

Metacognitive Experiences and Human Judgment

The Case of Hindsight Bias and Its Debiasing

Lawrence J. Sanna¹ and Norbert Schwarz²

¹University of North Carolina at Chapel Hill and ²University of Michigan

ABSTRACT—Theories of judgment have emphasized the influence of what comes to mind—the content of people’s thoughts. But recent research shows that metacognitive experiences accompanying thinking, like a sense of the ease or difficulty with which information comes to mind, qualify the conclusions that people derive from thought content. The case of hindsight bias and attempts to remove that bias (debiasing) illustrate this. After an event outcome is known, people display hindsight bias by exaggerating its inevitability, believing they “knew it all along.” The magnitude of hindsight bias varies with the ease or difficulty that known or alternative outcomes come to mind; the usually observed hindsight bias may even reverse when outcomes are difficult to bring to mind or increase when alternatives are difficult to bring to mind. Implications of metacognitive experiences can extend to other biases and their debiasing, as well as to how people make sense of the past more generally.

KEYWORDS—metacognition; hindsight bias; debiasing; temporal judgment

On September 11, 2001, nineteen terrorist hijackers took control of four commercial airplanes. Two airplanes were crashed into the World Trade Center, one was crashed into the Pentagon, and the fourth crashed in a rural field in Pennsylvania.

On November 9, 1989, the wall dividing West Berlin from East Berlin was opened, symbolizing the end of the Cold War. In the following weeks, people arrived with sledgehammers, physically demolishing the wall section by section.

On August 29, 2005, a category-four hurricane made landfall. The storm surge and high winds caused catastrophic damage along the coastlines of Alabama, Mississippi, and Louisiana, including devastating levee breaks in the city of New Orleans.

Even the most casual observer of the past two decades is familiar with the events of 9/11, the fall of the Berlin Wall, and hurricane Katrina. However, imagine back to a time before you heard about these events. Imagine, in fact, that they never occurred. Now, how inevitable do you think it is that terrorists would attack by crashing airplanes into buildings, that Berlin would be reunited, or that a major hurricane would flood 80% of New Orleans? Can you ignore the known outcomes when making these judgments?

Research on *hindsight bias* suggests you cannot. Identified by Fischhoff (1975), hindsight bias refers to people’s exaggerated sense of inevitability once outcomes are known, relative to foresight estimates when outcomes are unknown. People routinely overestimate how much they “knew it all along,” potentially producing negative consequences like overconfidence or inability to learn from mistakes. For example, students who view exam failures as inevitable may not take steps to improve; security officials who, after-the-fact, view terrorist attacks as foreseeable may spend more time blaming than working to further defense.

Hindsight bias is pervasive across numerous contexts like medical diagnoses, legal judgments, athletic wins and losses, electoral results, and other everyday outcomes; a key question is: What causes it? Initial theories focused on what people think about (thought content; for reviews, see Guilbault, Bryant, Posavac, & Brockway, 2004; Hawkins & Hastie, 1990). Thinking about known outcomes was presumed to produce hindsight bias; thinking about alternatives to known outcomes was presumed to reduce it.

But more recent research suggests that those theories neglected a crucial component: Hindsight bias is also caused partly by people’s *metacognitive experiences*, or subjective

Address correspondence to Lawrence J. Sanna, Department of Psychology, CB# 3270 Davie Hall, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-3270; e-mail: sanna@unc.edu.

experiences that accompany the thinking process. Only by considering the interplay of thought content and metacognitive experiences can hindsight bias be fully understood and explained. Moreover, this interplay also specifies the conditions under which hindsight bias can be lessened or even reversed, thereby also bearing on *debiasing* strategies.

METACOGNITIVE EXPERIENCES

Metacognitive experiences include emotions like surprise, ease or difficulty of processing new information, or ease or difficulty of recalling information from memory or generating thoughts about events. Metacognitive experiences influence a wide variety of judgments by qualifying the implications of thought content (for reviews, see Schwarz, 1998, 2004).

Evidence From Surprise and Processing Fluency

Metacognitive experiences of surprise and processing fluency bear on the extent to which information seems unexpected or novel. Surprise provides information about prior knowledge. High surprise indicates that outcomes deviate from expectations; low surprise indicates that outcomes are consistent with expectations. Hence, surprise can influence hindsight bias—after all, outcomes would not be surprising if one “knew it all along.” Across several studies, Ofir and Mazursky (1997) demonstrated that hindsight bias occurs following outcomes eliciting low or moderate surprise. However, high surprise reverses hindsight bias: People infer that outcomes were unexpected, reducing the extent to which they seem inevitable.

Similarly, familiar information is easier to process than new information is. Any variable that facilitates fluent processing (e.g., an easy-to-read typeface) increases feelings of familiarity (Schwarz, 2004). High familiarity fosters the impression that one knew the information all along. In a pair of studies, Werth and Strack (2003) presented people with general-knowledge questions and answers (e.g., “How high is the Eiffel tower?”—“300 meters”), and asked them to report what they would have answered had they not been given the answers. Questions and answers were presented in colors that were easy or difficult to read against the background. People were more likely to believe they “knew” the correct answer all along when the material was easy to read than when it was difficult to read. Feelings of familiarity accompanying fluent processing thus increase hindsight bias, whereas disfluent processing decreases hindsight bias—and even small changes in variables like the readability of a typeface are enough to shift beliefs about what was known.

Harley, Carlsen, and Loftus (2004) found a visual hindsight bias that is also driven by processing fluency. People attempted to identify degraded photos of celebrity faces as they gradually resolved to full clarity, and then predicted how others would perform at this task. Having just seen the faces, people mistook their own processing fluency to indicate that naive observers

would be able to identify the faces sooner than they themselves did. People thus concluded that, in comparison with their own earlier performance at this task, others “would see the faces all along.”

Evidence From Thought Generation

Across several studies, Sanna, Schwarz, and Small (2002, Experiment 1; see also Sanna, Schwarz, & Stocker, 2002) had people read about a battle in the British–Gurkha war (a story adapted from Fischhoff, 1975) that, they were told, the British won. The participants were asked to list 2 or 10 reasons why the British won or 2 or 10 reasons why the Gurkhas might have won instead. If only thought content mattered, a British victory should seem more likely the more pro-British thoughts people generated and less likely the more pro-Gurkha thoughts they generated. But the exact opposite occurred (Fig. 1): Listing 10 thoughts about a British victory (known outcome) decreased hindsight bias relative to only listing 2 thoughts; listing 10 thoughts about a Gurkha victory (alternative outcome) increased it relative to only listing 2 thoughts.

This is unexplainable by thought content alone. Participants’ self-reports indicated that listing 2 thoughts was easy and listing 10 thoughts was difficult, irrespective of whether they focused on the known outcome or the alternative outcome. The known outcome (i.e., British victory) was seen as unlikely when it was difficult to think of reasons for it—after all, if there were many reasons for a British victory, it would not be so hard to think of 10. Conversely, people inferred that the alternative outcome (i.e., a

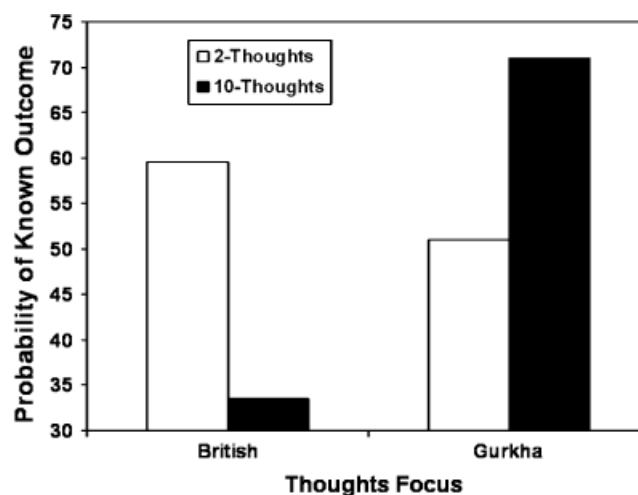


Fig. 1. Mean estimated probability of a known outcome (British war victory over the Gurkhas) in percentages. All participants were told that the British won (known outcome). Some participants listed 2 or 10 thoughts focusing on reasons why the British won; other participants listed 2 or 10 thoughts focusing on reasons why the Gurkhas could have won (alternative outcome). Finally, all participants were asked, “If we hadn’t already told you who had won, what would you have thought the probability of the British winning would be?” Participants reported estimates on a 0 to 100 scale. Adapted from Sanna, Schwarz, and Small (2002, Experiment 1).

Gurkha victory) was unlikely when it was difficult to think of reasons for it.

Even bodily feedback can influence people's metacognitive experiences. Sanna, Schwarz, and Small (2002, Experiment 2) asked all participants to list five reasons for the same British victory and five reasons for the Gurkha defeat—equalizing the content of people's thoughts this time—but varying the experienced difficulty by having some participants contract their corrugator muscles—that is, furrowing their brows (Fig. 2). Furrowing one's brow creates a feeling of mental effort (see Strack & Neumann, 2000); replicating the prior pattern, participants considered a British victory less likely when they furrowed their brows while listing pro-British thoughts, but more likely when they furrowed their brows while listing pro-Gurkha thoughts.

These findings are consistent with many other domains in which people's judgments are only consistent with thought content when recall or thought generation is easy and are opposite to thought content when recall or thought generation is difficult (see Schwarz, 1998).

NEW THEORETICAL FRAMEWORK

The observed interplay of thought content and metacognitive experiences requires a new theoretical framework for understanding hindsight bias and related phenomena (Table 1).

Hindsight Bias

Theories focused on thought content presume that outcome knowledge increases the accessibility of event-consistent information (see Guilbault et al., 2004; Hawkins & Hastie, 1990).

Drawing on this information, people infer that the outcome was inevitable and they knew it all along. But this may occur only when outcomes are unsurprising and the outcome-consistent information is easily processed, recalled, or generated. Metacognitive experiences are thus a previously unidentified but necessary ingredient for the emergence of hindsight bias.

“It Could Never Have Happened”

When outcomes are surprising (Ofir & Mazursky, 1997) or outcome-consistent information is difficult to process, recall, or generate, these metacognitive experiences can give rise to an “it could never have happened” effect (Sanna, Schwarz, & Small, 2002). Some metacognitive experiences can thus result in judgments that are completely opposite to the implications of thought content: Difficulty in thinking about known outcomes leads people to infer that they are less inevitable.

Debiasing

Trying “to convince oneself that it might have turned out otherwise” (Fischhoff, 1982, p. 343) is the most frequently recommended debiasing strategy (see Guilbault et al., 2004; Hawkins & Hastie, 1990). But this is only likely to work when the alternative outcomes are unsurprising and information supporting them is easily processed, recalled, or generated—which may explain why this debiasing technique often meets with limited success (Hawkins & Hastie, 1990) and sometimes backfires.

Backfire

When alternatives to known outcomes are surprising or when information bearing on them is difficult to process, recall, or



Fig. 2. Photographs depicting contracted corrugator muscle (furrowed brow) used to manipulate metacognitive experience in a study of hindsight bias. Participants were told to “contract your brow by moving your eyebrows toward the center of your forehead as depicted in the photographs.” Manipulation checks indicated that this procedure was effective in creating a sense of mental effort. Adapted from Sanna, Schwarz, and Small (2002, Experiment 2).

TABLE 1
Interplay of Thought Focus and Metacognitive Experiences in Hindsight Bias and Related Effects

Effect	Focus	Metacognitive experience	Outcome inference
Hindsight bias	Outcome	Unsurprising, fluent, easily recalled or generated	Inevitable
It-could-never- have-happened	Outcome	Surprising, disfluent, difficultly recalled or generated	Less inevitable
Debiasing	Alternative	Unsurprising, fluent, easily recalled or generated	Less inevitable
Backfire	Alternative	Surprising, disfluent, difficultly recalled or generated	Inevitable

Note. Other metacognitive experiences might be relevant to hindsight bias; those listed are examples.

generate, metacognitive experiences may give rise to a “backfire” effect (Sanna, Schwarz, & Small, 2002; Sanna, Schwarz, & Stocker, 2002). Most importantly, the difficulty of trying to think of many ways in which an event could have turned out otherwise only leaves people all the more convinced that it was inevitable (e.g., Sanna, Schwarz, & Stocker, 2002). Metacognitive experiences of difficulty thus limit the effectiveness of the frequently recommended debiasing strategy of generating many alternatives (e.g., Fischhoff, 1982)—and may even be counterproductive. Ironically, the opposite strategy is more likely to be effective: Asking people to generate many reasons why the event had to occur reliably reduces hindsight bias (Sanna, Schwarz, & Small, 2002)—although at the risk of a possible “it could never have happened” effect.

INFORMATIVENESS OF EXPERIENCES

People rely on their metacognitive experiences by default. They assume that any thoughts that come to mind, or experiences they have, while thinking about X are in fact “about” X—or else why would they be having those thoughts or experiences at that time? However, metacognitive experiences can be discounted when their pertinence to the judgment at hand is called into question (for reviews, see Schwarz, 1998, 2004).

People listing many thoughts about how Gore might have won the 2000 U.S. Presidential election concluded after the fact that they never expected Gore to win—even though prior to the election the same individuals predicted a large margin of victory for Gore over Bush (Sanna & Schwarz, 2003). But when people were asked how much they knew about politics after listing many thoughts on the subject, they attributed their difficulty of thought generation to their own lack of expertise, rendering the metacognitive experiences uninformative. In this case, people relied on the many pro-Gore thoughts they had generated and recalled that they had predicted an even wider margin of victory for Gore over Bush than they had actually predicted prior to the election. This latter finding is consistent with other studies demonstrating that people rely solely on thought content once the informational value of their metacognitive experiences is discredited (Schwarz, 1998, 2004).

The impact of metacognitive experiences can thus depend on varying situational influences. For example, people may find difficulty of thought generation uninformative when the envi-

ronment is noisy and distracting, but may find ease of thought generation particularly informative under these same conditions. Similarly, high surprise may lessen hindsight bias only when it is perceived as a diagnostic response to the outcome information, but not otherwise.

BROADER IMPLICATIONS AND FUTURE DIRECTIONS

As the case of hindsight bias illustrates, people’s judgments cannot be accounted for solely on the basis of what comes to mind but must be understood also in terms of people’s metacognitive experiences, like how hard or easily those thoughts come to mind. This same observation can hold true for numerous other phenomena of judgment.

Applications to Other Biases and Debiasing

People are susceptible to many judgmental biases besides hindsight bias. For example, people are likely to think they can complete tasks sooner than they actually do (planning fallacy), overestimate their emotional reactions to future events (affective-forecasting impact bias), or reduce their confidence in success as the time to perform approaches (confidence changes). Like hindsight bias, each of these biases similarly suggests that people are less accurate in decision making than may be desirable. For example, a contractor who underestimates the construction time needed may later have to deal with major cost overruns.

These diverse biases are subject to the same interplay of thought content and metacognitive experiences that is observed in the case of hindsight bias (see Sanna & Schwarz, 2004). As with hindsight bias, generating thoughts meant to give rise to the respective biases did so only when they were easy to bring to mind; finding it difficult to generate those thoughts lessened or reversed the respective bias. Conversely, thoughts expected to debias judgment did so only when they were easy to bring to mind; difficulty of thought generation increased the respective bias.

Metacognitive experiences could influence a host of other biases, such as people’s search for information-supporting preconceptions (confirmation bias) or the tendency to overestimate abilities (overconfidence bias), among many others. The flip side is that metacognitive experiences may be relevant to debiasing

these biases, helping people to become more accurate decision makers. Without knowledge of metacognitive experiences, techniques intended to lessen biases may in fact make them worse, as the described backfire effect illustrates. Future research may apply the metacognitive framework we have developed for understanding hindsight bias to other phenomena having to do with judgment.

Sense Making and Public Policy

Another future direction is understanding how people make sense of the past. As time passes, people may begin to make sense even of the most surprising events. Initially, high surprise can limit hindsight bias (Ofir & Mazursky, 1997). But because surprise also elicits more explanatory activity (Pezzo, 2003), plausible explanations may easily come to mind later on and hindsight bias may then creep in—"I was surprised but I really should have expected this." On a personal level, this may leave people less able to learn from mistakes as time passes, as with the student who views exam failure as inevitable and thus does not take steps to improve. On a public level, this could also have important policy implications. Temporal shifts may be particularly likely when outcomes are especially important or striking or have high impact, like the 9/11 attacks. 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—possibly leading to more blaming than actually working to further defense. Public discourse following 9/11 is certainly consistent with this conjecture. Media coverage may further change the metacognitive experiences associated with events. For example, frequent repetition of key event scenes in the news may contribute to hindsight bias by rendering the event more fluent, and this may have far-reaching implications for public opinion, calls for relevant policy, and individual coping strategies. These possibilities are promising avenues for further research.

Recommended Reading

- Christensen-Szalanski, J.J.J., & Willham, C.F. (1991). The hindsight bias: A meta-analysis. *Organizational Behavior and Human Decision Processes*, *48*, 147–168.
- Hoffrage, U., & Pohl, R.F. (Eds.). (2003). Hindsight bias [Special issue]. *Memory*, *11*(4/5).
- Sanna, L.J., & Chang, E.C. (Eds.). (2006). *Judgments over time: The interplay of thoughts, feelings, and behaviors*. New York: Oxford University Press.

- Sanna, L.J., Schwarz, N., & Small, E.M. (2002). (See References)
- Schwarz, N. (2004). (See References)

REFERENCES

- Fischhoff, B. (1975). Hindsight \neq foresight: The effect of outcome knowledge on judgments under uncertainty. *Journal of Experimental Psychology: Human Perception and Performance*, *1*, 288–299.
- Fischhoff, B. (1982). For those condemned to study the past: Heuristics and biases in hindsight. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 332–351). New York: Cambridge University Press.
- Guilbault, R.L., Bryant, F.B., Posavac, E.J., & Brockway, J.H. (2004). A meta-analysis of research on hindsight bias. *Basic and Applied Social Psychology*, *26*, 103–117.
- Harley, E.M., Carlsen, K.A., & Loftus, G.R. (2004). The "saw-it-all-along" effect: Demonstrations of visual hindsight bias. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *30*, 960–968.
- Hawkins, S.A., & Hastie, R. (1990). Hindsight: Biased judgments of past events after the outcomes are known. *Psychological Bulletin*, *107*, 311–327.
- Ofir, C., & Mazursky, D. (1997). Does a surprising outcome reinforce or reverse the hindsight bias? *Organizational Behavior and Human Decision Processes*, *69*, 51–57.
- Pezzo, M.V. (2003). Surprise, defence, or making sense: What removes the hindsight bias? *Memory*, *11*, 421–441.
- 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. (2002). 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. (2002). When debiasing backfires: Accessible content and accessibility experiences in debiasing hindsight. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *28*, 497–502.
- 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.
- Strack, F., & Neumann, R. (2000). Furrowing the brow may undermine perceived fame: The role of facial feedback in judgments of celebrity. *Personality and Social Psychology Bulletin*, *26*, 762–768.
- Werth, L., & Strack, F. (2003). An inferential approach to the knew-it-all-along phenomenon. *Memory*, *11*, 411–419.