liking of college football, self-rated familiarity with football, extent to which they had followed the current season of college football, and total score on the 10-item football knowledge quiz to a principal component analysis with varimax rotation. All four measures (Cronbach's $\alpha = .90$) loaded on a single factor that accounted for 78.3% of the variance, from which we computed a domain knowledge factor score for each participant.

Participants' predictions were coded as correct (1) or in-

correct (0) and submitted to a logistic regression with the following independent variables: dummy variables for both the low-trust-in-feelings and high-trust-in-feelings conditions, participants' domain knowledge factor score, and interactions between each of the two dummy variables and the domain knowledge factor score. The results revealed a significant positive interaction between the high-trust-in-feelings dummy and participants' domain knowledge score ($\beta = .54$; $\chi^2 = 3.71$, $p = .05$) and no significant interaction between the low-trust-in-feelings dummy and participants' domain knowledge factor score ($\beta = .27$; $\chi^2 = .77$, $p = .38$). (Note that six participants reported that they were fans of the two competing teams [three participants per team], and all six predicted that their respective favorite team would win the championship title. Removing these six participants from the data analysis improved the statistical significance of the high-trust-in-feelings by domain-knowledge-score interaction effect slightly to $p = .04$.) As illustrated in figure 3, among participants with an above-median level of domain knowledge, high trust in feelings improved prediction accuracy compared to low trust in feelings and compared to the baseline condition. However, among participants with a below-median level of domain knowledge, high trust in feelings did not improve prediction accuracy. If anything, high trust in feelings resulted in slightly lower accuracy compared to the baseline condition.

Therefore, the results of this study replicate the emotional oracle effect in yet another domain: one where the outcome was determined by the performance of a specific set of actors (the players, the coaches, the referees) rather than by the collective behavior of a broader population. That the effect can be observed in a domain where ability to intuit the collective behavior of a broader population cannot logically help suggests that a social-attunement explanation is at best insufficient. Moreover, the finding that the basic effect was contingent on participants' relevant domain knowledge is consistent with the privileged-window hypothesis: trust in feelings improves prediction accuracy only to the extent that one possesses pertinent tacit knowledge that one's feelings can meta-summarize.

STUDIES 6 AND 7: PREDICTING THE WEATHER

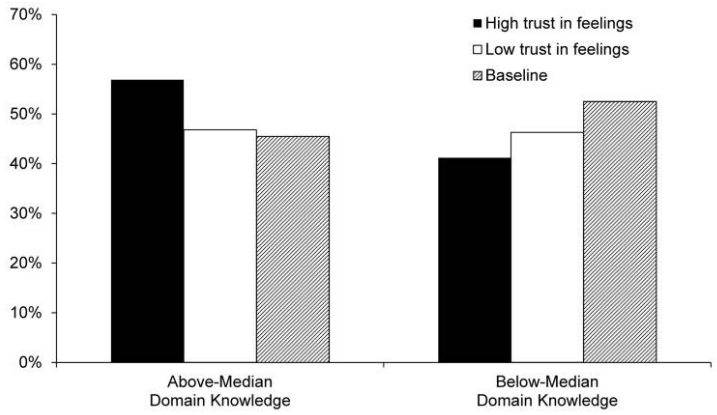
A key distinction between the social-attunement hypothesis and the privileged-window hypothesis is that the former pertains only to outcomes that are the aggregate result of human behavior, whereas the privileged-window hypothesis could account for a broader range of outcomes, that is, any meaningful outcome that is potentially predictable from the vast amount of information that we tacitly acquire about our environment. Therefore, another way to disentangle the two explanations would be to test the phenomenon with predictions of outcomes that cannot be driven by human behavior —for example, acts of nature. In the next two studies, we test whether higher trust in one's feelings improves people's ability to predict the weather.

Study 6, conducted in July 2009, involved 52 members of an online panel (from 24 different US states; mean age 26.7 years, 48% women) who, through a screening question at the beginning of the online survey, declared not having recently checked the weather forecasts for their home areas. After completing the TFM, participants were asked to predict what the weather would be in their zip code in 2 days. Participants expressed their predictions by choosing one of six possible weather conditions: (*a*) sunny/fine/clear, (*b*) partially sunny with some clouds, (*c*) cloudy/overcast, (*d*) rain, (*e*) thunderstorms, and (*f*) windy.

If the predictive value of feelings is limited to human-determined outcomes, as the social-attunement hypothesis

FIGURE 3

PROPORTION OF PARTICIPANTS WHO CORRECTLY PREDICTED THE WINNER OF THE NCAA BCS CHAMPIONSHIP TITLE IN STUDY 5



implies, participants should exhibit similar weather-prediction accuracy across the two TFM conditions. However, if the phenomenon extends to a broader range of outcomes, as the privileged-window hypothesis would suggest, high-trust-in-feelings participants may be more accurate in their weather predictions than low-trust-in-feelings participants. Interestingly, we found that high-trust-in-feelings participants were again significantly more accurate in their predictions (47.1% correct) than low-trust-in-feelings participants (27.8% correct), $Z = 2.51$, $p < .02$. There was no difference between high-trust-in-feelings and low-trust-in-feelings participants with respect to how long they took to make their predictions ($M_{\text{high-trust}} = 34.55$ seconds, $M_{\text{low-trust}} = 35.15$ seconds; $F < 1$). The finding that the predictive value of higher trust in feelings extends even to acts of nature suggests that the social-attunement hypothesis is insufficient, while it supports the more general privileged-window hypothesis.

To test whether higher trust in feelings improves the ability to predict the weather above chance, we compared these accuracy rates to two benchmarks. The first was the probability of making an accurate prediction based on a random choice of one of the six weather conditions (16.7%). The 47.1% accuracy rate among high-trust-in-feelings participants was significantly higher than this first benchmark ($Z = 4.76$, $p < .001$), whereas the 27.8% accuracy rate among low-trust-in-feelings participants was not ($Z = .81$, $p = .21$). The second benchmark was the probability of making an accurate prediction using the following heuristic: projecting the current day's weather as the predicted weather 2 days later, which would have resulted in a 32.7% accuracy rate in this particular study. Compared to this higher benchmark, high-trust-in-feelings participants were still marginally more accurate ($Z = 1.79$, $p = .07$), whereas low-trust-in-feelings participants were not ($Z = .41$, $p = .66$). These benchmark comparisons suggest that higher trust in feelings improves prediction accuracy above chance. This finding is consistent with the findings of studies 2 and 5 that the positive effect of trusting feelings on prediction accuracy is mostly driven by an improvement of predictions among participants with higher trust in their feelings rather than by a deterioration of predictions among participants with lower trust in their feelings.

To assess the reliability of the weather-prediction findings of study 6, this study was conceptually replicated in study 7 with a different operationalization of trust in feelings. As in study 3, instead of manipulating participants' trust in their feelings using the TFM, we simply measured their general trust in feelings when making predictions. Participants were 116 members (mean age 31.2 years, 60% women) of an online panel (from 36 different US states) who reported not having recently checked the weather forecast for their home areas. As in study 6, participants were asked to predict what the weather would be in their zip code in 2 days by choosing one of six weather conditions. Then, after some filler questions, participants rated (*a*) the degree to which they generally rely on feelings when making predictions and (*b*) the degree to which they rely on logic and reason, as in study 3. These two ratings were moderately positively correlated ($r = .32$, $p < .01$).

A logistic regression of participants' prediction accuracy on their ratings of general reliance on feelings and reliance on logic and reason yielded the same pattern of results as that found in study 6. Again, the more participants trusted their feelings in general when making predictions, the more likely they were to accurately predict the weather ($\beta = .50$, $\chi^2 = 3.22$, $p = .07$). For example, whereas participants who scored below the median on general trust in their feelings (less than 4) were only 17.1% accurate, participants who scored at the median or above were 35.5% accurate ($Z = 2.47$, $p < .01$). In contrast, the degree to which participants trusted their logic and reason in general when making predictions was not related to their ability to predict the weather ($\beta = .04$, $\chi^2 = .03$, $p = .87$), suggesting that the effect is specific to people's trust in their feelings in particular, as opposed to people's trust in their judgment in general. Further, neither trust in feelings nor trust in logic and reason was related to the time participants took to make their weather predictions (all $p > .56$).

We compared these accuracy rates to the same benchmarks used in study 6: (*a*) random guessing (with a 16.7% accuracy rate) and (*b*) same-weather-as-today prediction, which this time would have yielded a 14.5% accuracy rate. As in study 6, we found that the high-trust-in-feelings participants (at the median or above) had an accuracy rate significantly higher than both benchmarks ($Z = 4.41$, $p < .001$, compared to random; $Z = 5.21$, $p < .001$, compared to same-weather-as-today). The low-trust-in-feelings participants (below the median) did not differ significantly from either of these benchmarks ($Z = .07$, $p = .94$, compared to random; $Z = .47$, $p = .64$, compared to same-weather-as-today). The finding that high-trust-in-feelings participants performed significantly better than chance is again consistent with the findings of studies 2 and 5 that it is mostly higher trust in feelings that increases prediction accuracy rather than lower trust in feelings that decreases it.

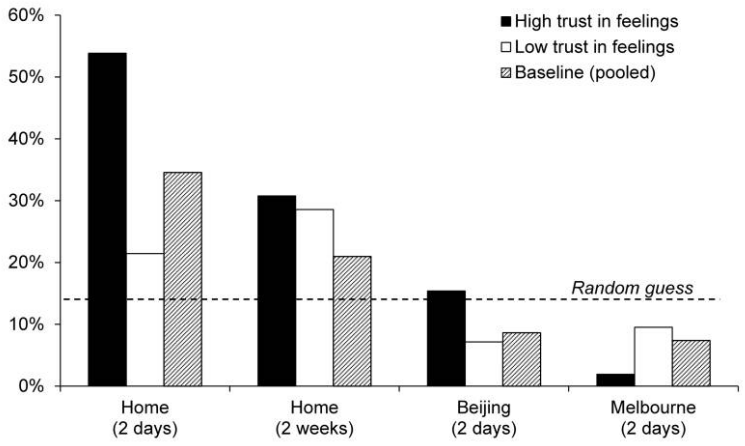
STUDY 8: PREDICTING THE WEATHER NEAR AND FAR

Thus far, the results of studies 5–7 appear to support the privileged-window hypothesis over the social-attunement hypothesis as an explanation of the emotional oracle effect: (*a*) the effect extends to domains where prediction accuracy cannot logically be enhanced by social attunement (a sports outcome and acts of nature); and (*b*) the effect only holds among individuals who possess sufficient general knowledge about the prediction domain.

In this final study, participants were again asked to predict future weather conditions. To further explore the privileged-window hypothesis, the boundary conditions of the emotional oracle effect were tested in two different ways. First, following the results of study 5, which suggest that relevant domain knowledge is required for high trust in feelings to

FIGURE 4

PROPORTION OF PARTICIPANTS WHO CORRECTLY PREDICTED THE VARIOUS WEATHER CONDITIONS IN STUDY 8



enhance prediction accuracy, we tested whether high trust in feelings would also allow individuals to better predict the weather conditions in a foreign location. According to the privileged-window hypothesis, it should not. Whereas it is conceivable that people could learn tacitly the predictors of weather in their own area, it is implausible that this would extend to the predictors of weather in a distant foreign land.

Second, we investigated whether high trust in feelings would allow individuals to better predict the weather conditions not just in 2 days but also in 2 weeks. In weather predictions, an extension of the prediction horizon should logically make the criterion inherently more unpredictable (Kahneman and Klein 2009). If the emotional oracle effect is indeed due to the tapping of meta-summaries of tacitly learned predictive cues, this effect should tend to dissipate when the cues lose their predictive validity (Brunswik 1952). Therefore, according to the privileged-window explanation, the emotional oracle effect should be stronger for predictions of the weather in 2 days than for predictions of the weather in 2 weeks.

Given these objectives, in study 8 we asked participants to predict the weather conditions in their own zip codes across different time horizons and in two foreign locations. Conducted in March 2011, this study involved 175 members of an online panel (from 46 different US states, mean age 34 years, 57% women) who declared not having recently checked the weather forecasts for their home areas as well as in Beijing, China, and Melbourne, Australia. As in study 2, participants were randomly assigned to one of four conditions: in addition to the low-trust-in-feelings and high-trust-in-feelings conditions, two baseline conditions were included wherein participants were asked to describe either two or 10 past situations in which they had to search for information using Google.

After completing the TFM (low-trust-in-feelings and high-trust-in-feelings conditions) or describing the stipulated number of Google-search situations (baseline conditions), participants were asked to predict what the weather would be (*a*) in their zip code in 2 days; (*b*) in their zip code in 2 weeks; (*c*) in Beijing in 2 days; and (*d*) in Melbourne in 2 days. As in the previous two studies, participants indicated their predictions by choosing one of seven possible weather conditions (the same six weather conditions as in the previous studies, plus a "snowing" option). Given that participants in the two baseline conditions did not differ in their responses (as in study 2), we pooled their responses in the subsequent analyses.

Participants' predictions were coded as 1 (correct) or 0 (incorrect) and compared across conditions. Consistent with the results in studies 6 and 7, high-trust-in-feelings participants were significantly more accurate in their 2-day local weather predictions (53.9% correct) than both low-trust-in-feelings participants (21.4% correct; $\chi^2 = 9.66$, $p = .002$) and baseline participants (34.6% correct; $\chi^2 = 9.98$, $p = .002$; see fig. 4). Somewhat unexpectedly (given the previous studies' results), low-trust-in-feelings participants were significantly less accurate in their 2-day local weather predictions than baseline participants ($\chi^2 = 7.81$, $p = .005$). Therefore, in this particular study, there was both an enhancement of prediction under high trust in feelings and a deterioration of prediction under low trust in feelings. We return to this issue in the general discussion. The amount of time participants took to make their predictions was not statistically different across conditions ($M_{\text{high-trust}} = 32.41$ seconds; $M_{\text{low-trust}} = 30.52$ seconds; $M_{\text{baseline}} = 37.11$ seconds; $F(2, 173) = 2.39$, $p = .10$).

By contrast, when the prediction time horizon was increased from 2 days to 2 weeks, there was no significant

difference across conditions in terms of prediction accuracy (low-trust-in-feelings: 28.6% correct, high-trust-in-feelings: 30.8% correct, baseline: 21.0%; all $p > .40$). The amount of time participants took to make their predictions was also not statistically different across conditions ($M_{\text{high-trust}} = 25.41$ seconds; $M_{\text{low-trust}} = 23.49$ seconds; $M_{\text{baseline}} = 27.94$ seconds; $F < 1$).

Although participants differed across conditions in their prediction accuracy of the weather in their respective zip codes in 2 days, they did not differ significantly in their accuracy of predicting the weather in Beijing within the same 2-day time horizon (low-trust: 7.1% correct, high-trust: 15.4% correct, baseline: 8.6%; all $p > .17$). Similarly, participants did not differ significantly in their accuracy of predicting the weather in Melbourne in 2 days (low-trust: 9.5% correct, high-trust: 1.9% correct, baseline: 7.4%; all $p > .16$). Be it for Beijing or for Melbourne, participants took the same amount of time to make their predictions across conditions ($F < 1$).

Together, these results highlight two boundary conditions for the emotional oracle effect. First, while high trust in feelings can enhance the accuracy of predicting future events, this enhancement holds to the extent that one possesses some relevant tacit knowledge about the prediction domain, as posited by the privileged-window hypothesis. Second, the effect tends to dissipate when the target becomes inherently more unpredictable. This second boundary condition seems to suggest that the effect hinges not upon the tapping of any type of knowledge but rather upon the tapping of tacit knowledge that pertains to the mapping of various cues onto the criterion to be predicted. When the criterion becomes inherently more noisy or unpredictable, this knowledge loses its predictive validity (Brunswik 1952). In other words, high trust in feelings does not enhance people's ability to predict any type of future outcome: it enhances only their ability to predict outcomes for which there exists a probabilistic relation between what can be learned about the past and what may happen in the future. As elaborated in the general discussion, this is a critical distinction between the emotional oracle phenomenon and recent findings that imply the existence of *psi*-like precognition or premonition (Bem 2011).

GENERAL DISCUSSION

Feeling the Future

The ability to accurately predict future events has enormous potential value for individuals and institutions alike. Not surprisingly, various professional fields—market research firms, Wall Street analysts, intelligence analysts, to name a few—devote massive amounts of resources to this endeavor (often with mixed success). Short of having similar access to resources, how are we supposed to know what the future holds for us, whether it is the price of orange juice next week, the length of the lines at the supermarket, or how quickly our house will sell? Although most theorists would suggest that we ought to rely on logic and reason to make such predictions, it appears that more intuitive, feeling-based processes may in fact lead to more accurate predictions.

Across eight studies involving more than 1,250 participants, we found that individuals who have higher trust in their feelings are better able to predict the outcome of a variety of future events than individuals who have lower trust in their feelings. This effect was observed whether the outcome to be predicted was the winner of a presidential primary (study 1), movies' successes at the box office (study 2), the winner of a singing competition (study 3), movements of the Dow Jones (study 4), the winner of a football championship game (study 5), or even the weather (studies 6–8). The effect emerged regardless of whether the outcome to be predicted resulted from the collective behavior of a large population (studies 1–4), was determined by the performance of a specific set of actors (study 5), or was solely dictated by acts of nature (weather in studies 6–8). Moreover, this effect was observed both when participants were experimentally induced to trust or not trust their feelings and when their chronic tendency to trust or not trust their feelings was simply measured. The fact that this effect was observed (*a*) in eight different studies (plus two others that are not included in the present version of the article), (*b*) with three conceptually distinct types of outcomes, and (*c*) with two different operationalizations of people's trust in their feelings suggests that the "emotional oracle" phenomenon is both reliable and generalizable (see table 1).

An important question is whether this phenomenon is due to an enhancement of prediction accuracy among those who trust their feelings or rather a decrease in prediction accuracy among those who do not. This question was examined directly in studies 2 (movies), 5 (NCAA football), and 8 (weather), which included baseline conditions. In studies 2 and 5, the effect was exclusively driven by an enhancement of prediction accuracy under high trust in feelings (see figs. 2 and 3). In study 8, the effect was driven both by an enhancement of prediction accuracy under high trust in feelings and, to a lesser extent, a deterioration of prediction accuracy under low trust in feelings. Pooling the results across the three studies ($N = 499$; including only participants with above-median domain knowledge in study 5), prediction accuracies were 53.2% under high trust in feelings, 31.9% under low trust in feelings, and 34.4% under baseline conditions. Meta-analytic comparisons indicate a significant difference between high-trust-in-feelings and baseline conditions ($t = 3.20$, $p < .002$) but no significant difference between low-trust-in-feelings and baseline conditions ($t = -.79$, $p = .43$). Therefore, it appears that the phenomenon is mostly due to an enhancement of predictions under higher trust in feelings rather than a deterioration of predictions under lower trust in feelings, although the latter may sometimes be observed as well (as it was in study 8).

The Privileged-Window Hypothesis

Why does this phenomenon occur? Although our studies do not directly test the underlying process explanation, the overall pattern of findings allows us to narrow down the set

of possibilities. One could argue that the effect arose simply because those who trusted their feelings took the various prediction tasks more seriously. This differential-involvement explanation can be ruled out. In none of the studies was there any observable difference in terms of amount of time spent on the prediction task, self-reported involvement, or prediction confidence across conditions.

A more viable explanation—at least for the first four studies—is a process of social attunement. Given that (*a*) many behaviors are driven by feelings and emotions (Zajonc 1980) and (*b*) feelings and emotions are, to a large extent, socially shared (Pham et al. 2001), it is possible that people who trust their feelings are better able to attune themselves to the collective sentiments of the broader population and thereby predict various outcomes that eventually rest on the aggregate behavior of the population. This explanation could clearly account for the findings of the first three studies (presidential nomination, movie success, and *American Idol*), and it could also account for the Dow Jones study's findings if stock market movements are seen as no more than the aggregate behavior of a potentially emotional crowd. However, this explanation would not account for the findings of study 5, where the outcome—the winner of a football game—was not determined by the aggregate behavior of a broader population but by the competitive performance of a particular set of actors (the teams and the referees). The explanation is even less plausible for the findings of the three weather studies, where the outcome was not determined by human behavior at all, but by acts of nature. This leads us to advance a third, broader explanation.

There is growing theoretical agreement that rather than being subjective and incomplete sources of information, feelings instead summarize large amounts of information that we acquire, consciously and unconsciously, about the world around us (Clore and Parrott 1994; Damasio 1994; Greifeneder et al. 2011; Koriat and Levy-Sadot 1999). Because this information is presumably encoded continuously in the background of our conscious attention (Dijksterhuis 2004; Hogarth 2005; Lieberman 2000), the tacit knowledge that we accumulate about the world around us should tend to have a good ecological mapping with a variety of meaningful criteria (Gigerenzer 2007). As meta-summaries of this accumulated knowledge, feelings may thus provide a privileged window into all we tacitly know about the environment around us (Greifeneder et al. 2011). Just as grammatical structures that are consistent or inconsistent with our past experience of a language tend to "feel right" or "feel wrong" (Topolinsky and Strack 2009), contemplated futures that are compatible with all the knowledge we have accumulated should tend to "feel right," and those that are incompatible should tend to "feel wrong." This process should tend to outperform a more analytical form of reasoning in predictions because of the fact that feelings tap into all we know about our environment, whereas reason-based predictions may encourage a more selective reliance on inputs and rationales that may seem logical but have in fact limited predictive validity (see also Wilson et al. 1993; Wilson and Schooler 1991). In other words, the predictive validity of feelings observed in our studies may lie in their inherent aggregation of large amounts of implicitly learned, outcome-relevant knowledge. In this respect, it may not be a total coincidence that in study 1 high-trust-in-feelings participants closely reproduced the aggregate predictions of major prediction markets (see fig. 1). After all, prediction markets also aggregate outcome-relevant public knowledge; but whereas subjective feelings aggregate tacit knowledge within the individual, prediction markets aggregate public knowledge across individuals.

Three aspects of our results seem consistent with this privileged-window explanation. First, the fact that high trust in feelings increases the ability to predict outcomes that result from the aggregate behavior of large populations as well as the outcome of a competitive sports event and the weather suggests an ability to extract a very broad range of predictive information when trusting one's feelings. In fact, the enhancement of judgment accuracy under higher trust in feelings need not be limited to predictions of future outcomes. According to the privileged-window hypothesis, this enhancement should extend to any judgment for which the overall pattern of information that we tacitly accumulate about the environment is diagnostic. For example, higher trust in feelings has also been found to enhance people's ability to intuit the optimal range of offers to make in the classic ultimatum game: offers that are favorable to the proposer yet are still likely to be accepted by the responder (Stephen and Pham 2008). Future research may identify similar effects in other judgment domains.

The above observation does not mean that high trust in feelings will enhance the ability to predict any type of outcome. In study 8, high trust in feelings increased the ability to predict the local weather in 2 days but not in 2 weeks. In other words, the phenomenon tends to dissipate when the criterion becomes inherently unpredictable. This second aspect of our findings suggests that the phenomenon is restricted to situations where there exists a probabilistic relation between what can be learned about the past and what may happen in the future, which is consistent with a privileged-window explanation. Interestingly, the finding that high trust in feelings does not appear to increase the ability to predict events that are inherently unpredictable seems to exclude the possibility of a *psi*-like explanation of the effect—a point that differentiates our results from recent work by Bem (2011), as discussed below.

A third aspect of the results that is consistent with a privileged-window explanation is the finding that the effect holds only when individuals have sufficient domain knowledge regarding the prediction at hand. When people's domain knowledge is insufficient, the effect disappears. In study 5, only participants who knew enough about college football were better able to predict the winner of the championship game if they trusted their feelings; those who knew relatively little about college football were not helped by a higher trust in their feelings. Similarly, in study 8, high trust in feelings only helped predict the local weather; it did not help predict the weather in a distant foreign location for which participants presumably had little relevant knowl-

edge. The phenomenon therefore appears to be contingent on people's ability to tap into what they tacitly know about the prediction to be made—a notion that is consistent with the privileged-window hypothesis.

Two types of knowledge should be distinguished, however. One type of knowledge is a general domain knowledge that one continuously acquires over time, either consciously or unconsciously. Through continuous learning and updating, this general domain knowledge gradually assembles various predictive cues that are relevant to the prediction to be made. This is the type of knowledge that, we believe, facilitates the emergence of an emotional oracle effect. A second type of knowledge is a narrower form of knowledge about particular objects involved in the prediction (e.g., having read Obama's biography or having seen the trailer of a soon-to-be-released movie). In general, this second type of knowledge should not facilitate the emergence of an emotional oracle effect, and it may in fact attenuate the effect, because this type of knowledge would encourage the reliance on a narrow set of object-specific cues that need not have strong predictive validity. In two additional studies not reported here ($N = 66$ and $N = 42$), we replicated the basic effect with predictions of movie box-office success (similar to study 2). In these particular studies, however, we found that familiarity with or intention to watch any of the movies significantly mitigated the effect. This is presumably because these idiosyncratic factors need not be diagnostic of the movies' overall success. According to Hogarth (2005), reliance on such local cues is the primary source of bias in intuitive judgments.

Relation to Other Research

Emotional Oracle Effect versus Epstein (2003). In an influential series of articles and chapters, Epstein (2003; Epstein and Pacini 1999) posited the existence of two separate judgment systems: the rational system and the experiential system (see Novak and Hoffman [2009] for an extension to consumer research). Whereas the rational system is characterized by analytical processes, logical operations, conscious appraisal, abstract symbols, learning by rules, and slower processing, the experiential system is characterized by holistic processes, emotions, subtle "vibes," concrete images, learning by association, and rapid processing. In many respects, the prediction process encouraged by a high trust in feelings resembles the type of experiential processing described by Epstein. Specifically, we believe that higher trust in feelings encourages a judgment process that is indeed more holistic, affect-rich, experienced as "vibes," and largely associative, tapping into tacitly learned experiences. However, we do not believe and did not find that the judgment process induced by higher trust in feelings is necessarily faster. In our studies, participants with high trust in their feelings consistently took about the same amount of time to make their predictions as participants with lower trust in feelings. The process used to make these feeling-based predictions is thus more than an immediate "gut" or "blink" response (Gladwell 2005). Instead, it is a somewhat reflective process, similar to typical feeling-as-information inferences (Pham 2004). Aside from this distinction in terms of implied judgment processes, our research departs from Epstein's research in two major respects. First, much of Epstein's empirical work has focused on documenting "irrational" biases that result from experiential processing (e.g., Denes-Raj and Epstein 1994; Epstein et al. 1992). In contrast, our studies uncover an important benefit of trusting one's feelings in predictions about the future—a benefit that parallels other ecological benefits of feeling-based judgments (Gigerenzer 2007; Pham 2007; Stephen and Pham 2008). Moreover, to the best of our knowledge, none of Epstein's work has examined the effects of experiential-like processing on ability to predict the future. This type of judgment is very important and has unique properties that clearly set it apart from the types of judgments examined by Epstein and his colleagues (e.g., choice of jelly beans).

Emotional Oracle Effect versus Hogarth (2005). Similarly, Hogarth (2005) recently distinguished a "deliberate-analytic" system of judgment from a "tacit-intuitive" system. This author's conceptualization of the latter maps fairly well onto our conceptualization of how people come to "feel the future." Specifically, Hogarth conceptualizes intuitive judgments as capitalizing on tacit knowledge that one has learned, often preconsciously, about the environment, which is consistent with the privileged-window explanation. In addition, he predicts that a more intuitive form of judgment will tend to outperform a more analytical form of judgment in domains characterized by a high degree of analytical complexity, where it is difficult to identify any single formal rule that has high predictive validity. This is also consistent with our belief that the emotional oracle effect is more likely to emerge in domains that are complex and where no individual cue alone would have high predictive validity (e.g., stock market movements, presidential elections).

However, an important distinction between the two conceptualizations is that Hogarth discusses tacit judgments mostly as "bottom-up" processes that are triggered by specific stimulus objects (e.g., encountering a person with an odd appearance, triggering a subtle feeling of discomfort that results in a tacit judgment that the person is not to be trusted). In contrast, we conceptualize the effects of higher trust in feelings as more "top-down": people who trust their feelings at a meta-cognitive level are encouraged to rely on a particular form of input (what "feels right") to guide their judgments. In addition, according to Hogarth, tacit judgments tend to be more partial and more susceptible to biases because they emphasize specific judgment cues such as "representativeness" or "availability." In contrast, in our conceptualization, feelings operate as meta-summaries of the entire knowledge that one has acquired about the issue in question. As such, we see the information provided by these feelings as more comprehensive than partial. Finally, while Hogarth discusses intuitive judgment across a variety of contexts, his discussion does not include predictions about the future.

Emotional Oracle Effect versus Bem (2011). In a recent and widely publicized (and debated) article, Bem (2011) reported evidence suggesting that people may be capable of (*psi-*

like) "precognition (conscious cognitive awareness) and premonition (affective apprehension) of a future event that could not otherwise be anticipated through any known inferential process" (407). In nine controlled experiments, Bem (2011) found that participants' responses to various standard psychological treatments (e.g., exposure to a prime) shifted in the direction of the treatment before the actual treatment was randomly administered. For example, in one study, participants were asked to categorize pictures as pleasant or unpleasant as quickly as possible. After each response was recorded, participants were then randomly assigned to be exposed to a prime word that was either affectively consistent or affectively inconsistent with the picture to which participants just responded. Even though the priming word was randomly selected and presented after participants had already responded to the picture, participants tended to respond significantly faster to the picture if the about-to-be-assigned priming word was affectively consistent with the picture than if it was affectively inconsistent. In other words, the subsequently presented word prime appeared to have a time-reversed priming effect on the preceding picture response. In another study, participants were found to have better recall for words that they were subsequently assigned to rehearse compared to words that they were not assigned to rehearse. As the author notes, there are no known physical, biological, or mainstream psychological explanations for such patterns of retroactive causation, suggesting some *psi*-like explanation.

We leave it to the natural process of cumulative scientific development to affirm or disprove Bem's extraordinary results, on which we prefer to withhold judgment at this point. However, given that both sets of findings appear to document an ability to "feel the future," it is important to point out the distinctions between the two sets of findings and their assumed explanations. A first distinction between the two programs of studies lies in the time frame in which the future is defined. In the Bem studies, the "future" typically occurs only seconds, or even fractions of a second, after participants appear to be able to intuit it. In our studies, the time frame is considerably longer, with the outcome occurring several hours to several days—and in study 1 several months—after the predictions were made. A second important distinction is that in Bem's studies participants were not explicitly asked to predict the subsequent event. Instead, their ability to intuit the future is implicitly revealed by their pattern of responses on various nonprediction tasks. In contrast, in our studies, participants were explicitly asked to predict the various outcomes and consciously assess which outcome was more likely. A third distinction is that for some unclear reason, Bem appears to find stronger effects when the stimulus to be foreseen is emotionally rich (e.g., an erotic or gruesome picture) than when it is emotionally poorer (a banal picture). While many outcomes to be predicted in our studies could be seen as having a rich affective quality (e.g., elections, singing competition winner, football game winner), this was not really true for the weather. Therefore, it is possible that what matters in these "feeling-the-future" effects (ours and possibly Bem's) is not that the stimuli or events are emotionally rich per se, but rather that they are relevant for the self. This redefined boundary condition would generally be consistent with a privileged-window explanation in that each person's window presumably summarizes the world for the self.

The most important distinction between our findings and Bem's findings, however, lies in the predictability of the events to be foreseen. By design, Bem focused on events that were statistically unpredictable: the outcomes of strictly random processes (e.g., stimuli selection from random number generators). In our studies, the outcomes to be predicted, while uncertain, were by no means purely random. In other words, the future, while unknown, was conceivably knowable. Therefore, a fundamental distinction between Bem's precognition and premonition phenomenon and our emotional oracle effect is that, while the former could conceivably predict, for example, the outcome of a roulette game, the latter (unfortunately or fortunately) cannot. Although we did not explicitly test this particular prediction in our studies, recall that in study 8 when the outcome (the weather) was made inherently unpredictable, that is, more "roulette-like" by extending the prediction horizon, the effect disappeared. This critical distinction raises a fundamental conceptual distinction between the two phenomena. Whereas Bem conceives of his findings as reflecting an extraordinary retroactive injection of the future into the present, we conceive of ours as reflecting a more mundane projection of our tacitly learned past onto the future.

To conclude, our findings add to a growing body of findings suggesting that there is more to human rationality than reason-based judgments. While cognitive reasoning tends to promote a logical form of rationality, feelings and emotions tend to support a more ecological form of rationality (Pham 2007). The future, for instance, need not be totally indecipherable if we simply learn to trust our feelings.

REFERENCES

Avnet, Tamar (2005), "To Trust or Not to Trust One's Feelings: The Metacognitive Processing of Feelings," PhD diss., marketing division, Columbia University.

Avnet, Tamar, Michel Tuan Pham, and Andrew T. Stephen (forthcoming), "Consumers' Trust in Feelings as Information," *Journal of Consumer Research*.

Bargh, John A., and Tanya L. Chartrand (1999), "The Unbearable Automaticity of Being," *American Psychologist*, 54 (7), 462–79.

Bechara, Antoine, Antonio R. Damasio, Hanna Damasio, and Steven W. Anderson (1994), "Insensitivity to Future Consequences following Damage to Human Prefrontal Cortex," *Cognition*, 50 (1–3), 7–15.

Bechara, Antoine, Hanna Damasio, Daniel Tranel, and Antonio R. Damasio (1997), "Deciding Advantageously before Knowing the Advantageous Strategy," *Science*, 275 (5304), 1293–35.

Bem, Daryl (2011), "Feeling the Future: Experimental Evidence for Anomalous Retroactive Influences on Cognition and Affect," *Journal of Personality and Social Psychology*, 100 (3), 407–25.

Berman, Craig (2009), "'Idol' Shocker: Kris Takes Season 8 Crown," *MSNBC*, May 21, http://www.msnbc.msn.com/id/30856188/.

Brunswik, Egon (1952), *The Conceptual Framework of Psychology*, Chicago: University of Chicago Press.

Campbell, Donald T., and Julian C. Stanley (1963), *Experimental*

and Quasi-Experimentation Designs for Research, Boston: Houghton Mifflin.

Carroll, John S., Richard L. Wiener, Dan Coates, Jolene Galegher, and James J. Alibrio (1982), "Evaluation, Diagnosis, and Prediction in Parole Decision Making," *Law and Society Review*, 17 (1), 199–228.

Clore, Gerald L., and W. Gerrod Parrott (1994), "Cognitive Feelings and Metacognitive Judgments," *European Journal of Social Psychology*, 24 (1), 101–15.

Damasio, Antonio R. (1994), *Descartes' Error: Emotion, Reason, and the Human Brain*, New York: Putnam.

Darke, Peter R., Amitava Chattopadhyay, and Laurence Ashworth (2006), "The Importance and Functional Significance of Affective Cues in Consumer Choice," *Journal of Consumer Research*, 33 (3), 322–28.

Dawes, Robyn M. (1979), "The Robust Beauty of Improper Linear Models in Decision Making," *American Psychologist*, 34 (7), 571–82.

Dawes, Robyn M., David Faust, and Paul E. Meehl (1989), "Clinical versus Actuarial Judgment," *Science*, 243 (4899), 1668–74.

Denes-Raj, Veronika, and Seymour Epstein (1994), "Conflict between Intuitive and Rational Processing: When People Behave against Their Better Judgment," *Journal of Personality and Social Psychology*, 66 (5), 819–29.

Dijksterhuis, Ap (2004), "Think Different: The Merits of Unconscious Thought in Preference Development and Decision Making," *Journal of Personality and Social Psychology*, 87 (5), 586–98.

Elster, Jon (1999), *Alchemies of the Mind: Rationality and the Emotions*, Cambridge: Cambridge University Press.

Epstein, Seymour (2003), "Cognitive-Experiential Self-Theory of Personality," in *Handbook of Psychology*, Vol. 5, *Personality and Social Psychology*, ed. Theodore Millon, Melvin J. Lerner, and Irving B. Weiner, Hoboken, NJ: Wiley & Sons, 159–84.

Epstein, Seymour, Abigail Lipson, Carolyn Holstein, and Eileen Huh (1992), "Irrational Reactions to Negative Outcomes: Evidence for Two Conceptual Systems," *Journal of Personality and Social Psychology*, 62 (2), 328–39.

Epstein, Seymour, and Rosemary Pacini (1999), "Some Basic Issues Regarding Dual-Process Theories from the Perspective of Cognitive-Experiential Self-Theory," in *Dual-Process Theories in Social Psychology*, ed. Shelly Chaiken and Yaacov Trope, New York: Guilford, 462–82.

Gigerenzer, Gerd (2007), *Gut Feelings: The Intelligence of the Unconscious*, New York: Viking Penguin.

Gladwell, Malcolm (2005), *Blink: The Power of Thinking without Thinking*, New York: Little, Brown.

Goldberg, Lewis R. (1968), "Simple Models or Simple Processes? Some Research on Clinical Judgments," *American Psychologist*, 23 (7), 483–96.

Greifeneder, Reiner, Herbert Bless, and Michel Tuan Pham (2011), "When Do People Rely on Affective and Cognitive Feelings in Judgment? A Review," *Personality and Social Psychology Review*, 15 (2), 107–41.

Hogarth, Robin M. (2005), "Deciding Analytically or Trusting Your Intuition? The Advantages and Disadvantages of Analytic and Intuitive Thought," in *The Routines of Decision Making*, ed. Tilmann Betsch and Susanne Haberstroh, Mahwah, NJ: Erlbaum, 67–82.

Isen, Alice M., Thomas E. Shalker, Margaret Clark, and Karp Lynn (1978), "Affect, Accessibility of Material in Memory, and Behavior: A Cognitive Loop?" *Journal of Personality and Social Psychology*, 36 (1), 1–12.

Kahneman, Daniel, and Gary Klein (2009), "Conditions for Intuitive Expertise: A Failure to Disagree," *American Psychologist*, 64 (6), 515–26.

Klein, Gary (2004), *The Power of Intuition: How to Use Your Gut Feelings to Make Better Decisions at Work*, New York: Crown Business.

Koriat, Asher, and Ravit Levy-Sadot (1999), "Processes Underlying Metacognitive Judgments: Information-Based and Experience-Based Monitoring of One's Own Knowledge," in *Dual-Process Theories in Social Psychology*, ed. Shelly Chaiken and Yaacov Trope, New York: Guilford, 483–502.

Lee, Leonard, On Amir, and Dan Ariely (2009), "In Search of Homo Economicus: Cognitive Noise and the Role of Emotion in Preference Consistency," *Journal of Consumer Research*, 36 (2), 173–87.

Lewicki, Pawel (1986), *Nonconscious Social Information Processing*, Orlando, FL: Academic Press.

Lieberman, Matthew D. (2000), "Intuition: A Social Cognitive Neuroscience Approach," *Psychological Bulletin*, 126 (1), 109–37.

Loewenstein, George (1996), "Out of Control: Visceral Influences on Behavior," *Organizational Behavior and Human Decision Processes*, 65 (3), 272–92.

Loewenstein, George, Elke U. Weber, Christopher K. Hsee, and Ned Welch (2001), "Risk as Feelings," *Psychological Bulletin*, 127 (2), 267–86.

Meehl, Paul E. (1954), *Clinical versus Statistical Prediction: A Theoretical Analysis and a Review of the Evidence*, Minneapolis: University of Minnesota Press.

Nagourney, Adam, and Carl Hulse (2008), "Neck and Neck, Democrats Woo Superdelegates," *New York Times*, February 10, http://www.nytimes.com/2008/02/10/us/politics/10superdelegates.html?ref=politics.

Novak, Thomas P., and Donna L. Hoffman (2009), "The Fit of Thinking Style and Situation: New Measures of Situation-Specific Experiential and Rational Cognition," *Journal of Consumer Research*, 36 (1), 56–72.

Pham, Michel Tuan (1998), "Representativeness, Relevance, and the Use of Feelings in Decision Making," *Journal of Consumer Research*, 25 (2), 144–59.

——— (2004), "The Logic of Feeling," *Journal of Consumer Psychology*, 14 (4), 360–69.

——— (2007), "Emotion and Rationality: A Critical Review and Interpretation of Empirical Evidence," *Review of General Psychology*, 11 (2), 155–78.

Pham, Michel Tuan, Joel B. Cohen, John W. Pracejus, and G. David Hughes (2001), "Affect Monitoring and the Primacy of Feelings in Judgment," *Journal of Consumer Research*, 28 (2), 167–88.

Schwarz, Norbert, Herbert Bless, Fritz Strack, Gisela Klumpp, Helga Rittenauer-Schatka, and Annette Simons (1991), "Ease of Retrieval as Information: Another Look at the Availability Heuristic," *Journal of Personality and Social Psychology*, 61 (2), 195–202.

Schwarz, Norbert, and Gerald L. Clore (1983), "Mood, Misattribution, and Judgments of Well-Being: Informative and Directive Functions of Affective States," *Journal of Personality and Social Psychology*, 45 (3), 513–23.

——— (1996), "Feelings and Phenomenal Experiences," in *Social Psychology: Handbook of Basic Principles*, ed. E. Tory Higgins and Arie W. Kruglanski, New York: Guilford, 433–65.

Shiv, Baba, and Alexander Fedorikhin (1999), "Heart and Mind in Conflict: The Interplay of Affect and Cognition in Con-

sumer Decision Making," *Journal of Consumer Research*, 26 (3), 278–92.

Slovic, Paul, Melissa Finucane, Ellen Peters, and Donald G. MacGregor (2002), "The Affect Heuristic," in *Heuristics and Biases: The Psychology of Intuitive Judgment*, ed. Thomas Gilovich, Dale Griffin, and Daniel Kahneman, New York: Cambridge University Press, 397–420.

Spann, Martin, and Bernd Skiera (2003), "Internet-Based Virtual Stock Markets for Business Forecasting," *Management Science*, 49 (1), 1310–26.

Stephen, Andrew T., and Michel Tuan Pham (2008), "On Feelings as a Heuristic for Making Offers in Ultimatum Negotiations," *Psychological Science*, 19 (10), 1051–58.

Sweet, Lynn (2008), "Obama, Clinton Neck and Neck," *Chicago Sun-Times*, February 6, http://www.suntimes.com/news/sweet/779277,CST-NWS-sweet06.article.

Topolinski, Sasha, and Fritz Strack (2009), "The Architecture of Intuition: Fluency and Affect Determine Intuitive Judgments of Semantic and Visual Coherence and Judgments of Grammaticality in Artificial Grammar Learning," *Journal of Experimental Psychology—General*, 138 (1): 39–63.

Westen, Drew (2007), *The Political Brain: The Role of Emotion in Deciding the Fate of the Nation*, New York: Public Affairs.

Wilson, Timothy D., Douglas J. Lisle, Jonathan W. Schooler, Sara D. Hodges, et al. (1993), "Introspecting about Reasons Can Reduce Post-choice Satisfaction," *Personality and Social Psychology Bulletin*, 19 (3), 331–39.

Wilson, Timothy D., and Jonathan W. Schooler (1991), "Thinking Too Much: Introspection Can Reduce the Quality of Preferences and Decisions," *Journal of Personality and Social Psychology*, 60 (2), 181–92.

Wolfers, Justin, and Eric Zitzewitz (2004), "Prediction Markets," *Journal of Economic Perspectives*, 18 (2), 107–26.

Yaniv, Ilan, and Robin M. Hogarth (1993), "Judgmental versus Statistical Prediction," *Psychological Science*, 4 (1), 58–62.

Zajonc, Robert B. (1980), "Feeling and Thinking: Preferences Need No Inferences," *American Psychologist*, 35 (2), 151–75.