METACOGNITIVE EXPERIENCES AND THE INTRICACIES OF SETTING PEOPLE STRAIGHT: IMPLICATIONS FOR DEBIASING AND PUBLIC INFORMATION CAMPAIGNS

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I. Introduction

Decades of psychological research documented that human judgment often falls short of normative ideals. Social and cognitive psychologists discovered an ever increasing number of systematic biases and illustrated their pervasive role in judgment and decision making (for reviews see Gilovich, Griffin, & Kahneman, 2002; Kahneman, Slovic, & Tversky, 1982; Kerr, MacCoun, & Kramer, 1996; Nisbett & Ross, 1980; Pohl, 2005). Similarly, researchers in applied fields, like health and consumer behavior, identified numerous erroneous beliefs that impair good decisions and prevent people from doing what would be in their best interest (Christensen, Moran, & Wiebe, 1999; Webley, Burgoyne, Lea, & Young, 2001). In both cases, the remedy seems obvious: If people only thought enough about the issues at hand, considered all the relevant information and employed proper reasoning strategies, their decision making would surely improve. This assumption is at the heart of numerous strategies that attempt to debias human judgment (for a review see Larrick, 2004); it is likewise central to public information campaigns designed to dispel erroneous beliefs and to replace them with more accurate information (for a review see Rice & Atkin, 2001).

Unfortunately, these attempts to improve decision making often fail to achieve their goals, even under conditions assumed to foster rational judgment.

127

Models of rational choice assume that people will expend more time and effort on getting it right when the stakes are high; hence, providing proper incentives should improve judgment. Empirically, it rarely does and Camerer and Hogarth (1999, p. 33) concluded after an extensive review that ''there is no replicated study in which a theory of rational choice was rejected at low stakes in favor of a well-specified behavioral alternative, and accepted at high stakes.'' Similarly, increasing people's accountability for their decisions improves performance in some cases, but impedes it in others (for a review see Lerner & Tetlock, 1999). One piece of this puzzle is that increased effort will only improve performance when people already possess strategies that are appropriate for the task at hand; in the absence of such strategies, they will just do the wrong thing with more gusto (see Shafir & LeBoeuf, 2002). But even when no particularly sophisticated strategy is required, trying harder does not necessarily result in any improvement—in fact, it may often backfire. This is the case for one of the most widely recommended debiasing strategies: encouraging people to ''consider the opposite,'' or to counterargue their initial response, by asking themselves, ''What are some reasons that my initial judgment might be wrong?'' (Larrick, 2004, p. 323). Ironically, the more people try to consider the opposite, the more they often convince themselves that their initial judgment was right on target. The strategy of consider the opposite produces this unintended effect because it ignores the second piece of the puzzle: the metacognitive experiences that accompany the reasoning process.

Similar surprises arise in the domain of public information campaigns. Presumably, erroneous beliefs can be dispelled by confronting them with contradictory evidence. Yet attempts to do so often increase later acceptance of the erroneous beliefs, as known since Allport and Lepkin's pioneering research (1945) into rumor transmission. Again, the unintended effect arises because the educational strategy focuses solely on information content and ignores the metacognitive experiences that are part and parcel of the reasoning process.

This chapter draws attention to the role of metacognitive experiences in judgment and decision making and explores their implications for debiasing strategies and public information campaigns. It is organized as follows. The first section introduces key metacognitive experiences and summarizes their principles of operation. The second section addresses a core assumption of most debiasing techniques: If people only thought enough about the right inputs, they would arrive at a less biased judgment. We identify the conditions under which this assumption holds as well as the conditions under which this strategy backfires. The third section addresses public information campaigns and illuminates why attempts to discredit erroneous beliefs often achieve the opposite. Throughout, we identify open issues for future research

and the chapter concludes with a discussion of theoretical and applied implications.

II. Metacognitive Experiences

Most theories of judgment and decision making (for reviews see Koehler & Harvey, 2004; Lopes, 1994; Plous, 1993; Wyer & Srull, 1989) focus on the role of declarative information, that is on *what* people think about, and on the inference rules they apply to accessible thought content. Not surprisingly, theories of debiasing share this focus (for reviews see Arkes, 1991; Fischhoff, 1982; Larrick, 2004; Wilson & Brekke, 1994). However, human reasoning is accompanied by a variety of metacognitive experiences, which provide experiential information that people systematically use in forming a judgment. These experiences qualify the implications of accessible declarative information, with the result that we can only accurately predict people's judgments by taking the interplay of declarative and experiential information into account (for reviews see Schwarz, 1998, 2004; Schwarz & Clore, in press). Two of these experiences are of particular interest to this chapter, namely, the ease or difficulty with which information can be brought to mind and thoughts can be generated, and the fluency with which new information can be processed.

A. ACCESSIBILITY EXPERIENCES

Accessibility experiences refer to the ease or difficulty with which information can be recalled and thoughts can be generated. According to most models of judgment, we should evaluate an object more favorably when we bring many rather than few positive attributes to mind, should consider an event more likely when we generate many rather than few reasons for its occurrence, and so on. Empirically, this is often *not* the case (Sanna, Schwarz, & Stocker, 2002b; Wänke, Bohner, & Jurkowitsch, 1997). Recalling many attributes or generating many reasons is more difficult than recalling or generating only a few and these metacognitive accessibility experiences are informative in their own right. What people conclude from them depends on which of many naive theories of mental functioning they apply (Schwarz, 2004).

The naive theory that is most relevant in the present context links recall experiences to characteristics of the external world. It holds that the more exemplars exist, the easier it is to bring some to mind. This correct belief is at the heart of Tversky and Kahneman's availability heuristic (1973) and

people infer higher frequency and probability when examples are easy rather than difficult to recall. Because frequent exemplars are also more typical for their category, ease of recall further suggests high typicality. Accordingly, people infer that they use their bicycles more often after recalling few rather than many instances (Aarts & Dijksterhuis, 1999), rate themselves as more assertive after recalling few rather than many of their own assertive behaviors (Schwarz et al., 1991), hold an attitude with more confidence after generating few rather than many supporting arguments (Haddock, Rothman, Reber, & Schwarz, 1999), and are more likely to choose a product after generating few rather than many reasons for this choice (Novemsky, Dhar, Schwarz, & Simonson, in press). Throughout, people's inferences and decisions are consistent with the implications of *what* comes to mind when recall or thought generation is experienced as easy, but opposite to these implications when it is experienced as difficult. In addition, people are more confident in their judgments when the relevant information was easy to bring to mind (Haddock et al., 1999; Tormala, Petty, & Brinol, 2002).

From a content-focused perspective, these findings may simply reflect that the examples become less compelling as people attempt to recall or generate an increasing number of them. Several lines of research converge on ruling out this possibility. First, when the informational value of experienced difficulty of recall or thought generation is undermined through misattribution manipulations, people draw on the recalled examples. For example, Schwarz et al. (1991, Experiment 3) told participants that unfamiliar music played in the background may interfere with the recall task. In this case, participants reported higher assertiveness the more examples of assertive behavior they brought to mind, reversing the otherwise observed pattern (see also Haddock et al., 1999; Sanna & Schwarz, 2003). This indicates that participants' themselves found the examples compelling, unless their implications were qualified by an informative experience of difficulty. Second, yoked participants, who merely read the thoughts generated by another and are hence deprived of the generation experience, are more influenced when their partner lists many rather than few arguments, in contrast to the person who lists them (Wänke, Bless, & Biller, 1996). This increasing influence on others' judgments would not be observed if the quality of participants' thoughts declined with the number of thoughts generated. Finally, the same influence of accessibility experiences can be observed when all participants list the same number of thoughts and their subjective experience of difficulty is manipulated through facial feedback in the form of corrugator contraction, an expression associated with mental effort (Sanna, Schwarz, & Small, 2002a; Stepper & Strack, 1993). In combination, these findings highlight the role of subjective accessibility experiences and rule out alternative accounts in terms of the quality of the examples recalled or arguments generated.

As our review will indicate, experienced difficulty of thought generation can thwart the success of popular debiasing strategies, which encourage people to guard against overconfidence, hindsight bias, and similar fallacies by thinking about alternative possibilities. Such strategies only work when generating alternatives is experienced as easy, but backfire when it is experienced as difficult. Variations in the perceived informational value of the experience and in the naive theory applied to the experience introduce additional complexities, as addressed in a later section.

B. PROCESSING FLUENCY

Processing fluency refers to the ease or difficulty with which new, external information can be processed. Variables like figure–ground contrast, presentation duration, or the amount of previous exposure to the stimulus affect the speed and accuracy of low-level processes concerned with the identification of a stimulus' physical identity and form; they influence *perceptual fluency* (Jacoby, Kelley, & Dywan, 1989). Variables like the consistency between the stimulus and its context or the availability of appropriate mental concepts for stimulus classification affect the speed and accuracy of high-level processes concerned with the identification of stimulus meaning and its relation to semantic knowledge structures; they influence *conceptual fluency* (Whittlesea, 1993). Empirically, both types of fluency show parallel influences on judgment (for a review see Winkielman, Schwarz, Fazendeiro, & Reber, 2003) and can be subsumed under the general term *processing fluency*.

Because the different variables that affect processing fluency result in similar phenomenological experiences, the meaning of the experience is open to interpretation. Which interpretation people choose, and which inferences they draw, depends on the naive theory they bring to bear (Schwarz, 2004). Some naive theories pertain to presentation conditions; they give rise to illusions of perception. For example, people assume that material is easier to process when shown for long rather than short durations or with high rather than low clarity. Applying these theories, they infer that a stimulus was presented for a longer duration or with higher clarity when it is easy to process due to previous exposures (Jacoby, & Girard, 1990; Whittlesea, Witherspoon & Allan, 1985). Other theories pertain to one's state of knowledge; they give rise to illusions of knowledge. People assume, for example, that familiar material is easier to process than unfamiliar material. Hence, they erroneously infer that they have seen a stimulus before when it is easy to process due to favorable presentation conditions (Whittlesea et al., 1990). For reasons discussed later, this fluency–familiarity link fosters the

acceptance of new information as true when it is easy to process, but flags it for closer scrutiny when it is difficult to process.

In addition, high fluency is experienced as hedonically positive (as captured by psychophysiological measures, Winkielman & Cacioppo, 2001). This affective response can itself serve as a basis of judgment and fluently processed stimuli are evaluated more favorably than less fluently processed ones (for a review see Reber, Schwarz, & Winkielman, 2004). As is the case for other subjective experiences, the impact of fluency experiences is eliminated when people, correctly or incorrectly, attribute fluency to an irrelevant source, thus undermining its informational value for the judgment at hand (for a review see Kelley & Rhodes, 2002).

C. SUMMARY

As this summary of core insights from research into the interplay of declarative and experiential information indicates, we cannot predict people's judgments by knowing solely *what* comes to mind (for more extended reviews see Kelley & Rhodes, 2002; Schwarz, 2004; Schwarz & Clore, in press). By the same token, we cannot design strategies to improve people's judgments by focusing solely on their use of declarative information. Instead, strategies of debiasing need to take the interplay of declarative and experiential information into account.

III. Accessibility Experiences and the Emergence and Attenuation of Bias

According to content-focused models of judgment, many biases arise because people focus narrowly on focal features of the issue and fail to consider a wider range of information. For example, people are overconfident about future success because they focus on behaviors that will lead to success and fail to consider variables that may impede success (Koriat, Lichtenstein, & Fischhoff, 1980); once they learn about the outcome of an event, people assume that they knew all along that this would happen because they focus on outcome congruent knowledge and fail to consider variables that may have given rise to alternative outcomes (Fischhoff, 1975); when predicting the time by which a task will be completed, people's estimates are too optimistic because they focus on goal-directed behaviors and fail to consider variables that may impede progress (Buehler, Griffin, & Ross, 1994). The strength of these biases is assumed to increase with the number of focal

thoughts and to decrease with the number of alternatives considered. From this perspective, any strategy that succeeds in encouraging people to consider information about alternatives should attenuate the respective bias (Larrick, 2004).

Research into the interplay of accessible declarative information and subjective accessibility experiences leads to different predictions regarding the role of focal and alternative thoughts in the emergence as well as attenuation of bias. It predicts (1) that the focal thoughts that are assumed to give rise to bias will only do so when they come to mind easily. (2) When focal thoughts are difficult to bring to mind, the otherwise observed bias is attenuated or eliminated (and sometimes even reversed) despite the numerous "biasing" focal thoughts generated. These contingencies have been overlooked in previous research because people are likely to truncate the search process early (see Bodenhausen & Wyer, 1987), before any difficulties of recall and thought generation are likely to be experienced. Hence, their judgments are usually consistent with spontaneously generated focal thoughts, which led to the erroneous conclusion that we can predict people's judgments on the basis of thought content alone. Empirically this is not the case (Schwarz et al., 1991), as reviewed above.

The same logic applies to thoughts about alternatives. (3) Thinking about alternatives will only attenuate bias when alternatives come to mind easily. Hence, (4) trying to think of many alternatives will increase rather than decrease bias, in contrast to the predictions of content-focused models. Ironically, this suggests that successful debiasing may become the less likely the harder people try to avoid bias: the more they search for information that may argue against their initial judgment, the harder they will find their task, convincing them that their initial judgment was indeed right on target.

Finally, subjective accessibility experiences are only used as a source of information when their informational value is not discredited (for reviews see Schwarz, 2004; Schwarz & Clore, in press). When people attribute the experienced ease or difficulty to an irrelevant source, they turn to accessible thought content instead. In this case, the judgment is solely based on accessible declarative information and (5) bias increases with the number of focal thoughts and (6) decreases with the number of alternative thoughts, as predicted by content-focused models.

Figure 1 summarizes this logic; it is a generalized version of a metacognitive model of hindsight bias proposed by Sanna and Schwarz (2006, in press). We assume that judgments are always a joint function of thought content (accessible declarative information) and accompanying metacognitive experiences. When the informational value of the metacognitive experience is discredited, judgments are based on declarative information and hence consistent with thought content (lower right-hand oval). When the informational value of
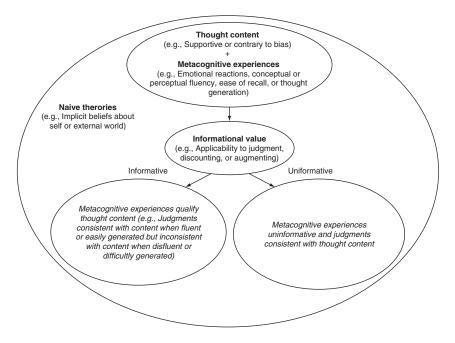
Fig. 1.   The interplay of thought content and metacognitive experiences.

the experience is not discredited (lower left-hand oval), the metacognitive experience qualifies the implications of declarative information. What exactly people conclude from the experience depends on the nature of the experience (ease or difficulty of thought generation, fluency of processing, and so on) and the naive theory of mental processes applied. In the case of accessibility experiences, judgments are consistent with the implications of declarative information when it was easy to bring to mind. However, the content congruent judgments at which people arrive under this condition are likely to be more extreme than is the case when the metacognitive experience is uninformative (lower right-hand oval): When experienced ease of recall or thought generation is discredited, two arguments are just two arguments; when it is not discredited, the experienced ease suggests that there are many more arguments where those two came from. Finally, judgments are opposite to the implications of accessible declarative information when it was difficult to bring to mind.

In sum, this model converges with content-based models by predicting content congruent judgments (1) when the accessibility experience is discredited or (2) when recall or thought generation is experienced as easy.

It differs from content-based models by predicting (3) easily recalled or generated thoughts are more influential when the experience is considered informative than when it is not. Finally, and most important, it (4) arrives at predictions that are opposite to the predictions of content-based models when recall or thought generation is difficult.

A. THE INTERPLAY OF DECLARATIVE AND EXPERIENTIAL INFORMATION

Consistent support for this model comes from a study that took advantage of a real-world event, namely students' first exam in a psychology class (Sanna & Schwarz, 2004). In a between-subjects design, students made a variety of judgments either 28 days or a few minutes before their exam, or right after they received their grades. In addition, they listed either 0, 3, or 12 thoughts about succeeding or failing on the exam, as described below. Manipulation checks indicated that listing 3 thoughts was experienced as easy, whereas listing 12 thoughts was experienced as difficult, irrespective of whether thoughts were about success or failure. We focus on this study because it bears on a number of different biases and note additional experimental work along the way.

1. Confidence Changes

Previous research showed that people are overconfident about their future success at a distance, but become more realistic as the moment of truth approaches. For example, students taking an immediate test predict a lower likelihood of success than those taking the test in 4 weeks (Nisan, 1972); similarly, college seniors provide more muted estimates of first-job salaries than sophomores and juniors (Shepperd, Ouellette, & Fernandez, 1996). These differences presumably reflect a focus on success-related thoughts at a temporal distance, which gives way to worries and awareness that one may not be as well prepared as one hoped as the moment of truth comes closer.

The left-hand panel of Fig. 2 supports this reasoning. Twenty-eight days before the exam, students who listed no exam-related thoughts were as optimistic as students who had just listed three reasons for success. Conversely, 5 minutes before the exam, students who listed no thoughts were as pessimistic as students who had just listed 3 reasons for why they may fail. Thus, spontaneous thoughts about success and failure seem to account for distal confidence and proximal pessimism, respectively—but only when these thoughts are easy to generate. When students had to list 12 thoughts, which they found difficult, this pattern reversed. In this case, listing success-related
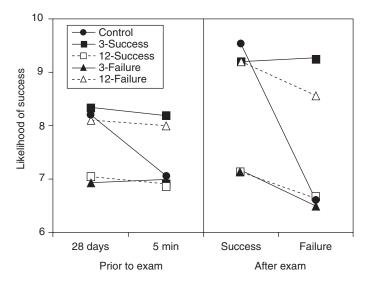
Fig. 2.   Likelihood-of-success ratings by thought-listing and time: Confidence changes and hindsight bias. Shown are the mean ratings of the likelihood of success (10 = very likely) as a function of thought-listing condition and time. The thought-listing conditions were as follows: control, no thoughts listing; 3-success, generate 3-success thoughts; 3-failure, generate 3-failure thoughts; 12-success, generate 12-success thoughts; 12-failure, generate 12-failure thoughts. Thoughts were listed either 28 days or approximately 5 minutes prior to the exam, or right after learning grades. Participants in the latter condition were grouped according to whether they viewed their grade as a success or failure. Adapted from Sanna and Schwarz (2004), © 2004 American Psychological Society.

thoughts undermined their confidence long before the exam, whereas listing failure-related thoughts boosted their confidence right before the exam. In combination, this pattern of findings indicates that confidence changes over time are a joint function of thought content and the ease with which these thoughts can be brought to mind.

This pattern bears directly on the success and failure of debiasing strategies. Presumably, overconfidence long before the exam can be reduced by prompting participants to consider reasons why the exam may not go well, whereas their pessimism right before the exam can be alleviated by prompting them to consider reasons for success. As the left-hand panel of Fig. 2 shows, this is the case—but only when the respective thoughts come to mind easily. Listing 3 failure-related thoughts 28 days before the exam reduced confidence to the level of control participants' pessimism 5 minutes before the exam, whereas listing 12 failure-related thoughts failed to do so. Conversely, listing 3 success-related thoughts 5 minutes prior to the exam brought confidence back to its distant level, yet 12 failure-related thoughts failed to do so.

Throughout, listing few success (failure)-related thoughts was functionally equivalent to listing many failure (success)-related thoughts.

Confidence shifts over time have been observed in many different domains, including the forecasts of professional market analysts (for a review see Kadous, Krische, & Sedor, 2006). Paralleling the temporal shifts discussed above, the optimism of market analysts' earnings forecasts is a function of their time horizon: ''analysts' two-year-ahead forecasts are relatively more optimistic than their 1-year-ahead forecasts'' and the ''optimism in quarterly earnings forecasts decreases as the earnings announcement date approaches'' (Kadous et al., 2006, p. 380). To reduce the optimism of analysts' forecasts, analysts are often encouraged to consider ways in which the scenarios presented by a company's management may fail (Heiman, 1990; Koonce, 1992). Kadous et al. (2006) found that the success of this strategy depends on analysts' ease of thought generation. They presented professional analysts with scenarios that outlined a company's plans and asked them to generate 0, 2 (easy), or 12 (difficult) ways in which the plan may fail. Replicating the above findings, this strategy reduced analysts' optimism when thought generation was easy, but not when it was difficult. This finding also highlights that the influence of subjective accessibility experiences is not limited to lay judgment; it can also be observed with professional analysts, whose forecasts move markets and whose optimism hurts investors (Dechow, Hutton, & Sloan, 2000).

2. Hindsight Bias

Once people know the outcome of an event, they believe that it was relatively inevitable and that they ''knew all along'' what would happen. This hindsight bias (Fischhoff, 1975) has been observed across many content domains (for reviews see Christensen-Szalanski & Willham, 1991; Hawkins & Hastie, 1990). The usually recommended remedy is to think about alternatives to the known outcome in an attempt ''to convince oneself that it might have turned out otherwise'' (Fischhoff, 1982, p. 343).

To assess hindsight bias, Sanna and Schwarz (2004) asked students right after they received their grades to report which likelihood of success they would have predicted 28 days earlier, at the beginning of class. The right-hand panel of Fig. 2 shows the results. Replicating numerous earlier studies, students who listed no thoughts assumed that they knew the outcome all along and provided higher retrospective ratings of success when they succeeded (after exam/success) rather than failed (after exam/failure). Moreover, their retrospective estimates were more extreme than the ratings provided by their peers 28 days earlier, even compared to peers who had just generated three reasons why they might succeed or fail at that time.

More important, asking successful students to think of three reasons why they might have failed eliminated their hindsight bias; so did asking failing students to list three reasons why they might have succeeded. Yet, generating 12 thoughts about alternative outcomes did not further attenuate hindsight bias, in contrast to what content-focused theorizing would predict (Fischhoff, 1982)—to the contrary, it undermined the effectiveness of this debiasing strategy. Finally, generating many thoughts in support of the obtained outcome attenuated hindsight, again in contrast to what content-focused theorizing would predict: Successful students who were asked to list 12 reasons for why they succeeded concluded that they would not have expected their success; neither did failing students think they would have expected their failure after listing 12 reasons for failing.

In sum, hindsight bias was successfully reduced when participants found it easy to think of (a few) reasons for alternative outcomes or found it difficult to think of (many) reasons for the obtained outcome. Other studies reiterate this point. Sanna et al. (2002b) presented participants with a story about the British–Gurkha war (taken from Fischhoff, 1975), which informed them that either the British or the Gurkha had won. Next, they listed few or many reasons for how the war could have come out otherwise. Generating few reasons for the alternative outcome attenuated hindsight bias, whereas generating many reasons backfired and increased hindsight bias above the otherwise observed level. The same pattern was observed when participants' accessibility experiences were manipulated through facial feedback (Sanna et al., 2002a). Specifically, all participants listed five thoughts about how the war could have come out otherwise and some were induced to contract the currugator muscle while doing so, which conveys a feeling of mental effort (Stepper & Strack, 1993). As predicted, listing five thoughts about alternative outcomes while tensing the currogator muscle increased hindsight bias, resulting in a significant backfire effect. Finally, listing many thoughts about why the war had to turn out the way it did, or tensing the currogator muscle while doing so, attenuated hindsight bias (Sanna et al., 2002b), again paralleling the above findings (Sanna & Schwarz, 2004).

Throughout, these results highlight that generating many focal thoughts is functionally equivalent to generating few alternative thoughts, whereas generating many alternative thoughts is functionally equivalent to generating few focal thoughts. Any attempt to debias hindsight needs to take this interplay of declarative and experiential information into account. Because previous theorizing has not done so, it is not surprising that a comprehensive meta-analysis concluded that "efforts to reduce hindsight bias have generally been unsuccessful" (Guilbault, Bryant, Brockway, & Posavac, 2004, p. 112). Our findings suggest that a clearer pattern is likely to emerge once we take participants' accessibility experiences into account; unfortunately, virtually

all prior studies fail to report the details needed to consider this variable in a meta-analysis.

3. Planning Fallacy

As a final example, consider the planning fallacy (Buehler et al., 1994; Kahneman & Tversky, 1979). At a temporal distance, people usually predict that task completion will need less time than is actually the case. This bias has been observed in diverse settings ranging from household chores to school assignments. Incentives worsen the planning fallacy, as people expecting tax refunds or other monetary rewards for speedy completion are even more optimistic than those who have no incentive for speedy completion (Buehler, Griffin, & MacDonald, 1997; Buehler et al., 1994). Again, this fallacy presumably reflects a focus on acts that facilitate task completion at the expense of hurdles that impair it. Accordingly, it should be attenuated when attention is drawn to reasons for slow progress (Newby-Clark, Ross, Buehler, Koehler, & Griffin, 2000).

Twenty-eight days before the exam, control participants predicted that they would complete their exam preparation 4.4 days prior to the exam, although their peers who responded to the questionnaire 5 minutes prior to the exam reported that were not done until 0.3 days prior to the exam (Fig. 3). This replicates the usual planning fallacy. Again, control participants' early optimism matched the optimism of those who generated three success-related thoughts well before the exam, whereas those who generated
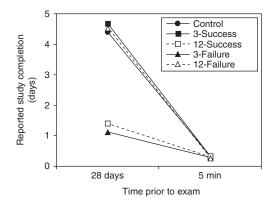

Fig. 3. Predicted and actual study completion time by thought-listing and time: Planning fallacy. Shown are the predicted (reported 28 days prior to the exam) and actual (reported 5 minutes prior to the exam) completion times in days. Adapted from Sanna and Schwarz (2004), © 2004 American Psychological Society.

three failure-related thoughts provided more realistic estimates. More important, listing 12 failure-related thoughts failed to attenuate the planning fallacy, whereas listing 12 success-related thoughts, ironically, did attenuate it. Once again, listing few success (failure)-related thoughts, an easy task, was functionally equivalent to listing many failure (success)-related thoughts, a difficult task.[1]

4. Conclusions

In sum, these findings illustrate that we can only predict the emergence and attenuation of bias by paying attention to the joint influence of accessible declarative information and subjective accessibility experiences. First, focal thoughts give rise to bias when they are easy to bring to mind. This is usually the case when people are left to their own devices as they truncate the search process early (Bodenhausen & Wyer, 1987), before any difficulty is experienced. Accordingly, the judgments of control participants, who did not list any thoughts, converged with the judgments of participants who listed three focal thoughts (see Figs. 2 and 3). Second, focal thoughts attenuate or eliminate bias when they are difficult to bring to mind. Hence, bias is more likely to arise when people generate few rather than many focal thoughts, in contrast to what content-focused models would predict. Conversely, third, thoughts about alternatives attenuate or eliminate bias when they come to mind easily, but, fourth, increase bias when they are difficult to bring to mind. As a result, the frequently recommended debiasing strategy of ''consider the opposite!'' is only successful when people do not try too hard to follow it—and backfires when people are overly zealous in their efforts to protect themselves against bias. We propose that this previously overlooked contingency accounts for the mixed success of the consider-the-opposite strategy (see Arkes, 1991; Guilbault et al., 2004; Hawkins & Hastie, 1990).

B. DISCREDITING THE INFORMATIONAL VALUE OF THE EXPERIENCE

Theoretically, the observed interaction of declarative information and subjective accessibility experiences should only be observed when the informational value of the accessibility experience is not called into question (see Fig. 1). When it is called into question, people discount the accessibility experience as a source of information for the judgment at hand and rely on

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[1]No impact of the thought manipulation is observed 5 minutes prior to the exam, reflecting that actual study completion times were known at that point.

thought content to arrive at a judgment (Schwarz et al., 1991). Unfortunately, this does not imply that debiasing is necessarily successful when people do not take their metacognitive experiences into account.

1. Could Gore Have Won?

Taking advantage of the 2000 presidential election in the United States, Sanna and Schwarz (2003) asked participants to predict the outcome of the popular vote 1 day prior to the November 7 election. Following an extended court battle over disputed election outcomes in Florida, the Democratic candidate Gore conceded the election on December 13, 2000. On December 14, participants were asked to recall their preelection predictions made on November 6. The intervening 5 weeks were filled with extensive media coverage of legal and political debates ranging from voting irregularities in Florida to the role of state legislatures in national elections and the responsibilities of the Supreme Court. Table I shows the results.

In the popular vote, Gore–Lieberman led over Bush–Cheney by a small difference of 0.32%. Prior to the election, participants predicted a clear victory for Gore, with a lead of close to 5%. After the election, participants who were merely asked to recall their preelection prediction recalled that they did predict a Gore win, but at a much smaller margin of 0.58%. This hindsight bias is consistent with previous observations in election studies (Leary, 1982; Powell, 1988). Asking participants to list 12 thoughts about how Gore could have won before they recalled their earlier predictions did not attenuate hindsight bias. Nor did listing 12 thoughts, which participants experienced as difficult, result in a backfire effect, in contrast to earlier studies (Sanna & Schwarz, 2004; Sanna et al., 2002a,b). This probably reflects that a backfire effect would have implied a qualitative change in form of recalling that one predicted a Bush victory, which imposes some constraints.

More important, the experienced difficulty of listing 12 thoughts in favor of a Gore victory was discredited for a third group of participants. Right after listing their thoughts, they were asked to rate how knowledgeable they are about politics. The instructions read, "Thank you for listing those thoughts. We realize this was an extremely difficult task that only people with a good knowledge of politics may be able to complete. As background information, may we therefore ask you how knowledgeable you are about politics?" This manipulation suggests that any experienced difficulty may not imply that there were no ways for Gore to win—it may merely imply that one's own knowledge is not sufficient to come up with them. Hence, these participants should discount their difficulty experience and draw on the thoughts they generated. The results indicate that they did: These participants recalled that they predicted a large victory for Gore, with

TABLE I

ACTUAL ELECTION OUTCOME, MEAN PREDICTED OUTCOME, AND MEAN RECALLED PREDICTIONS BY
THOUGHT-LISTING AND ATTRIBUTION

	Actual outcome	
Gore–Lieberman	48.31	
Bush–Cheney	47.99	
Difference	0.32	

	Participants' estimates	
	Preelection prediction	Postelection recall
No Thoughts-Listing		
Gore–Lieberman	49.54	48.22
Bush–Cheney	45.08	47.54
Difference	4.45	0.58
12-Thoughts		
Gore–Lieberman	49.69	48.80
Bush–Cheney	44.42	48.19
Difference	5.26	0.61
12-Thoughts, Attribution (Experience Uninformative)		
Gore–Lieberman	49.85	52.09
Bush–Cheney	45.14	44.57
Difference	4.71	7.52

Note: Values are in predicted percentages of popular vote and recalled predictions. Difference = Gore–Lieberman – Bush–Cheney. Adapted from Sanna and Schwarz (2003, Experiment 2), © 2002 Elsevier Science.

a margin of 7.52%—in fact, significantly larger than the 4.71% margin they had predicted prior to the election.

In sum, once the outcome of the popular vote was known, it seemed inevitable and participants erroneously "recalled" that they had predicted it all along. This hindsight bias was not attenuated by generating 12 thoughts about alternative outcomes. More important, inducing participants to attribute the experienced difficulty to their own lack of knowledge undermined its informational value. As observed in earlier studies (Schwarz et al., 1991), these participants drew on the pro-Gore thoughts they had just generated and inferred that they must have predicted a large victory for Gore. Far from improving the accuracy of recall, this successful elimination of hindsight bias came at the price of a significant bias in the opposite direction. A parallel study, using the outcome of football games as the content domain, produced comparable results (see Sanna & Schwarz, 2003).

2. Conclusions

In combination, the reviewed research highlights the crucial role of subjective accessibility experiences in the production and reduction of judgmental biases. Thoughts about focal aspects of a given issue produce bias when they are easy to bring to mind, but reduce bias when they are difficult to bring to mind; conversely, thoughts about alternatives reduce bias when they are easy to bring to mind, but produce bias when they are difficult to bring to mind. Hence, encouraging people to ''consider the opposite'' can be a successful debiasing strategy when consideration of the opposite is experienced as easy; the strategy backfires when consideration of the opposite is difficult—and even furrowing one's brow can be enough to produce a backfire effect. Finally, encouraging people to generate many focal thoughts can, paradoxically, be a successful debiasing strategy, provided that thought generation is difficult. The latter strategy has not been examined in previous research and its potential deserves future attention. Overall, this systematic pattern of findings cannot be derived from models that focus exclusively on the role of declarative information.

IV. Fluency, Familiarity, and Truth: Implications for Public Information Campaigns

So far, we considered metacognitive experiences that arise when people elaborate on an issue. We now turn to a metacognitive experience that accompanies exposure to new information, namely the fluency with which the information can be processed. As discussed in Section II, people correctly assume that familiar information is easier to process than novel information. Applying this naive theory of mental processes, they infer from experienced processing fluency that the information is familiar—even when the fluency derives from presentation variables, like good figure–ground contrast or long exposure times, or from contextual influences, like preceding semantic primes (for reviews see Kelley & Rhodes, 2002; Winkielman et al., 2003). In memory experiments, this fluency–familiarity link gives rise to the erroneous ''recognition'' of fluently processed but previously unseen stimuli (see Kelley & Rhodes, 2002).

More important for the present purposes, the perceived familiarity of information influences the likelihood that the information is accepted as true or flagged for closer scrutiny. In terms of the model presented in Fig. 1, judgments are likely to be consistent with the implications of fluently processed declarative information, but inconsistent with the implications of disfluently processed declarative information. We review selected results to

illustrate these effects and subsequently turn to their implications for public information campaigns.

A. FLUENCY, FAMILIARITY, AND BIAS

1. Fluency and Hindsight Bias

If fluently processed information seems more familiar, we may expect that fluently processed information about an outcome gives rise to more pronounced hindsight bias—after all, if it seems familiar, we probably ''knew it all along.'' Empirically, this is the case. Werth and Strack (2003) gave participants general knowledge questions (e.g., ''How high is the Eiffel tower?'') along with answers (300 m). Next, they asked participants what they would have answered, had they not been given solutions. To manipulate processing fluency, questions and answers were presented in colors that were either easy or difficult to read against the background. As expected, high processing fluency increased the size of hindsight bias, and participants' confidence in their answers, whereas low processing fluency attenuated hindsight bias. Presumably, participants found the easy-to-read material more familiar and hence concluded that they knew this information all along and ''would have'' provided the correct answer.

2. Fluency and the Detection of Distorted Questions

Conversely, Song and Schwarz (2007) observed that low processing fluency flags material for closer scrutiny. When asked, ''How many animals of each kind did Moses take on the Ark?'' most people responded ''two'' despite knowing that Noah rather than Moses was the actor in the biblical story (Erickson & Mattson, 1981). Previous research addressed a variety of plausible accounts for this ''Moses illusion'' (for a comprehensive review see Park & Reder, 2003), including the possibility that recipients are cooperative communicators (Grice, 1975; Schwarz, 1994, 1996) who notice the distortion, but simply correct for it by responding to what the questioner ''must have meant.'' Yet making participants aware that the text may be distorted, or asking them to identify such distortions, does not eliminate the effect (Bredart & Modolo, 1988; Reder & Kusbit, 1991), in contrast to what a Gricean account would predict. The account that is most compatible with the available data holds that ''distortion detection involves a two-pass process—the first to flag a potential mismatch and the second to invoke a careful inspection that might confirm an erroneous term in the question'' (Park & Reder, 2003, p. 282). Distorted questions pass the first stage when the semantic overlap between the question and the person's knowledge

provides a sufficient match (e.g., Moses and Noah are both characters in the Old Testament, who received commands from God that were related to water), but not when the semantic overlap is low (e.g., when Moses is replaced by ''Nixon'' in the above question; see Erickson & Mattson, 1981; van Oostendorp & de Mul, 1990).

From the present perspective, semantic overlap is only one of many variables that influences whether the content of the question is likely to seem familiar. If so, any other manipulation that increases perceived familiarity should also affect the size of the Moses illusion, including manipulations of processing fluency. To test this prediction, Song and Schwarz (2007) presented the Moses question and related ones in either an easy-to-read or difficult-to-read print font. As expected, many more participants answered ''two'' in response to the Moses question when the font was easy to read (15 of 17) than when it was difficult to read (8 of 15). Other questions replicated this effect, indicating that low processing fluency flags material for closer scrutiny because it seems less familiar, much like high processing fluency conveys that one knew it all along (Werth & Strack, 2003).

B. FLUENCY, CONSENSUS, AND TRUTH

When the objective state of affairs is difficult to determine, people often resort to social consensus information to judge the truth value of a belief: if many people believe it, there's probably something to it (Festinger, 1954). Because one is more frequently exposed to widely shared beliefs than to highly idiosyncratic ones, the familiarity of a belief is often a valid indicator of social consensus. But, unfortunately, information can seem familiar for the wrong reason, leading to erroneous perceptions of social consensus. For example, Weaver, Garcia, Schwarz, and Miller (in press) exposed participants to multiple iterations of the same statement, provided by the same communicator. When later asked to estimate how widely the conveyed belief is shared, participants estimated higher consensus the more often they had read the identical statement coming from the same single source. Findings of this type indicate that repeated exposure to a statement influences perceptions of social consensus, presumably because the statement seems more familiar.

This inferred consensus contributes to the observation that repeated exposure to a statement increases its acceptance as true. In a classic study of rumor transmission, Allport and Lepkin (1945) observed that the strongest predictor of belief in wartime rumors was simple repetition. Numerous subsequent studies confirmed this conclusion and demonstrated that a given statement is more likely to be judged ''true'' the more often it is repeated. This illusion of truth effect has been obtained with trivia statements and words from a foreign

language (Begg, Anas, & Farinacci, 1992; Hasher, Goldstein, & Toppino, 1977) as well as advertising materials (Hawkins & Hoch, 1992).

Theoretically, any other variable that increases processing fluency should have the same effect as message repetition. Supporting this prediction, Reber and Schwarz (1999) found that participants were more likely to accept statements like "Osorno is a city in Chile" as true when the statements were presented in colors that made them easy (e.g., dark blue) rather than difficult (e.g., light blue) to read against the background. Similarly, McGlone and Tofighbakhsh (2000) manipulated processing fluency by presenting substantively equivalent novel aphorisms in a rhyming (e.g., "woes unite foes") or nonrhyming form (e.g., "woes unite enemies"). As expected, participants judged substantively equivalent aphorisms as more true when they rhymed than when they did not.

In combination, these findings indicate that processing fluency serves as an experiential basis of truth judgments. In the absence of more diagnostic information, people draw on the apparent familiarity of the statement to infer its likely truth value—if it seems they heard it before, there is probably something to it (Festinger, 1954). This inference involves the (over)application of the correct naive theory that "familiar material is easy to process"—and the application of any other theory [like "Good figure–ground contrast makes things easy to read" in the Reber and Schwarz (1999) study] would presumably render the fluency experience uninformative for truth judgments.

C. IMPLICATIONS FOR PUBLIC INFORMATION CAMPAIGNS

The fluency–familiarity–truth link suggested by the above studies has important implications for the design of public information campaigns, including some obvious ones and some rather counterintuitive ones. On the obvious side, it suggests that frequent repetition of the information that one wants to convey to the public is a good idea. All information campaigns attempt to do so, although usually based on the assumption that frequent exposure facilitates successful learning and message retention (McQuail, 2000; Rice & Atkin, 2001; Tellis, 2004). From a metacognitive perspective, frequent exposure also facilitates increasingly fluent processing of the message and increased perceptions of familiarity, which, in turn, increase the likelihood of message acceptance. Rhyming slogans and presentation formats that facilitate fluent processing will further enhance this effect.

On the counterintuitive side, this logic implies that false information is better left alone. Any attempt to explicitly discredit false information necessarily involves a repetition of the false information, which may contribute to its later

familiarity and acceptance. Although this problem has been known since Allport and Lepkin's research (1945) into wartime rumors, the idea that false information needs to be confronted is so appealing that it is still at the heart of many information campaigns. Like the debiasing strategy of consider-the-opposite, it derives its appeal from the assumption that judgments are based on declarative information—and it fails because it underestimates the power of metacognitive experiences.

1. Spreading Myths by Debunking Them

Figure 4 shows a flyer published by the Centers for Disease Control (CDC). The flyer is available online, provided under materials that physicians can download to educate patients. It illustrates a common format of information campaigns that counter misleading information by confronting "myths" with "facts." In this case, the myths are erroneous beliefs about flu vaccination (e.g., "The side effects are worse than the flu"), which are confronted with a number of facts. From the perspective of content-focused models of judgment, the facts present strong arguments and should decrease the acceptance of the myths. Yet the flyer repeats the myths, which may contribute to their fluency and perceived familiarity when they are encountered again, possibly increasing rather than decreasing their later acceptance.

Skurnik, Yoon, and Schwarz (2007) tested this possibility by giving participants the CDC's "Facts & Myths" flyer shown in Fig. 4 or a parallel "Facts" version that presented only the facts. Of interest was how these flyers affect participants' beliefs about the flu and their intention to receive flu vaccination. These measures were assessed either immediately after participants read the respective flyer or 30 minutes later.

Participants who read the "Facts & Myths" flyer received a list of statements that repeated the facts and myths and indicated for each statement whether it was true or false. Right after reading the flyer, participants had good memory for the presented information and made only a few random errors, identifying 4% of the myths as true and 3% of the facts as false. Thirty minutes later, however, their judgments showed a systematic error pattern: They now misidentified 15% of the myths as true, whereas their misidentification of facts as false remained at 2%.

This is the familiar pattern of illusion-of-truth effects: Once memory for substantive details fades, familiar statements are more likely to be accepted as true than to be rejected as false. This familiarity bias results in a higher rate of erroneous judgments when the statement is false rather than true, as observed in the present study. On the applied side, these findings illustrate how the attempt to debunk myths facilitates their acceptance after a delay of only 30 minutes.
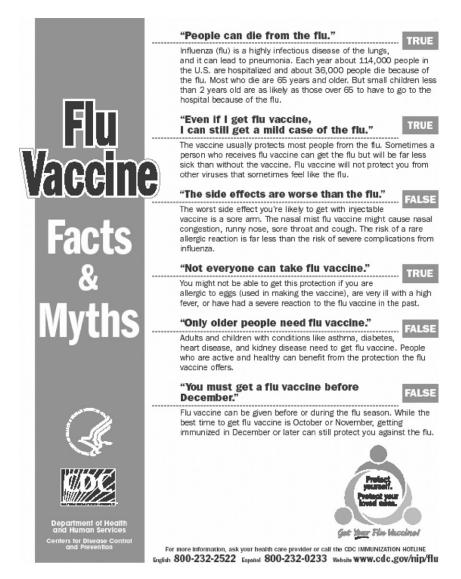
Fig. 4.   Flyer distributed by the Centers for Disease Control (http://www.cdc.gov/flu/professionals/flugallery/flyers.htm; accessed 28 Dec 2006).

Participants' attitude judgments and behavioral intentions showed a parallel pattern. Right after reading the flyer, flyers both improved participants' attitudes toward flu vaccination and increased their intention to get vaccinated, relative to participants who had not read a flyer. The same positive

influence was observed after a 30-minute delay for participants who had only read the facts. In contrast, the "Facts & Myths" flyer backfired after a delay: these participants reported less favorable attitudes toward flue vaccination and lower behavioral intentions than control participants who read no flyer at all.

In sum, providing participants *only* with the facts had the intended effects on participants' attitudes and intentions, both immediately and after a short delay. The classic "Facts & Myths" format, on the other hand, was only effective immediately and backfired after a short delay. A mere 30 minutes later, the "Facts & Myth" flyer facilitated acceptance of myths as facts, impaired participants' attitudes toward vaccination, and undermined their vaccination intentions, relative to controls who read no flyer at all. In combination, these findings suggest that participants drew on the declarative information provided by the flyers when it was highly accessible (no-delay condition). As this information faded from memory, they increasingly relied on the perceived familiarity of the information to determine its truth value, resulting in the observed backfire effects.

2. Turning Warnings into Recommendations

If confronting a given myth with several facts backfires, we may expect that backfire effects are even more pronounced when misleading claims are merely identified as false. Moreover, the observed delay effects suggest that older adults may be particularly vulnerable to the backfire effects of information campaigns. Numerous studies indicate that explicit memory declines with age, whereas implicit memory stays largely intact [see Park (2000) for a review]. If so, older adults may be unlikely to remember the details of previously seen information (a function of explicit memory), but may still find previously seen statements more easy to process and may experience them as familiar (a function of implicit memory).

Skurnik, Yoon, Park, and Schwarz (2005) tested this possibility in the context of health product claims. They exposed older and younger adults once or thrice to statements like, "Shark cartilage is good for your arthritis;" each statement was explicitly marked as "true" or "false."

Either immediately after the learning phase or after a 3-day delay, participants were shown the statements again and were asked to identify each one as true or false. Figure 5 shows the results. Without a delay (top panel), young participants were equally likely to misidentify a true statement as false and a false statement as true, indicating some random error. Older participants, on the other hand, were more likely to misidentify a false statement as true than a true statement as false. Not surprisingly, this illusion-of-truth effect was more pronounced after a single exposure than after three exposures,
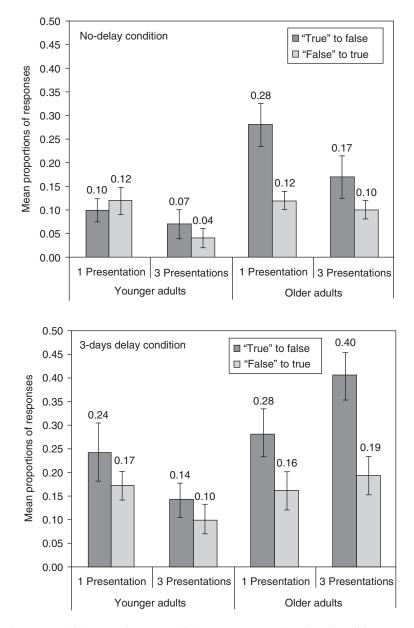
Fig. 5. Truth judgments for true and false statements as a function of repetition, age, and delay. Shown is the proportion of false statements identified as true ("true" to false) and true statements identified as false ("false" to true) after no delay (top panel) and a delay of 3 days (bottom panel). Adapted from Skurnik, Yoon, Park, and Schwarz (2005), © 2005 Journal of Consumer Research, Inc.

indicating that three exposures resulted in better memory for the presented information.

After a 3-day delay (bottom panel), young participants in the single exposure condition showed a sizeable illusion of truth effect and misidentified 24% of the false statements as true; this effect was less pronounced after three exposures, which improved memory for the details. Finally, older participants misidentified 29% of the false statements as true after a single exposure and this error increased to a full 40% when they had been told three times that the statements are false.

Note that the overall pattern shows an increasing reliance on familiarity as memory fades. Without a delay, young participants remember much of the presented information and make some random errors; older participants' memory is less good and they resort to familiarity as a basis for truth judgments, resulting in a bias to accept false statements as true that exceeds the error of rejecting true statements as false. Over the course of a 3-day delay, younger participants' memory for details fades as well, putting them in the position that older participants experienced without a delay. Finally, older participants are particularly likely to accept false statements as true after three warnings, suggesting that repeated warnings primarily increase the perceived familiarity of the statements for this age group. As a result, repeating false information as part of a public information campaign may put older adults at a particular risk, essentially turning warnings into recommendations.

3. Lending Credibility to Myths

As these studies illustrate, attempts to inform people that a given claim is false may increase acceptance of the misleading claim. In addition, such attempts may also have the unintended effect that the false claim is eventually associated with a highly credible source. Because messages from high credibility sources are more influential, as known since Hovland and Weiss (1951), this will further enhance the acceptance of the false claim—including its acceptance by others, who are told that one learned it from a credible source. Two different processes are likely to contribute to this.

First, consider participants who read the CDC's ''Facts & Myths'' flyer in Skurnik et al.'s study (2007). As the results indicate, some of the participants came to accept the myths as true. After some delay, these participants may recall (and report to others) that they learned this information from a truly credible source—the CDC. Such cases of source confusion have been repeatedly observed in rumor transmission. For example, Emery (2000) reported a case where an Internet rumor about flesh-eating bananas became attributed to increasingly more credible sources over time, including the CDC and the Los Angeles Times, which had both made explicit efforts to debunk it.

Second, people may infer the credibility of the source from the strength with which they hold a belief, as Fragale and Heath (2004) proposed. Highly credible sources usually elicit high confidence in the information they convey. Drawing on this relationship, people may consult their confidence in their beliefs as a source of information that bears on the likely source. To test this possibility, Fragale and Heath (2004) exposed participants to statements like, "The wax used to line Cup-o-Noodles cups has been shown to cause cancer in rats." They manipulated participants' acceptance of these statements by presenting them either two or five times. Next, participants learned that some statements were taken from the National Enquirer (a low-credibility source) and some from Consumer Reports (a high-credibility source). Their task was to guess which source had originally reported which statement. As predicted, a given statement was more likely to be attributed to Consumer Reports than to the National Enquirer the more often it had been presented. Thus, frequent exposure does not only increase the acceptance of a statement as true, as reviewed above, but also facilitates the attribution of the "true" statement to a highly credible source. This source attribution, in turn, may increase the likelihood that recipients convey the information to others, who themselves are more likely to accept (and spread) it, given its alleged credible source (Rosnow & Fine, 1976).

These examples suggest that countering false information in ways that repeat it may further contribute to its dissemination by associating the information with a credible source, either through source confusion or through erroneous inferences of source credibility.

D. CONCLUSIONS

In combination, the reviewed findings dovetail with research into rumor transmission (Allport & Postman, 1947; Koenig, 1985; Rosnow & Fine, 1976) by highlighting the risks of repeating erroneous information. Public information campaigns that confront myths with facts, or warn people that a given claim is false, necessarily reiterate the information they want to discredit. This strategy is successful as long as people remember what is true and what is false. Unfortunately, memory for these details fades quickly. When the false claims are encountered again on a later occasion, all that is left may be the vague feeling that "I heard something like this before." This sense of familiarity, in turn, will foster the acceptance of statements as true. Once a statement is accepted as true, people are likely to attribute it to a credible source—which, ironically, may often be the source that attempted to discredit it (Emery, 2000)—lending the statement additional credibility when conveyed to others.

Perceived familiarity exerts the observed influence because, under natural conditions, frequent exposure to an opinion is often a valid cue that many people share it, providing the social consensus information that figures prominently in Festinger's "secondary reality tests" (1954). Moreover, daily conversational conduct is based on the assumption that communicated information is truthful and relevant (Grice, 1975), again fostering acceptance, in particular when it seems that one has "heard this repeatedly." Unfortunately, people are not good at tracking where they heard what how often and any variable that facilitates fluent processing may elicit erroneous estimates of high consensus and the acceptance of the statement as true—even when all repetitions came from the same single source (Weaver et al., in press) or the fluency of processing is solely due to the quality of the print font (Reber & Schwarz, 1999).

To counteract this powerful influence of the fluency–familiarity–truth link, it is not sufficient that the correct information is compelling and highly memorable. It also needs to be closely linked to the false statement to ensure that exposure to the "myth" prompts recall of the "fact." This is difficult to achieve, although memorable slogans that link the myth and fact may provide a promising avenue. In most cases, however, it will be safer to refrain from any reiteration of the myths and to focus solely on the facts. The more the facts become familiar and fluent, the more likely it is that they will be accepted as true and serve as the basis of people's judgments and intentions.

V. Implications and Future Directions

Guided by the information processing paradigm and its computer metaphor (Lachman, Lachman, & Butterfield, 1979), psychologists emphasized the "cold" cognitive processes of information encoding, storage, and retrieval. In social psychology, this emphasis was soon complemented by an exploration of processes that do not easily fit the computer metaphor, including the use of experiential information. While the initial work addressed the role of moods and emotions, later work extended the analysis to metacognitive experiences and bodily sensations (for a review see Schwarz & Clore, in press). Paralleling these developments, cognitive psychologists rediscovered the role of subjective experiences in memory, which figured prominently in early theorizing, but went out of fashion with the behaviorist as well as cognitive revolution (for reviews see Brewer, 1992; Roediger, 1996). After decades of pervasive "neglect of conscious experience" (Tulving, 1989, p. 4), it is now widely accepted that an understanding of memory and judgment

requires the consideration of the phenomenal experiences that accompany cognitive processes. Nevertheless, many substantive areas of research remained untouched by these developments.

As the reviewed research illustrates, we cannot understand the emergence of many judgmental biases without taking the interplay of declarative and experiential information into account, nor can we design strategies to debias judgment without doing so. Similarly, many well-intentioned public information campaigns may be counterproductive when they are solely informed by theories that emphasize the role of declarative information. Much remains to be learned about the role of metacognitive experiences in these areas. This final section addresses open issues and likely complications, and identifies avenues for future research.

A. NAIVE THEORIES

Our discussion of accessibility experiences focused on the naive theory identified in Tversky and Kahneman's availability heuristic (1973): when there are many (few) examples or reasons, it is easy (difficult) to bring some to mind. Applying this naive theory, people infer from the experienced ease or difficulty that there are many or few reasons of the sought after type.

A growing body of research indicates, however, that people hold numerous other naive theories about the difficulty of recall and thought generation (Schwarz, 2004; Skurnik, Schwarz, & Winkielman, 2000). They assume that information that is well represented in memory is easier to recall than information that is poorly represented, making ease of recall a cue for memory judgments (Winkielman, Schwarz, & Belli, 1998); that recent events are easier to recall than distant events, making ease of recall a cue for temporal distance (Sanna, Chang, & Carter, 2004; Schwarz, Cho, & Xu, 2005); that important events are easier to recall than unimportant ones; and that thought generation is easier when one has high rather than low expertise, making ease a cue for importance and expertise (Schwarz et al., 2005). Drawing on these naive theories, people may consider ease of thought generation more informative, and difficulty less informative, when the event is distant rather than recent, unimportant rather than important, and when they lack rather than have domain expertise. Hence, different naive theories of mental processes suggest variables that may moderate the size of bias, and the success of debiasing, by influencing the perceived informational value of metacognitive experiences. We consider this a particularly promising area for future research.

Importantly, once a specific naive theory is applied, it renders the metacognitive experience uninformative for later judgments that require application of a different theory (Schwarz, 2004). Schwarz et al.'s participants (2005), for example, inferred from the difficulty of listing many ''fine Italian

restaurants'' that there are few in town when asked for a frequency judgment, but that they did not know much about town when asked for a knowledge judgment. Each of these judgments, however, entails an attribution of the recall experience, either to the number of restaurants in town or to one's own expertise. Once this implicit attribution is made, the experience is uninformative for the next judgment that requires a different theory and people turn to thought content instead. Hence, those who first concluded that their difficulty reflects a lack of knowledge subsequently inferred that there are many fine Italian restaurants in town—after all, they listed quite a few and they do not even know much about town. Conversely, those who first concluded that there are not many restaurants in town subsequently reported high expertise—after all, there are not many such restaurants and they nevertheless listed quite a few, so they must know a lot about town. We anticipate similar judgment-order effects in debiasing. Whenever a preceding judgment entails an attribution of one's metacognitive experience, it may render the experience uninformative for other judgments, paralleling the misattribution effects reviewed above.

Similar considerations apply to people's inferences from experienced fluency of processing (see Schwarz, 2004). The model shown in Fig. 1 incorporates naive theories and assumes that they supply the inference rules that are applied to a given accessibility experience. Once an experience-based inference is drawn, the experience is uninformative for judgments that require the application of a different inference rule.

B. TEMPORAL CHANGES

Theoretically, it is likely that accessibility experiences change over time, with differential effects on immediate and delayed judgments. Suppose, for example, that participants in a hindsight bias experiment are asked to generate many thoughts about alternatives. Experiencing this as difficult, they will conclude that the event was rather inevitable, as seen above (Sanna et al., 2002a,b). Yet a couple of days later the previously generated thoughts about alternatives may come to mind easily, potentially turning the initial backfire effect into a delayed debiasing success.

Conversely, suppose that the outcome of an event initially elicits high surprise. Surprise is ''a cognitive state having to do with unexpectedness'' (Ortony, Clore, & Collins, 1988, p. 33) and its experience curtails hindsight bias (Ofir & Mazursky, 1997). Yet surprising events also elicit explanatory activity and sense-making (Pezzo, 2003), which renders outcome congruent thoughts easily accessible downstream. As a result, a metacognitive experience that curtails hindsight bias initially may give rise to increased hindsight bias after a delay.

Temporal shifts may be particularly likely when outcomes are especially important, striking, or impactful. At first, the shock of the outcome elicits a strong sense of surprise, and events appear to have been very unpredictable. However, as people strive to understand what happened, the search for explanations makes potential causes highly accessible, resulting in the conclusion that it could have been foreseen and should have been prevented. Public discourse following the 9/11 terror attacks is consistent with this conjecture (for a review see Wirtz, 2006). Media coverage may further change the metacognitive experiences associated with events through frequent repetition of key event scenes, rendering them highly accessible and fluent, with far reaching implications for public opinion, calls for relevant policy, and individual coping strategies. To date, little is known about such temporal trajectories.

C. METACOGNITIVE EXPERIENCES IN GROUPS

Many decisions are made in groups and theories of group decision making share the usual focus on declarative information (for reviews see Kerr & Tindale, 2004; Kerr et al., 1996). At present, little is known about the role of metacognitive experiences in group decision making (but see Sanna, Parks, Chang, & Carter, 2005). For example, does the ease of collectively generating thoughts influence groups in the same way as individuals? Which naive theories do people hold about thought generation in groups? They probably assume that pooled resources make collective thought generation easier than individual thought generation; but do they also assume that group pressure or distraction may impede thought generation under some conditions? Which theory do they apply under which conditions? Assuming that people believe that coming up with many thoughts is easier in groups than individually, would group members find a collective experience of ease *less* informative than an individual one? Conversely, would they find a collective experience of difficulty *more* informative than an individual one?

Exploring these and related issues will contribute to our understanding of group decision making and may fruitfully extend the exploration of metacognitive processes beyond the individual domain.

Acknowledgments

References

Aarts, H., & Dijksterhuis, A. (1999). How often did I do it? Experienced ease of retrieval and frequency estimates of past behavior. *Acta Psychologica, 103,* 77–89.

Allport, F. H., & Lepkin, M. (1945). Wartime rumors of waste and special privilege: Why some people believe them. *Journal of Abnormal and Social Psychology, 40,* 3–36.

Allport, F. H., & Postman, L. J. (1947). *The psychology of rumor.* New York: Holt, Rinehart, & Winston.

Arkes, H. R. (1991). Costs and benefits of judgmental errors: Implications for debiasing. *Psychological Bulletin, 110,* 486–498.

Begg, I. M., Anas, A., & Farinacci, S. (1992). Dissociation of processes in belief: Source recollection, statement familiarity, and the illusion of truth. *Journal of Experimental Psychology: General, 121,* 446–458.

Bodenhausen, G. V., & Wyer, R. S. (1987). Social cognition and social reality: Information acquisition and use in the laboratory and the real world. In H. J. Hippler, N. Schwarz, & S. Sudman (Eds.), *Social information processing and survey methodology* (pp. 6–41). New York: Springer-Verlag.

Bredart, S., & Modolo, K. (1988). Moses strikes again: Focalization effect on a semantic illusion. *Acta Psychologica, 67,* 135–144.

Brewer, W. F. (1992). Phenomenal experience in laboratory and autobiographical memory. In M. A. Conway, D. C. Rubin, H. Spinner, & W. A. Wagenaar (Eds.), *Theoretical perspectives in autobiographical memory* (pp. 31–51). Netherlands: Kluwer.

Buehler, R., Griffin, D., & MacDonald, H. (1997). The role of motivated reasoning in optimistic time predictions. *Personality and Social Psychology Bulletin, 23,* 238–247.

Buehler, R., Griffin, D., & Ross, M. (1994). Exploring the ''planning fallacy'': Why people underestimate their task completion times. *Journal of Personality and Social Psychology, 67,* 366–381.

Camerer, C. F., & Hogarth, R. M. (1999). The effects of financial incentives in experiments: A review and capital-labor-production framework. *Journal of Risk and Uncertainty, 19,* 7–42.

Christensen, A. J., Moran, P. J., & Wiebe, J. S. (1999). Assessment of irrational health beliefs. *Health Psychology, 18,* 169–176.

Christensen-Szalanski, J. J. J., & Willham, C. F. (1991). The hindsight bias: A meta-analysis. *Organizational Behavior and Human Decision Processes, 48,* 147–168.

Dechow, P. M., Hutton, A. P., & Sloan, R. G. (2000). The relation between analysts' forecasts of long-term earnings growth and stock price performance following equity offerings. *Contemporary Accounting Research, 17,* 1–32.

Emery, D. (2000, February 23). *The great banana scare of 2000.* Retrieved July 17, 2004, from http://urbanlegends.about.com/od/fooddrink/a/killer_bananas.htm

Erickson, T. A., & Mattson, M. E. (1981). From words to meaning: A semantic illusion. *Journal of Verbal Learning and Verbal Behavior, 20,* 540–552.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7,* 123–146.

Fischhoff, B. (1975). Hindsight ≠ foresight: The effect of outcome knowledge on judgments under uncertainty. *Journal of Experimental Psychology: Human Perception and Performance, 1,* 288–299.

Fischhoff, B. (1982). Debiasing. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 442–444). New York: Cambridge University Press.

Fragale, A. R., & Heath, C. (2004). Evolving information credentials: The (mis)attribution of believable facts to credible sources. *Personality and Social Psychology Bulletin, 30,* 225–236.

Gilovich, T., Griffin, D., & Kahneman, D. (2002). *Heuristics and biases: The psychology of intuitive judgment*. New York: Cambridge University Press.

Grice, H. P. (1975). Logic and conversation. In P. Cole & J. L. Morgan (Eds.), *Syntax and semantics* (Vol. 3: Speech acts, pp. 41–58). New York: Academic Press.

Guilbault, R. L., Bryant, F. B., Brockway, H. H., & Posavac, E. J. (2004). A meta-analysis of research on hindsight bias. *Basic and Applied Social Psychology, 26,* 103–117.

Haddock, G., Rothman, A. J., Reber, R., & Schwarz, N. (1999). Forming judgments of attitude certainty, importance, and intensity: The role of subjective experiences. *Personality and Social Psychology Bulletin, 25,* 771–782.

Hasher, L., Goldstein, D., & Toppino, T. (1977). Frequency and the conference of referential validity. *Journal of Verbal Learning and Verbal Behavior, 16,* 107–112.

Hawkins, S. A., & Hastie, R. (1990). Hindsight: Biased judgments of past events after the outcomes are known. *Psychological Bulletin, 107,* 311–327.

Hawkins, S. A., & Hoch, S. J. (1992). Low-involvement learning: Memory without evaluation. *Journal of Consumer Research, 19,* 212–225.

Heiman, V. B. (1990). Auditors' assessments of the likelihood of error explanations in analytical review. *The Accounting Review, 65,* 875–890.

Hovland, C. I., & Weiss, W. (1951). The influence of source credibility on communication effectiveness. *Public Opinion Quarterly, 15,* 635–650.

Jacoby, L. L., Kelley, C. M., & Dywan, J. (1989). Memory attributions. In H. L. Roediger & F. I. M. Craik (Eds.), *Varieties of memory and consciousness: Essays in honour of Endel Tulving* (pp. 391–422). Hillsdale, NJ: Erlbaum.

Kadous, K., Krische, S. D., & Sedor, L. M. (2006). Using counter-explanation to limit analysts' forecast optimism. *The Accounting Review, 81,* 377–397.

Kahneman, D., Slovic, P., & Tversky, A. (Eds.) (1982). *Judgment under uncertainty: Heuristics and biases.* New York: Cambridge University Press.

Kahneman, D., & Tversky, A. (1979). Intuitive prediction: Biases and corrective procedures. *Management Science, 12,* 313–327.

Kelley, C. M., & Rhodes, M. G. (2002). Making sense and nonsense of experience: Attributions in memory and judgment. *The Psychology of Learning and Motivation, 41,* 293–320.

Kerr, N. L., MacCoun, R. J., & Kramer, G. P. (1996). Bias in judgment: Comparing groups and individuals. *Psychological Review, 103,* 687–719.

Kerr, N. L., & Tindale, R. S. (2004). Group performance and decision making. *Annual Review of Psychology, 55,* 623–655.

Koehler, D. J. & Harvey, N. (Eds.) (2004). *Blackwell handbook of judgment and decision making.* Oxford: Blackwell Publishing.

Koenig, F. (1985). *Rumor in the market place: The social psychology of commercial hearsay*. Dover, MA: Auburn House.

Koonce, L. (1992). Explanation and counter-explanation during audit analytical reviews. *The Accounting Review, 67,* 59–76.

Koriat, A., Lichtenstein, S., & Fischhoff, B. (1980). Reasons for confidence. *Journal of Experimental Psychology: Human Learning & Memory, 6,* 107–118.

Lachman, R., Lachman, J. T., & Butterfield, E. C. (1979). *Cognitive psychology and information processing.* Hillsdale, NJ: Erlbaum.

Larrick, R. P. (2004). Debiasing. In D. J. Koehler & N. Harvey (Eds.), *Blackwell handbook of judgment and decision making* (pp. 316–337). Oxford: Blackwell Publishing.

Leary, M. R. (1982). Hindsight distortion and the 1980 presidential election. *Personality and Social Psychology Bulletin, 8,* 257–263.

Lerner, J. S., & Tetlock, P. E. (1999). Accounting for the effects of accountability. *Psychological Bulletin, 125,* 225–275.

Lopes, L. L. (1994). Psychology and economics: Perspectives on risk, cooperation, and the marketplace. *Annual Review of Psychology, 45,* 197–227.

McGlone, M. S., & Tofighbakhsh, J. (2000). Birds of a feather flock conjointly (?): Rhyme as reason in aphorisms. *Psychological Science, 11,* 424–428.

McQuail, D. (2000). *McQuail's mass communication theory.* Newbury Park, CA: Sage.

Newby-Clark, I. R., Ross, M., Buehler, R., Koehler, D. J., & Griffin, D. (2000). People focus on optimistic scenarios and disregard pessimistic scenarios while predicting task completion times. *Journal of Experimental Psychology: Applied, 6,* 171–182.

Nisan, M. (1972). Dimension of time in relation to choice behavior and achievement orientation. *Journal of Personality and Social Psychology, 21,* 175–182.

Nisbett, R. E., & Ross, L. (1980). *Human inference: Strategies and shortcomings of social judgment.* New York: Prentice Hall.

Novemsky, N., Dhar, R., Schwarz, N., & Simonson, I. (in press). Preference fluency in consumer choice. *Journal of Marketing Research.*

Ofir, C., & Mazursky, D. (1997). Does a surprising outcome reinforce or reverse the hindsight bias? *Organziational Behavior and Human Decision Processes, 69,* 51–57.

Ortony, A., Clore, G. L., & Collins, A. (1988). *The cognitive structure of emotions.* London: Cambridge University Press.

Park, D. C. (2000). The basic mechanisms accounting for age-related decline in cognitive function. In D. C. Park & N. Schwarz (Eds.), *Cognitive aging: A primer* (pp. 3–22). Philadelphia, PA: Psychology Press.

Park, H, & Reder, L. M. (2003). Moses illusion. In R. F. Pohl (Ed.), *Cognitive illusions* (pp. 275–292). New York, NY: Psychology Press.

Pezzo, M. V. (2003). Surprise, defence, or making sense: What removes the hindsight bias? *Memory, 11,* 421–441.

Plous, S. (1993). *The psychology of judgment and decision making.* New York: McGraw-Hill.

Pohl, R. F. (2005). *Cognitive illusions: A handbook on fallacies and biases in thinking, judgment and memory.* New York: Routledge.

Powell, J. L. (1988). A test of the knew-it-all-along effect in the 1984 presidential statewide elections. *Journal of Applied Social Psychology, 18,* 760–773.

Reber, R., & Schwarz, N. (1999). Effects of perceptual fluency on judgments of truth. *Consciousness and Cognition, 8,* 338–342.

Reber, R., Schwarz, N., & Winkielman, P. (2004). Processing fluency and aesthetic pleasure: Is beauty in the perceiver's processing experience? *Personality and Social Psychology Review, 8,* 364–382.

Reder, L. M., & Kusbit, G. W. (1991). Locus of the Moses illusion: Imperfect encoding, retrieval or match? *Journal of Memory and Language, 30,* 385–406.

Rice, R. & Atkin, C. (Eds.) (2001). *Public communication campaigns* (3rd ed.). Newbury Park, CA: Sage.

Roediger, H. L. (1996). Memory illusions. *Journal of Memory and Language, 35,* 76–100.

Rosnow, R. L., & Fine, G. A. (1976). *Rumor and gossip: The social psychology of hearsay.* New York: Elsevier.

Sanna, L. J., Chang, E. C., & Carter, S. E. (2004). All our troubles seem so far away: Temporal pattern to accessible alternatives and retrospective team appraisals. *Personality and Social Psychology Bulletin, 30,* 1359–1371.

Sanna, L. J., Parks, C. D., Chang, E. C., & Carter, S. E. (2005). The hourglass is half full or half empty: Temporal framing and the group planning fallacy. *Group Dynamics: Theory, Research, and Practice, 9,* 173–188.

Sanna, L. J., & Schwarz, N. (in press). Metacognitive experiences and hindsight bias: It's not just the thought (content) that counts! *Social Cognition.*

Sanna, L. J., & Schwarz, N. (2006). Metacognitive experiences and human judgment: The case of hindsight bias and its debiasing. *Current Directions in Psychological Science, 15,* 172–176.

Sanna, L. J., & Schwarz, N. (2003). Debiasing the hindsight bias: The role of accessibility experiences and (mis)attributions. *Journal of Experimental Social Psychology, 39,* 287–295.

Sanna, L. J., & Schwarz, N. (2004). Integrating temporal biases: The interplay of focal thoughts and accessibility experiences. *Psychological Science, 15,* 474–481.

Sanna, L. J., Schwarz, N., & Small, E. M. (2002a). Accessibility experiences and the hindsight bias: I knew it all along versus it could never have happened. *Memory & Cognition, 30,* 1288–1296.

Sanna, L. J., Schwarz, N., & Stocker, S. L. (2002b). When debiasing backfires: Accessible content and accessibility experiences in debiasing hindsight. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 28,* 497–502.

Schwarz, N. (1994). Judgment in a social context: Biases, shortcomings, and the logic of conversation. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 26, pp. 123–162). San Diego: Academic Press.

Schwarz, N. (1996). *Cognition and communication: Judgmental biases, research methods, and the logic of conversation.* Hillsdale, NJ: Erlbaum.

Schwarz, N. (1998). Accessible content and accessibility experiences: The interplay of declarative and experiential information in judgment. *Personality and Social Psychology Review, 2,* 87–99.

Schwarz, N. (2004). Metacognitive experiences in consumer judgment and decision making. *Journal of Consumer Psychology, 14,* 332–348.

Schwarz, N., Bless, H., Strack, F., Klumpp, G., Rittenauer-Schatka, H., & Simons, A. (1991). Ease of retrieval as information: Another look at the availability heuristic. *Journal of Personality and Social Psychology, 61,* 195–202.

Schwarz, N., Cho, H., & Xu, J. (2005). Diverging inferences from identical inputs: The role of naive theories. Paper presented at the European Association of Experimental Social Psychology, Würzburg, Germany.

Schwarz, N., & Clore, G. L. (in press). Feelings and phenomenal experiences. In E. T. Higgins A. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (2nd ed.). New York: Guilford.

Shafir, E., & LeBoeuf, R. A. (2002). Rationality. *Annual Review of Psychology, 53,* 491–517.

Shepperd, J. A., Ouellette, J. A., & Fernandez, J. K. (1996). Abandoning unrealistic optimism: Performance estimates and the temporal proximity of self-relevant feedback. *Journal of Personality and Social Psychology, 70,* 844–855.

Skurnik, I., Schwarz, N., & Winkielman, P. (2000). Drawing inferences from feelings: The role of naive beliefs. In H. Bless & J. Forgas (Eds.), *The message within: The role of subjective experience in social cognition and behavior* (pp. 162–175). Philadelphia, PA: Psychology Press.

Skurnik, I., Yoon, C., Park, D. C., & Schwarz, N. (2005). How warnings about false claims become recommendations. *Journal of Consumer Research, 31,* 713–724.

Skurnik, I., Yoon, C., & Schwarz, N. (2007). Education about flu can reduce intentions to get a vaccination. Manuscript under review.

Song, H., & Schwarz, N. (2007). Low processing fluency attenuates the Moses illusion. Manuscript under review.

Stepper, S., & Strack, F. (1993). Proprioceptive determinants of emotional and nonemotional feelings. *Journal of Personality and Social Psychology, 64,* 211–220.

Tellis, G. J. (2004). *Effective advertising.* Thousand Oaks, CA: Sage.

Tormala, Z. L., Petty, R. E., & Brinol, P. (2002). Ease of retrieval effects in persuasion: A self-validation analysis. *Personality and Social Psychology Bulletin, 28,* 1700–1712.

Tulving, E. (1989). Memory: Performance, knowledge, and experience. *European Journal of Cognitive Psychology, 1,* 3–26.

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology, 5,* 207–232.

van Oostendorp, H., & de Mul, S. (1990). Moses beats Adam: A semantic relatedness effect on a semantic illusion. *Acta Psychologica, 74,* 35–46.

Wänke, M., Bless, H., & Biller, B. (1996). Subjective experiences versus content of information in the construction of attitude judgments. *Personality and Social Psychology Bulletin, 22,* 1105–1113.

Wänke, M., Bohner, G., & Jurkowitsch, A. (1997). There are many reasons to drive a BMW—Surely you know one: Ease of Argument Generation influences Brand Attitudes. *Journal of Consumer Research, 24,* 70–77.

Weaver, K., Garcia, S. M., Schwarz, N., & Miller, D. T. (in press). Metacognitive beliefs about group opinion: Inferences of extensity from familiarity. *Journal of Personality and Social Psychology.*

Webley, P., Burgoyne, C. B., Lea, S. E. G., & Young, B. M. (2001). *The economic psychology of everyday life.* New York: Psychology Press.

Werth, L., & Strack, F. (2003). An inferential approach to the knew-it-all-along phenomenon. *Memory, 11,* 411–419.

Whittlesea, B. W. A. (1993). Illusions of familiarity. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 19,* 1235–1253.

Whittlesea, B. W. A., Jacoby, L. L., & Girard, K. (1990). Illusions of immediate memory: Evidence of an attributional basis for feelings of familiarity and perceptual quality. *Journal of Memory and Language, 29,* 716–732.

Wilson, T. D., & Brekke, N. (1994). Mental contamination and mental correction: Unwanted influences on judgments and evaluations. *Psychological Bulletin, 116,* 117–142.

Winkielman, P., & Cacioppo, J. T. (2001). Mind at ease puts a smile on the face: Psychophysiological evidence that processing facilitation leads to positive affect. *Journal of Personality and Social Psychology, 81,* 989–1000.

Winkielman, P., Schwarz, N., & Belli, R. F. (1998). The role of ease of retrieval and attribution in memory judgments: Judging your memory as worse despite recalling more events. *Psychological Science, 9,* 124–126.

Winkielman, P., Schwarz, N., Fazendeiro, T, & Reber, R. (2003). The hedonic marking of processing fluency: Implications for evaluative judgment. In J. Musch & K. C. Klauer (Eds.), *The psychology of evaluation: Affective processes in cognition and emotion* (pp. 189–217). Mahwah, NJ: Erlbaum.

Wirtz, J. J. (2006). Responding to surprise. *Annual Review of Political Science, 9,* 45–65.

Witherspoon, D., & Allan, L. G. (1985). The effects of a prior presentation on temporal judgments in a perceptual identification task. *Memory and Cognition, 13,* 103–111.

Wyer, R. S., & Srull, T. K. (1989). *Memory and cognition in its social context.* Hillsdale, NJ: Erlbaum.