

# When Thinking Feels Difficult: Meta-Cognitive Experiences in Judgment and Decision Making

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*Most models of judgment and decision making focus solely on what comes to mind. This focus on thought content misses that the meta-cognitive experiences that accompany the thought process are informative in their own right. These experiences include the ease or difficulty with which information can be brought to mind or reasons can be generated (accessibility experiences) and the fluency with which new information can be processed (processing fluency). Meta-cognitive experiences can qualify the implications of thought content, resulting in judgments and decisions that are opposite to the predictions derived from content-focused models. For example, recalling many risk-increasing behaviors is more difficult than recalling only a few. Drawing on this difficulty, people who recall many risk-increasing behaviors infer that they are at lower risk than people who recall merely a few*

*risk-increasing behaviors, in contrast to what the content of recall would suggest. Similarly, content-focused models of judgment suggest that we evaluate the truth of a proposition on the basis of relevant knowledge. In contrast, people are more likely to accept a proposition as true the easier it is to read, for example, due to good figure-ground contrast of the visual presentation. This reflects that easy-to-process information is experienced as more familiar and hence more likely to be accepted as true. These and related findings highlight that we cannot understand judgment and decision processes without taking the meta-cognitive experiences that accompany the reasoning process into account. **Key words:** meta-cognitive experiences; judgment; decision making. (Med Deci Making 2005;00:000-000)*

**P**lease consider the following questions before you read on:

- Who perceives a higher personal risk of heart disease? 1) A man who thinks of 3 risk-increasing behaviors he engages in or 2) a man who thinks of 8 such behaviors?
- Who is more likely to think, in hindsight, that an obtained outcome was inevitable? 1) A person who thinks of 2 ways the event could have turned out otherwise or 2) a person who thinks of 10 such ways?
- Who is more likely to defer choice? 1) A decision maker who lists 2 reasons for choosing one of the choice alternatives or 2) a decision maker who lists 10 such reasons?
- Finally, when is a statement more likely to be accepted as true? 1) When it is printed in light blue on a white background, 2) when it is printed in dark blue on a white background, or 2) the color of the font makes no difference.

According to most models of judgment and decision making, the correct answer is obvious. Presumably, our judgments and choices are based on the attributes of the target or choice alternatives that come to mind at the time we make the judgment or choice.<sup>1,2</sup> Hence, we should perceive more risk the more risk-increasing behaviors come to mind, should consider an outcome less inevitable the more alternatives we can think of, and should be more likely to make a choice the more reasons we see for doing so. Empirically, however, the opposite is the case and 1) rather than 2) is the correct answer for the 1st 3 problems, as the experiments re-

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viewed below will demonstrate. Finally, our assessments of the truth value of a statement should be solely based on our relevant domain knowledge, not on the color of the font in which the statement is printed. Nevertheless, 2) is the empirically correct answer to this problem, and we are more likely to accept a statement as true when it is easy to read.

These findings are surprising for most models of judgment and decision making because the results are at odds with the expectation that our judgments and decisions depend on *what* comes to mind. Instead, these findings illustrate that the subjective experiences that accompany the reasoning process are informative in their own right. These subjective experiences come in the form of moods and emotions, addressed by George Loewenstein (2005 [this issue]), and in the form of meta-cognitive experiences, like the ease or difficulty with which we can recall relevant information, generate arguments, or process novel material. These latter experiences are the topic of this article. To date, the role of meta-cognitive experiences has mostly been addressed in social cognition research,<sup>3,4</sup> although they have far-reaching implications for decision making.

## ACCESSIBLE CONTENT V. ACCESSIBILITY EXPERIENCES

### Perceived Risk of Heart Disease

Suppose you are asked to evaluate your risk for heart disease. To arrive at a judgment, you presumably review the risk-increasing and risk-decreasing behaviors you engage in, evaluate their relevance, and integrate their implications to form a risk judgment. But would your judgment solely depend on the relevant behaviors that come to mind, as content-focused models of judgment predict? Or would it make a difference if those behaviors come to mind easily or need to be searched for with some effort?<sup>5</sup> That is, does the ease or difficulty with which relevant behaviors can be brought to mind provide information over and above the implications of the behaviors themselves?

To address this issue, we<sup>6</sup> asked male undergraduates to recall either 3 or 8 risk-increasing or risk-decreasing behaviors they engage in. Following this recall task, they indicated their perceived risk of heart disease. If they solely draw on the behaviors that this task brought to mind, they should see themselves at more risk the more risk-increasing behaviors they brought to mind and at less risk the more risk-decreasing behaviors they brought to mind. This prediction is consistent with the assumption that risk perceptions are con-

structed on the spot, based on the information that is accessible at this time. Suppose, however, that they find it difficult to come up with 8 risk-increasing behaviors; they can do it, but find out that it is hard work. In this case, they may actually think, "If it's so hard to come up with eight examples, maybe I'm not doing that much risk-increasing stuff."<sup>5</sup> If so, they may conclude that their risk cannot be very high. In other words, the experienced ease or difficulty with which risk-increasing behaviors can be brought to mind may qualify the conclusions drawn.

Figure 1 displays relevant findings. The left-hand panel shows the results from participants who did *not* have a family history of heart disease. These participants perceived more risk after recalling 3 risk-increasing behaviors than after recalling 3 risk-decreasing behaviors, consistent with the predictions of most judgment models. This pattern reversed, however, when participants had to recall 8 behaviors. In this case, they perceived *lower* risk after recalling risk-increasing than after recalling risk-decreasing behaviors. Moreover, recalling 8 risk-increasing behaviors resulted in *lower* risk perceptions than recalling 3. Similarly, recalling 8 risk-decreasing behaviors resulted in *higher* risk perceptions than recalling 3. These findings are at odds with the common assumption that our judgments are based on *what* comes to mind, that is, on accessible content. Apparently, participants concluded from the experienced difficulty of recalling 8 behaviors that they don't engage in many of these behaviors of this type, resulting in risk judgments that are opposite to the implications of recalled content.

Findings of this type illustrate that every recall task provides 2 distinct sources of information: The *accessible content* that is brought to mind and the *subjective accessibility experience*, that is, the experienced ease or difficulty of bringing it to mind. These accessibility experiences are informative in their own right and qualify the implications of accessible content. In general, our judgments are only consistent with what comes to mind when it comes to mind easily, as in the 3-behaviors condition of the present study. When recall or thought generation is experienced as difficult, our judgments are opposite to the implications of recalled content, as in the 8-behaviors condition of the present study.<sup>3,4</sup> The observed influence of accessibility experiences is eliminated when their informational value is called into question. For example, when participants attribute the experienced recall difficulty to music played in the background,<sup>7</sup> the subjective experience is rendered uninformative and participants draw on recalled content even when recall is difficult.

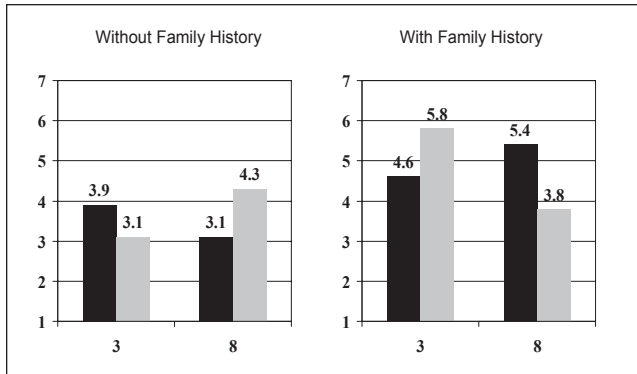


Figure 1 Own vulnerability to heart disease as a function of recalled behavior and family history.

Note: Black bars = risk-increasing behaviors; gray bars = risk-decreasing behaviors; 3 and 8 = number of behaviors requested. Higher values indicate higher risk judgments. Adapted from Rothman and Schwarz (1998).<sup>6</sup>

Given that any attempt to recall information renders these 2 distinct sources of information accessible, an important question is, When do people rely on their accessibility experiences and when do they rely on accessible content? In general, reliance on one's subjective accessibility experiences is a heuristic strategy, which people are more likely to use under low motivation, high time pressure, and similar conditions that discourage systematic information processing. When the task is of high personal relevance, and the cognitive resources needed for systematic information processing are available, people are more likely to rely on accessible content.<sup>3</sup> Figure 1 illustrates this difference. Judging one's risk of heart disease is a less personally relevant task for men without a family history of heart disease than for men with a family history. Accordingly, men without a family history relied on their accessibility experiences, as already discussed and shown in the left-hand panel of Figure 1. In contrast, men with a family history of heart disease relied on recalled content, as shown in the right-hand panel of Figure 1. These men inferred higher risk the more risk-increasing behaviors they recalled, and lower risk the more risk-decreasing behaviors they recalled.

These differences are particularly apparent in participants' reported intention to change their behavior. Figure 2 shows these intentions. Men without a family history didn't see much reason for behavior change when they had to recall risk-increasing behaviors: Given how difficult it was to bring 8 risky behaviors to mind, they apparently concluded they don't do many risky things to begin with. By the same token, however, finding it difficult to recall 8 risk-decreasing behaviors suggested to them that they don't do enough to protect

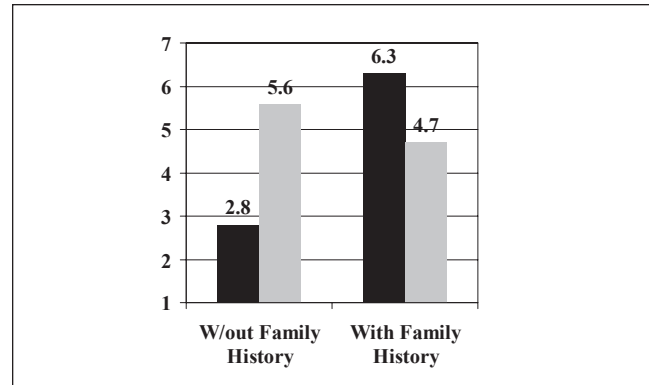


Figure 2 Intended behavior change after recalling 8 behaviors as a function of family history.

Note: Black bars = risk-increasing behaviors; gray bars = risk-decreasing behaviors. Higher values indicate higher intention to change behavior. Adapted from Rothman and Schwarz (1998).<sup>5</sup>

themselves, resulting in high intentions to change their behavior. In contrast, men with a family history drew on recalled content rather than their subjective accessibility experiences. Accordingly, they saw little reason to change their behavior after recalling many risk-decreasing behaviors, which suggested that they already do a lot to protect themselves. But after recalling many risk-increasing behaviors, behavior change seemed a good idea. As a result, the recall task had opposite effects on the behavioral intentions of men with and without a family history of heart disease, reflecting their differential processing motivation.

As these findings illustrate, we cannot predict judgments and intentions by merely knowing what comes to mind. We also need to take into account the person's subjective accessibility experience as well as the person's processing motivation, which determines the source of information the person is most likely to draw on, as several studies illustrated.<sup>3</sup>

### Debiasing Hindsight

Studies of debiasing hindsight reiterate this theme. After the outcome of an event is known, people believe that they knew it all along, and they may even misremember their earlier predictions as having been in line with the obtained outcome, as first observed in Fischhoff's classic study.<sup>8</sup> Examples range from politics and sports to medical diagnoses.<sup>9</sup> The typical recommendation to debias hindsight is to force ourselves to argue against the inevitability of the reported outcome, that is, to try to convince ourselves that it might have turned out otherwise. But this strategy rarely works and most attempts to debias hindsight are not

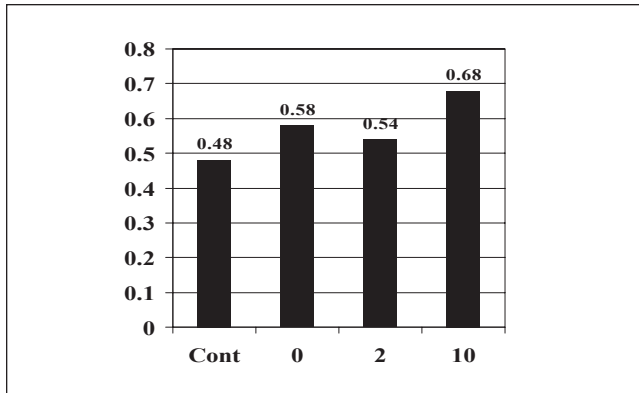


Figure 3 Likelihood of obtained outcome as a function of number of counterfactual thoughts.

Note: Higher values indicate higher likelihood. Cont = control condition without outcome knowledge; 0, 2, and 10 indicate number of counterfactuals requested. Adapted from Sanna, Schwarz, and Stocker (2002).<sup>10</sup>

very successful.<sup>9</sup> One reason may be that thinking about alternatives is difficult—and this difficulty may convince us all the more that the obtained outcome was, in fact, inevitable.

To test this possibility, we<sup>10</sup> presented participants with a story about the British/Gurkha war (taken from Fischhoff<sup>8</sup>) and asked them to list either 2 or 10 thoughts about how the war could have come out otherwise. Next, we asked them, “If we hadn’t already told you who won, what would you have predicted?” Figure 3 shows participants’ likelihood estimates for the obtained outcome.

Compared to control participants, who were not informed about the outcome of the war, participants who learned the outcome considered it more likely. This replicates the standard hindsight effect. Generating 2 thoughts about how the war could have come out otherwise did not significantly attenuate this hindsight bias. However, generating 10 thoughts about how the war could have turned out otherwise had a pronounced impact: It *increased* the hindsight bias, in contrast to what most models of judgment would predict. Apparently, participants concluded from the difficulty of generating 10 counterfactual thoughts that there weren’t many ways in which the war could have turned out otherwise, thus convincing them all the more that the obtained outcome was inevitable. As theoretically expected, these backfire effects of debiasing manipulations are eliminated when the experienced difficulty is rendered uninformative through (mis)attribution manipulations.<sup>11</sup>

Of course, skeptics may wonder if these findings merely reflect that participants who had to generate 10 counterfactual thoughts simply ran out of good

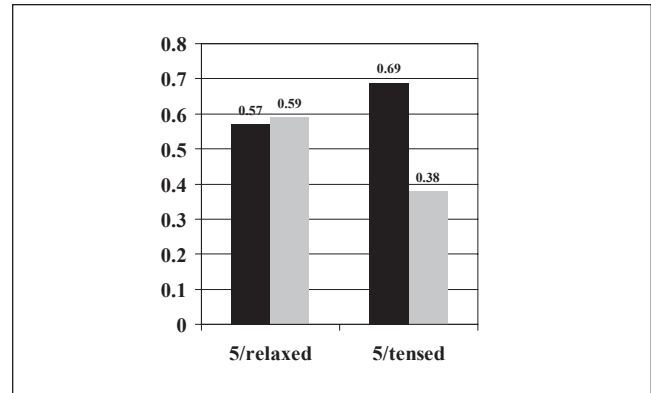


Figure 4 Likelihood judgments as a function of corrugator contraction.

Note: Higher values indicate higher likelihood. Black bars indicate supporting thoughts, and gray bars counterfactual thoughts. Adapted from Sanna, Schwarz, and Small (2002).<sup>12</sup>

counterfactuals, listing poor reasons as the task dragged on. Empirically, analyses of participants’ thoughts provide no evidence for this assumption, but it would be comforting to rule out this possibility. To do so, we asked all participants in a subsequent study<sup>12</sup> to list 5 thoughts pertaining either to why the war had to come out the way it did or to how it might have come out otherwise. To manipulate their subjective experience independent of the number of thoughts required, we relied on a bodily feedback manipulation. Using an appropriate cover story, we asked half of the participants to contract their corrugator muscles during the thought listing, resulting in a furrowed brow. As previously observed,<sup>13</sup> a furrowed brow is associated with the feeling of cognitive effort and mirrors the effects of difficulty of thought generation. Figure 4 shows the results.

Listing 5 thoughts with a relaxed brow did not affect participants’ hindsight bias, independent of whether the thoughts pertained to the obtained or an alternative outcome. Not so, however, when participants furrowed their brow during the thought listing, producing a feeling of cognitive effort. In this case, listing 5 ways in which the war could have come out otherwise increased hindsight, replicating our earlier backfire effect. Conversely, listing five reasons why the war had to come out the way it did dramatically decreased hindsight—in fact, to an extent that we obtained a bias in the opposite direction, relative to a baseline likelihood of 0.48 in the absence of outcome knowledge.

Once again, we cannot predict people’s judgments by knowing solely what comes to mind. Instead, we need to take their subjective accessibility experiences into account. These experiences are informative in

their own right and qualify the implications of accessible content. In fact, merely frowning our brows can be sufficient to reverse the conclusions we draw from our thoughts. As a result, the usual debiasing recommendations often fail: The more people try to think of counterfactuals, the more likely it is that they will experience the task as difficult, convincing them all the more that the obtained outcome was inevitable. This logic holds for many cognitive biases, including the planning fallacy, impact bias, optimism, and related phenomena.<sup>14</sup>

### Choice

As may be expected on the basis of these judgment phenomena, accessibility experiences have also been found to influence people's decisions in choice situations.<sup>15</sup> Thinking of a few good reasons for choosing one of the alternatives offered in a choice task is easier than thinking of many reasons. As a result, decision makers who are asked to think of many reasons for a choice are more likely to defer choice and more likely to select a compromise alternative, than decision makers who only need to come up with 1 or 2 reasons. These effects of experienced difficulty are obtained even when the decision maker successfully generates many reasons, in contrast to what content-focused models of choice would predict. As in the judgment domain, the influence of accessibility experiences on choice is eliminated when the informational value of the difficulty experience is undermined through attribution manipulations.

These observations extend the general finding that difficult decisions elicit more conservative choices, in the form of decision deferral, increased compromise effects, and increased status quo bias.<sup>15</sup> Whereas difficulty has typically been manipulated through characteristics of the choice set itself, experienced difficulty arising from other sources has the same effect. Moreover, the influence of characteristics of the choice set itself is presumably mediated by subjective difficulty experiences. If so, the usually observed effects of characteristics of the choice set should be eliminated when the subjective experience is misattributed to another source (e.g., the distracting nature of noise next door). This possibility remains to be tested.

### FLUENCY OF PROCESSING

So far, I addressed the influence of accessibility experiences, that is, the ease or difficulty of recall and thought generation. A related meta-cognitive experi-

ence is the ease or difficulty with which we can process new information. I refer to this experience as *processing fluency*, a term that subsumes perceptual fluency (pertaining to the ease of visual perception) and conceptual fluency (pertaining to the ease of semantic processing). The experience of processing fluency can influence a wide range of judgments, including judgments of preference, familiarity, and truth.<sup>4,16,17</sup> Here, I focus on judgments of truth.

### Familiarity and Truth

In general, familiar material, which we have seen before, is easier to process than novel material. This influence of familiarity on experienced processing fluency gives rise to a logically unwarranted reverse conclusion: People infer from ease of processing that the material must be familiar. As a result, any variable that facilitates processing leads to increased perceptions of familiarity, even when the facilitation derives from irrelevant characteristics like high figure-ground contrast, long exposure times, or preceding visual or semantic primes.<sup>17</sup>

This fluency-familiarity link has important consequences for judgment and decision making. As Festinger<sup>18</sup> observed, under conditions of uncertainty, we often resort to "secondary reality tests," using apparent social consensus as a criterion of truth. In fact, repeated exposure to a statement reliably increases its acceptance as true,<sup>19,20</sup> as first observed by Allport and Lepkin<sup>21</sup> in a classic study on rumor control. However, repeated exposures are not required to make a statement "feel" familiar. Instead, any variable that increases the ease with which the statement can be processed is sufficient to do the trick. For example, we observed that a given statement was more likely to be accepted as true when the color in which it was printed made it easier to read.<sup>22</sup> Specifically, we presented participants with statements like, "Orsono is a city in Chile," shown either in light or dark colors against a light or dark background. Whenever the figure-ground contrast facilitated easy reading of the statement, the statement was more likely to be endorsed as true. Whereas this study manipulated the ease of visual processing, McGlone and Tofiqbakhsh<sup>23</sup> manipulated the ease of semantic processing, with similar results. Specifically, they presented participants with novel statements in a rhyming or nonrhyming form, while holding the meaning of the statement constant. They observed that the same meaning was more likely to be endorsed as true when the statement rhymed. Thus, "Birds of a feather flock together" seems more compelling than "Birds of a feather congregate."

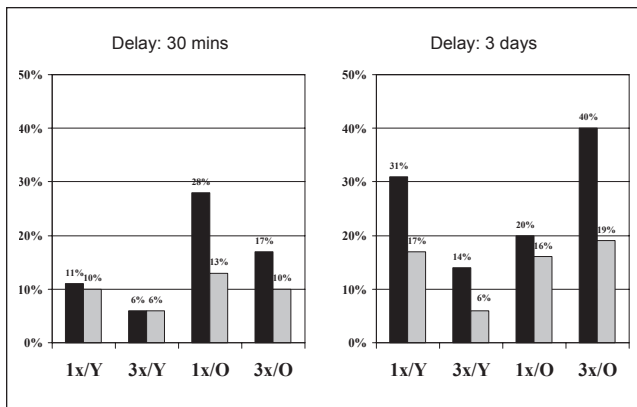


Figure 5 Truth judgments as a function of age, repetition, and delay.

Note: Shown is the percentage of false statements identified as true (black bars) and true statements identified as false (gray bars) for younger (Y) and older (O) adults after 1 (1x) or 3 (3x) exposures. Adapted from Skurnik, Yoon, Park, and Schwarz (in press).<sup>25</sup>

These and related studies<sup>4</sup> converge on the conclusion that fluency of processing feeds into judgments of truth, presumably by making the presented information “feel” more familiar. Based on this familiarity, people apparently reason, “It kind of sounds familiar. Seems I must have heard this before. So there’s probably something to it.”

### How Warnings Become Recommendations

These intuitive judgments of truth render us vulnerable to erroneous conclusions, with potentially important consequences. As Allport and Lepkin<sup>21</sup> observed 6 decades ago, attempts to counter rumors by refuting their core content are often futile and merely contribute to the spreading the rumor. Similarly, warnings like, “It is not true that shark cartilage is good for your arthritis” may ironically turn into recommendations: Once the details of the warning are forgotten, all that remains may be an increased sense of familiarity when the person later encounters the claim, “Shark cartilage is good for your arthritis.” Older people may be particularly vulnerable to this ironic effect because explicit memory declines with age, whereas implicit memory remains largely intact.<sup>24</sup> Hence, older people may not be able to recall the details of previously presented information, but they may nevertheless find previously seen material highly familiar when they encounter it again, and may accept the claim as true for that reason.

A recent study confirmed this conjecture.<sup>25</sup> In this study, we showed young (aged 18 to 25) and old (aged 71 to 86) adults health statements such as, “Shark cartilage is good for your arthritis.” We explicitly identified

each statement as true or false, by saying “The FDA has determined that this statement is true” or “The FDA has determined that this statement is false.” All statements were shown either once or thrice. Participants were then asked to identify the statements as true or false, either 30 min or three days after the initial exposure. Figure 5 shows the results.

After a 30-min delay (left-hand panel), young people made some errors, identifying some false statements as true and some true statements as false. Not surprisingly, these nonsystematic errors were more frequent when the statements were shown only once. Older adults’ errors, on the other hand, showed a systematic pattern. When they saw the statements only once, they were more likely to identify a false statement as true than to identify a true statement as false. Presumably, they couldn’t recall the details after a single exposure, but experienced the statements as familiar, resulting in a bias that favors acceptance as true. Presenting the statements thrice again attenuated these errors, presumably by improving memory for this short delay.

More important, the observed patterns changed profoundly after a 3-day delay, shown in the right-hand panel. After 3 days, young participants were in a similar position as old participants after 30 min: Lacking memory for details, they now were more likely to identify false statements as true than to identify true statements as false. Increased repetition of the statements again attenuated this effect. On the other hand, older participants who saw the statements only once showed a smaller illusion of truth effect after 3 days than after 30 min, indicating that a single exposure was not sufficient to induce a feeling of familiarity after a 3-day delay. Finally, the most important finding comes from older participants who saw the warnings 3 times. After 3 days, these participants accepted 40% of the false claims as true. Thus, far from increasing older participants’ accuracy, repeated warnings only increased their acceptance of false claims as true, once enough time had passed to forget the details. Subsequent experiments replicated these findings.<sup>25</sup>

In sum, repetition can turn warnings into recommendations. Once the details of the warnings fade from memory, all that is left is a vague feeling of familiarity when we encounter the disputed claim again. Based on the tacit assumption that things we hear often are likely to hold some kernel of truth, this feeling of familiarity facilitates subsequent acceptance of the statement as true. Accordingly, education campaigns should refrain from reiterating false claims. The most promising strategy is to only present information that is true, ensuring that this information, rather than the refuted claim, will seem familiar in the future.

## CONCLUSIONS

In closing, let me emphasize that none of the reviewed phenomena can be accounted for by attending solely to *what* comes to mind. To understand judgment and decision making, we also need to address the subjective experiences that accompany the reasoning process. These experiences include the ease or difficulty of recall and thought generation, the fluency with which new information can be processed, bodily feedback, and our emotional reactions to thought content.<sup>3,4,26</sup> These experiences are informative in their own right; they may serve as a basis of judgment, and can qualify the implications of accessible thought content. In fact, merely frowning your brow can change which conclusions you draw from a given piece of information. The construction of judgments and preferences involves an intricate interplay of the declarative information we usually focus on and the experiential information that accompanies it. Unless we understand this interplay, we will do a poor job at understanding people's judgments and decisions.

## QUESTION & ANSWERS

**Q:** I'm wondering if it's possible to reduce hindsight bias or help us debias. If you gave me 8 reasons why it could have come out the other way, so that it was really easy for me to know that many reasons, would that make me less susceptible to hindsight bias?

**A:** Yes, if the counterfactuals are provided to you, you would not experience the difficulty of generating them and we would not observe a backfire effect. If I asked Peter Ubel to generate 8 counterfactuals, he would find that difficult and would conclude that the event was inevitable. But if I then handed Peter's counterfactuals to you to read, you'd be deprived of the experience of difficulty and would be persuaded by Peter's thoughts, although he, himself, was not. Wänke, Bless, and Biller<sup>27</sup> conducted such an experiment in a different domain and observed exactly this result.

**Q:** I was very intrigued by the rhyming feeling of familiarity, and I am wondering if that explains why traditional poetry always seems so profound, and free-formed poetry always seems so confusing?

**A:** That's a good point, and findings by McGlone and Tofghbakhsh<sup>23,28</sup> support your intuition.

**Q:** I was just wondering in the warning v. recommendation study, did you give the people an "I don't know" option, as in, are they aware that they were having trouble trying to figure out whether it was a warning or recommendation or unaware of this entirely?

**A:** This has been done in some studies. It decreases the percentage of substantive answers but does not change the overall pattern.

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