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Debiasing the hindsight bias: The role of accessibility experiences and (mis)attributions

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Abstract

Two studies tested the role of accessibility experiences and attributions in debiasing the hindsight bias. Participants listed 4 or 12 thoughts about how a college football game, or the 2000 US Presidential election, might have turned out differently. Listing 12 thoughts was experienced as difficult, suggesting to participants that there were few ways in which the event could have turned out otherwise. Hindsight biases increased under this condition, unless participants attributed the difficulty of the thought generation to their own lack of knowledge, which resulted in a trend in the opposite direction. The interplay of accessible content, accessibility experiences and attribution in mental simulation is discussed.

Keywords: Hindsight bias; Accessibility; Metacognition; Mental simulation; Judgmental biases

After learning event outcomes, people "not only tend to view what has happened as having been inevitable, but also tend to view it as having been 'relatively inevitable' before it happened" (Fischhoff, 1982a, p. 428). Documented by Fischhoff (1975) and Fischhoff and Beyth (1975), this *hindsight bias* is robust and has been obtained in varied domains, from medical diagnoses (e.g., Arkes, Wortmann, Saville, & Harkness, 1981) and legal judgments (e.g., Kamin & Rachlinski, 1995) to election results (e.g., Leary, 1982) and sporting events (Leary, 1981; see Christensen-Szalanski & Willham, 1991; Hawkins & Hastie, 1990, for reviews).

Debiasing hindsight by thinking about alternatives

Hindsight biases emerge independent of judges' expertise, accuracy motivation, or task importance (Hawkins & Hastie, 1990). The most frequently recommended remedy for debiasing the hindsight bias is "to force oneself to argue against the inevitability of the reported outcome, that is, to try to convince oneself that it might have turned out otherwise" (Fischhoff, 1982b, p. 343). Thinking about alternatives makes them more accessible and presumably helps to restore the original foresight perspective in which alternative outcomes were more conceivable. Empirically, thinking about alternatives has been found to attenuate hindsight biases, but it does not fully eliminate them (e.g., Koriat, Lichtenstein, & Fischhoff, 1980; Slovic & Fischhoff, 1977).

Worse, thinking about alternatives as a debiasing strategy may have unwanted side effects. Theoretically, generating reasons renders two sources of information accessible: The reasons generated (*accessible content*) and the ease or difficulty with which they could be brought to mind (*accessibility experience*). Across numerous studies, Schwarz and colleagues observed that the conclusions drawn from accessible content are qualified by accessibility experiences (see Schwarz, 1998, for a review). Judgments are consistent with *what* comes to mind only when it comes to mind easily. When recall or generation is difficult, judgments are opposite to the implications of accessible content. This reflects that people infer from difficulty of recall or generation that

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there cannot be many examples—or else, thinking of them would not be so difficult, consistent with Tversky and Kahneman's (1973) availability heuristic.

Sanna, Schwarz, and Stocker (2002) applied this logic to the debiasing strategy proposed by Fischhoff (1982b). Participants read about the British-Gurkha war (adapted from Fischhoff, 1975) and generated either two or 10 thoughts about how the war might have turned out differently. Generating only two alternatives was experienced as easy and resulted in a small attenuation of the hindsight bias. In contrast, generating 10 thoughts was experienced as difficult and actually *increased* the size of the hindsight bias. That is, trying to generate many reasons why the war might have turned out otherwise "backfired" and only convinced participants all the more that the outcome was inevitable. This finding suggests that, ironically, people may be more likely succumb to the hindsight bias the more they try to avoid it.

Making debiasing work: The role of (mis)attributions

But can debiasing work? In the present experiments, we test whether the "backfire" effects when generating many alternatives observed by Sanna et al. (2002) can be eliminated when the informational value of the accessibility experience is discredited. Earlier research suggests that this should be the case. For example, Schwarz et al. (1991) asked participants to recall either 6 (easy) or 12 (difficult) examples of their own assertive behavior. Participants rated themselves less assertive after recalling 12 than 6 examples, reflecting that the difficulty of recalling 12 examples suggested that they may not behave assertively very often. But this was *not* so when participants attributed the experienced difficulty to background music played to them. In that case, participants relied on recalled content (number of examples), even when it was difficult to bring to mind, and reported more assertiveness after recalling 12 than 6 examples. These and similar (mis)attribution findings (e.g., Haddock, Rothman, Reber, & Schwarz, 1999; Winkielman, Schwarz, & Belli, 1998) indicate that people draw on accessibility experiences when their informational value is not discredited, but draw on accessible content when it is (see Schwarz, 1998, for a review).

We thus predict that generating many reasons for why events might have turned out otherwise may eliminate hindsight biases, *but only* when the experienced difficulty of thought generation is discounted through attribution manipulations. The present research tests this possibility and bears directly on our underlying theoretical rationale. Moreover, it may suggest conditions under which debiasing might work. We examined these predictions in the context of two real-life events, namely a homecoming football game (Experiment 1) and the 2000 Presidential elections in the US (Experiment 2), using participants' recall of pre-event expectations as an indicator of hindsight bias. These procedures thus also extend our exploration of experiential information in debiasing the hindsight bias beyond the simple scenarios and probability judgments used by Sanna et al. (2002).

Experiment 1: Homecoming football game

Following Leary's (1981) demonstration of hindsight biases in sports, we used a college football game. The game was played Homecoming Weekend between the University of North Carolina at Chapel Hill (UNC) and the University of Maryland (UMD) in Fall of 2000. Homecoming is a special event in which alumni revisit campus and old friends, and enjoy various activities. At game time, UNC (4-5) and UMD (5-4) were matched in wins and losses, and the game was predicted to be close by odds-makers (UNC was a 6-point favorite). UNC won 13-10. On Monday following the Saturday game, participants listed 4 or 12 thoughts about alternative outcomes and then reported the score they expected *prior* to the game. Pilot-tests suggested generating 4 thoughts were easy and 12 thoughts were difficult in this setting.

We predicted that participants' recall of pre-game expectations would show a hindsight bias, and the more so, the more thoughts they listed about how the game might have turned out differently. That is, we expected recalled expectations to be closer to the actual game outcome when participants listed 12 rather than 4 thoughts about alternatives, replicating Sanna et al.'s (2002) results with a different indicator of hindsight bias. Extending prior research, however, this prediction should only hold when the informational value of participants' subjective accessibility experiences is not undermined through (mis)attribution manipulations.

Method

Participants

Fifty-three introductory psychology students at UNC participated for course credit, and were randomly assigned to condition.

Procedure

"Social judgment" questionnaires were distributed in class on Monday following the Saturday game. Participants read that researchers were studying a variety of judgments, and that in this study they were interested in the Homecoming Game.

Thought listing. Participants in the 4-thoughts and 12-thoughts conditions were asked, "Please list 4 [12, respectively] thoughts about how the game on Saturday might have turned out differently."

Manipulation check. All participants rated the degree to which they found generating thoughts difficult along a scale ranging from 1 = *very easy* to 7 = *very difficult*.

Score judgment. All participants reported scores that they had expected prior to the game, according to the following instructions:

> We are interested in what you thought the score would be before the game was played. That is, *before* knowing the outcome of the game, what would you have predicted the score to be at that time? In the spaces below, please list the number of points that you thought each team would score.
>
> Before knowing the game results, I would have predicted that:
>
> Carolina would score ——points and
>
> Maryland would score ——points.

Attribution. After listing thoughts and rating their difficulty, but before judging scores, some participants received attribution manipulations, modeled after Winkielman et al. (1998). Specifically, we suggested that thought listing required extensive knowledge of football. Thus, any difficulty encountered may be due to a lack of knowledge, rather than to the actual absence of reasons that may have led to a different outcome. In the 12-thoughts condition, participants read the following:

> Thank you for listing those thoughts. We realize this was an extremely difficult task that only people with a good knowledge of football may be able to complete. As background information, may we therefore ask you how knowledgeable you are about football?

In the 4-thoughts condition, a similar manipulation was used except participants read that listing four thoughts was "an extremely easy task that anyone with a little knowledge of football could complete." Participants rated their knowledge on a 7-point scale (1 = *not knowledgeable at all*; 7 = *very knowledgeable*).[1]

[1] Theoretically, the impact of the attribution manipulation on participants' knowledge ratings is an open issue. On the one hand, one may assume that participants' accessibility experiences affect their knowledge ratings in a manner that is consistent with the attribution manipulation. On the other hand, participants may conclude from the manipulation that the task is so difficult that their experience is not very diagnostic at the level of knowledge a college student may be expected to have. In either case, the manipulation would render the accessibility experience nondiagnostic for the hindsight task that is of central interest. Empirically, there was little variability in participants' knowledge ratings. In Experiment 1, knowledge in the 4-thoughts/attribution ($M = 5.95$; $SD = .89$) and 12-thoughts/attribution ($M = 5.82$; $SD = .72$) conditions did not differ, $t(26) = .42$, $p = .69$. The low variability in knowledge also precluded effective tests of associations between knowledge, on the one hand, and subjective difficulty and outcome judgments, on the other hand—correlations were nonsignificant. The low variability in knowledge within the 12-thoughts/attribution ($M = 4.33$; $SD = .68$) condition of Experiment 2 also precluded tests of associations. If greater knowledge or expertise is related to the hindsight bias (but see Detmer, Fryback, & Gassner, 1978, for evidence inconsistent with this idea), then future research that involves pre-selecting participants based upon differing degrees of prior knowledge or expertise may be desirable.

Results and discussion

Thoughts listing and subjective difficulty

A 2 (thoughts listing) × 2 (attribution) ANOVA on number of thoughts listed revealed a thoughts-listing main effect, $F(1, 49) = 79.02$, $p < .001$, $\eta^2 = .62$, with fewer thoughts listed in the 4-thoughts ($M = 3.46$, $SD = .55$) than 12-thoughts ($M = 9.77$, $SD = 1.30$) conditions. Examples were: "It was getting close and it's lucky we stopped them on that last drive or else," and "If the Terps punted in the third quarter, they'd have been better off."[2]

An ANOVA on the difficulty manipulation check also revealed a thoughts-listing main effect, $F(1, 49) = 15.18$, $p < .001$, $\eta^2 = .23$, with the task rated easier in the 4-thoughts ($M = 3.45$, $SD = 2.40$) than 12-thoughts ($M = 6.03$, $SD = 2.60$) conditions.

In sum, the thoughts-listing manipulations had their intended effects.

Game outcome

UNC won 13-10. Ratings of UNC and UMD are not independent, as judgments are made on the basis of the teams playing each other and their combined strengths and weaknesses. We thus subtracted UMD from UNC scores and used the difference as the dependent variable. Positive numbers indicate scores favoring UNC. All participants reported pre-game expectations favoring UNC (see Table 1), as may be expected in light of their affiliation.

Of greater interest was whether recalled expectations were similar to, or different from, the actual difference of 3 points. Specifically, recalled pre-game expectations close to 3 indicate that participants believe they "knew all along" what the actual outcome would be. A 2 × 2 ANOVA on this difference score revealed only the predicted interaction, $F(1, 49) = 6.91$, $p = .01$, $\eta^2 = .13$.

In the no-attribution condition, participants who listed 12 thoughts about how the game could have turned out otherwise recalled pre-game expectations that were closer to the actual difference of 3 than those who listed only 4 thoughts; $F(1, 23) = 11.09$, $p < .003$, $\eta^2 = .32$, for the simple effect. Thus, the more participants thought about alternate outcomes, the more they assumed they knew the game outcome all along. This

[2] We further explored the nature of the thoughts listed for assurances that participants listed thoughts opposite to the outcome. Two judges unaware of hypotheses rated thought content for a focus on alternate outcomes versus different routes to the same outcome, with high agreement (over 99%, $k = .98$); disagreements were resolved through discussion. It was quickly apparent that virtually all thoughts expressed ideas about an alternate outcome. In short, all participants did what we told them to do. Less than 2% of all thoughts might have been construed as alternate ways of obtaining the same outcome, and dropping out these does not influence our results. This pattern applies to both experiments in this article.

Table 1
Game outcome by thoughts-listing and attribution and actual score for Experiment 1

Attribution		Thoughts-listing		Actual score	
		4-Thoughts	12-Thoughts		
No attribution				Difference	3
(Experience informative)				UNC/UMD	13/10
Difference	*M*	10.53	4.75		
	SD	5.59	4.30		
	n	13	12		
UNC/UMD	*M*	27.46/16.92	15.66/10.91		
Attribution					
(Experience uninformative)					
Difference	*M*	7.06	10.30		
	SD	6.64	6.36		
	n	15	13		
UNC/UMD	*M*	19.06/12.00	25.38/15.07		

Note. UNC, University of North Carolina at Chapel Hill; UMD, University of Maryland. Difference M = (UNC score − UMD score). *SD*, standard deviation of difference *M*. UNC/UMD *M*s are presented within each cell for informational purposes.

replicates the increased hindsight bias observed by Sanna et al. (2002) when participants do not (mis)attribute subjective accessibility experiences, and also generalizes it from probability judgments to recalled pre-event expectations. In contrast, but also as we predicted, the hindsight bias did not increase when the informational value of accessibility experiences was undermined. In the attribution condition, listing 4 versus 12 thoughts did not affect participants'recall of pregame expectations, $F(1,26) = 1.26$, $p = .26$, $\eta^2 = .04$, for the simple effect.

The effectiveness of the attribution manipulation can also be seen within the respective thoughts-listing conditions. Participants who listed 12 thoughts showed more hindsight bias when the informational value of their experienced difficulty was not undermined than when it was; $F(1,23) = 6.25$, $p = .02$, $\eta^2 = .21$, for the simple effect. Participants who listed 4 thoughts showed less hindsight bias when the informational value of experienced ease was not undermined than when it was, although this failed to reach significance; $F(1,26) = 1.82$, $p = .18$, $\eta^2 = .06$, for the simple effect.

In sum, participants who generated many thoughts about alternative outcomes displayed more hindsight bias than participants who generated only a few thoughts. Thus, a strategy often assumed to attenuate hindsight biases actually increased this bias, as previously observed by Sanna et al. (2002) for probability judgments. However, extending prior findings, the hindsight bias did not increase when the informational value of experienced difficulty was called into question. This highlights the crucial role of accessibility experiences in debiasing hindsight. Internal analyses provide further support for this conclusion. Participants' subjective difficulty ratings and recalled pre-game expectations correlated in the no-attribution conditions, $r(23) = -.48$, $p < .02$, but were only $r(26) = -.15$, $p = .27$ in the attribution conditions ($z = 1.24$, $p = .10$, one-tailed, for the difference between the two correlations).

Experiment 2: 2000 US presidential election

Experiment 1 assessed participants' recall of pre-event expectations as an indicator of hindsight bias. Experiment 2 further extends the range of hindsight indicators by comparing *actual pre-event predictions* with recall of these predictions after the event. For this experiment, we took advantage of another real world event, the 2000 Presidential election in the US. These elections are held every four years on the Tuesday following the first Monday in November, the outcome usually known by Tuesday night. This was not the case in 2000 due to a close race between Democratic candidates Gore and Lieberman and Republican candidates Bush and Cheney, resulting in prolonged legal battles eventually settled by the US Supreme Court. Following the Court decision, Gore conceded the election in a televised address on December 13, 2000. As a result, five weeks passed between participants' pre-election predictions on November 6 and their post-election recall of predictions on December 14, 2000. These 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 responsibilities of the Supreme Court.

Previous research (e.g., Leary, 1982; Powell, 1988) documented pronounced hindsight biases in elections. We thus predicted that: (a) participants' recall of pre-election predictions would be biased towards the actual outcome once it was known, and (b) this would be more pronounced for those listing 12 thoughts about alternative outcomes prior to recalling their pre-election

predictions. As in Experiment 1, however, we further predicted that (c) listing 12 thoughts would attenuate the hindsight bias when participants attributed the experienced difficulty to their own lack of knowledge.

Method

Participants

Ninety-four introductory abnormal psychology students participated for extra course credit and were randomly assigned to condition.

Procedure

"Election Surveys" were administered during regular class sessions. Participants were assured that responses would remain anonymous.

Predictions. Seventy-one of 94 participants predicted Presidential election outcomes on the Monday preceding the Tuesday election. They read the following:

> We are conducting a survey of people's beliefs about the election. In the spaces below, we would like you to predict the election results. What percentage of the national popular vote will the major candidates get? Please note that your predictions should total 100%.
>
> I predict that:
>
> ——% will vote for Bush/Cheney.
>
> ——% will vote for Gore/Lieberman.
>
> ——% will vote for another candidate.
>
> 100% Total

The remaining 23 participants predicted state bond issue results in a similar fashion, with responses labeled "—% will vote for passage of this Bond," "—% will vote against passage of this Bond," and "—% will vote for waiting until next year to decide." Bond issue participants were thus equated with others in making predictions, but they only rated Presidential election outcomes in hindsight (constituting the *hindsight only* condition).

Hindsight. Hindsight was measured at the first class meeting after the election outcome became final. There were four hindsight conditions.[3] In each, participants read:

> We are interested in what your predictions were before the election. *Before* knowing the election results, what would you have predicted the outcome to be at that time? In the spaces below, please tell us the percentage of the national popular vote that you thought the major candidates would get. Please note that your predictions should total 100%.
>
> Before knowing the results of the election, I would have predicted that:
>
> ——% will vote for Bush–Cheney.
>
> ——% will vote for Gore–Lieberman.
>
> ——% will vote for another candidate.
>
> 100% Total

Of the 71 participants who made Presidential election predictions, one-third ($n = 24$) simply responded to the above paragraph, the *prediction–hindsight* condition.

Before responding to the above paragraph, another one-third ($n = 26$) were first asked to list 12 thoughts about how the election might have turned out differently: "We are conducting a survey of people's beliefs about the election. Please list 12 thoughts about ways in which the election might have turned out differently." We refer to this as the *12-thoughts* condition.

The remaining one-third ($n = 21$) who made pre-election predictions completed the same thought-listing task. Following this task, and prior to recalling their predictions, these participants attributed the difficulty of thought generation to their lack of knowledge by reading:

> 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?

Participants rated their knowledge on a 7-point scale (1 = *not knowledgeable at all*; 7 = *very knowledgeable*). We refer to this as the *12-thoughts/attribution* condition.

All participants in the two 12-thoughts conditions also rated the degree of difficulty they had in bringing those thoughts to mind on a 7-point scale, as in Experiment 1.

Results and discussion

In the actual election, Gore–Lieberman received 48.31%, Bush–Cheney received 47.99%, and Others received 3.60% of the national popular vote (see Table 2). The outcome between the two major parties was close, as predicted by many in the media. Even though Gore–Lieberman had a slight lead in the popular vote, Bush–Cheney were declared winners and received more Electoral College votes. Our participants predicted the national popular vote.

Participants' vote scores summed to 100%, and are not independent. We thus used the difference between Bush–Cheney and Gore–Lieberman as the dependent variable. We subtracted percentages for Bush–Cheney from Gore–Lieberman; positive scores indicate a Gore–Lieberman advantage and scores closer to the actual difference of .32% indicate greater hindsight bias.

Pre-election predictions

Participants in three conditions made pre-election predictions on the day before the election. Overall, our

[3] We planned to include 4-thoughts and 4-thoughts/attribution conditions. However, the delayed announcement of election results hindered this. By the time the outcome was finalized, the class had broken up into smaller in-depth discussion groups led by individual teaching assistants, and we did not have access to all classes. In an attempt to maintain statistical power we dropped the 4-thoughts conditions, which did not show significant differences in Experiment 1.

Table 2
Probability judgments by condition in percent and actual percentage for Experiment 2

Condition		Pre-election prediction	Post-election hindsight
Hindsight only ($n = 23$)			
Difference	*M*		.30
	SD		3.52
Bush–Cheney/Gore–Lieberman	*M*		47.47/47.78
Prediction–hindsight ($n = 24$)			
Difference	*M*	4.45	.58
	SD	6.83	1.96
Bush–Cheney/Gore–Lieberman	*M*	45.08/49.54	47.54/48.22
12-Thoughts ($n = 26$)			
Difference	*M*	5.26	.61
	SD	6.21	1.92
Bush–Cheney/Gore–Lieberman	*M*	44.42/49.69	48.19/48.80
12-Thoughts attribution ($n = 21$)			
Difference	*M*	4.71	7.52
	SD	5.94	3.20
Bush–Cheney/Gore–Lieberman	*M*	45.14/49.85	44.57/52.09
Actual percentage			
	Difference	0.32	
	Bush–Cheney/Gore–Lieberman	47.99/48.31	

Note. Difference M = (Gore/Lieberman − Bush/Cheney). *SD*, standard deviation of difference *M*. Bush–Cheney/Gore–Lieberman *M*s are presented within each cell for informational purposes.

participants predicted that Gore–Lieberman would lead with 49.69% over Bush–Cheney with 44.86%. A one-way ANOVA on difference scores for predicted vote percentages revealed no differences between conditions, $F < 1$, $\eta^2 = .00$. Differences in hindsight thus are not due to any initial differences in predictions.

Post-election hindsight

A comparison of participants' pre-election predictions with their post-election recall shows a hindsight bias. Before the elections, participants in the three prediction conditions expected an average lead for Gore–Lieberman over Bush–Cheney of 4.83% ($SD = 6.33$). After the election, participants in the hindsight-only condition, who had not made predictions, reported a predicted Gore–Lieberman lead of only .30%. A contrast between hindsight-only and the combined three pre-election conditions was significant, $t(92) = 4.97$, $p < .001$, $\eta^2 = .05$.

Actually making a prediction (prediction–hindsight condition) did not eliminate this hindsight bias, as shown by a recalled predicted lead of only .58%, in comparison with a pre-election predicted lead of 4.45% in this condition; $t(23) = 2.00$, $p = .057$, $\eta^2 = .08$, for the pre/post-election contrast. This finding replicates the usual hindsight bias effect (e.g., Fischhoff, 1982a; Leary, 1982).

Listing 12 thoughts about how Gore–Lieberman might have won did not attenuate this hindsight bias either (12-thought condition). That is, participants in the 12-thoughts condition recalled a predicted lead of only .61%, despite an actual predicted lead of 5.26% in this condition; $t(25) = 3.96$, $p < .001$, $\eta^2 = .14$, for the pre/post-election contrast. Thus, merely thinking about alternatives did not attenuate participants' belief that they "knew it all along." Note, however, that generating 12 thoughts did not significantly increase the hindsight bias in Experiment 2, in contrast to earlier findings (Sanna et al., 2002) and Experiment 1. This is most likely due to the nature of the election result: Given the miniscule lead of Gore–Lieberman over Bush–Cheney, an increased hindsight bias would require participants to erroneously recall that they actually predicted a Bush–Cheney victory. Hence, we assume that this finding reflects a floor effect rather than a theoretically meaningful difference between experiments.

More important, the hindsight bias was again eliminated when participants attributed the difficulty of generating thoughts to their own lack of knowledge (12-thought/attribution condition). In fact, these participants recalled that they had predicted a lead of 7.52%, even though their actual predictions amounted to a lead of only 4.71%; $t(20) = 1.69$, $p = .10$, $\eta^2 = .07$, for the pre/post-election contrast. Thus, generating thoughts under conditions that allowed participants to discount the experienced difficulty of thought generation not only eliminated the otherwise observed hindsight bias, but resulted in a trend in the opposite direction.

This pattern of results is also reflected in an ANOVA that omits the hindsight-only condition and treats the

remaining conditions as a 3 (condition: prediction–hindsight; 12-thoughts; 12-thoughts/attribution) × 2 (time: pre/post election) factorial. There were main effects of time, $F(1,68) = 4.23$, $p = .043$, $\eta^2 = .06$, condition, $F(2,68) = 6.72$, $p < .003$, $\eta^2 = .09$, and a Time × Condition interaction that follows our predictions, $F(2,68) = 6.20$, $p < .004$, $\eta^2 = .08$.

Thoughts generated and difficulty

Participants in the two 12-thoughts conditions generated an average of 9.98 ($SD = 1.65$) thoughts about how the election might have turned out differently. Examples were: "He [Gore] could have won Tennessee," and "That secretary of Florida [Katherine Harris] should have let them count." Participants also rated bringing to mind 12-thoughts as difficult (overall, $M = 6.41$, $SD = 2.31$). Neither the number of thoughts generated, nor subjective difficulty ratings, differed as a function of the attribution manipulation, which was introduced later.

In sum, participants' post-election recall of pre-election expectations was biased towards the actual election outcome. This hindsight bias was of the same magnitude when participants only thought about which predictions they would have made (hindsight-only condition), actually had made pre-election predictions (prediction–hindsight condition), or listed approximately 10 thoughts about alternate outcomes (12-thoughts condition). As in Experiment 1, however, generating alternatives eliminated the hindsight bias when participants attributed the experienced difficulty to their own lack of knowledge (12-thought/attribution condition). Moreover, participants' ratings of the difficulty of generating 12 thoughts correlated with their post-election recall under no-attribution conditions, $r(24) = -.48$, $p < .04$, but not under attribution conditions, $r(19) = .20$, $p = .22$ ($z = 2.30$, $p < .02$, for the difference between the two correlations).

General discussion

As numerous studies demonstrated (see Christensen-Szalanski & Willham, 1991; Hawkins & Hastie, 1990, for reviews), knowing an event's outcome reliably produces the impression that it was inevitable. Hence, people feel they could have anticipated it all along and often erroneously recall or reconstruct that they did, in fact, anticipate it. This is likely to interfere with their ability to learn from the past because it fosters false confidence in the accuracy of theories about the world (Fischhoff, 1982b). To counteract the hindsight bias it may appear useful "to force oneself to argue against the inevitability of the reported outcome, that is, to try to convince oneself that it might have turned out otherwise" (Fischhoff, 1982b, p. 343). Yet this strategy may not always be successful. As our experiments show, participants who try to generate many alternatives may in fact experience greater hindsight bias (see also Sanna et al., 2002). Ironically, the strategy may be less effective the more one tries "to convince oneself that it might have turned out otherwise" (Fischhoff, 1982b, p. 343), realizing along the way that reasons for an alternate outcome are difficult to bring to mind.

Theoretically, we trace our results to a variable that has so far been neglected in debiasing research, namely people's accessibility experiences. Generating many alternatives is difficult and experienced difficulty is informative in its own right (see Schwarz, 1998; Schwarz & Vaughn, 2002, for reviews), consistent with the logic of Tversky and Kahneman's (1973) availability heuristic. Supporting this interpretation, the impact of accessibility experiences was eliminated when their informational value was called into question through (mis)attribution manipulations, as reflected in differential recall of pre-event predictions and differential correlations between difficulty ratings and recall.

The effects of generating (too) many thoughts, however, should not distract from the observation that simulating alternatives did not increase the hindsight bias under some conditions (see also Sanna, 2000; Sanna, Stocker, & Clarke, in press; Sanna & Turley-Ames, 2000; Sanna, Turley-Ames, & Meier, 1999, for related views on the functionality of mental simulations in other domains). In particular, participants who generated only a few thoughts and found it easy, and those who generated many thoughts but could (mis)attribute the experienced difficulty, did not succumb to the hindsight bias. These findings are consistent with our theoretical analysis and some previous observations of attenuated hindsight (e.g., Arkes et al., 1981; Koriat et al., 1980; Slovic & Fischhoff, 1977). Similarly, it is conceivable that other variables may also elicit backfire effects in debiasing hindsight, for example, when counterfactual simulations provide causal antecedent-outcome links for the obtained outcome (Roese & Olson, 1996) or when the event outcomes were expected a priori (Mazursky & Ofir, 1990). Our findings suggest, however, that such content-driven effects may not be observed when participants find the thought generation difficult, an issue that awaits further research.

That the ironic effects of generating many alternatives went unnoticed in prior debiasing research reflects psychologists' common focus on thought content. Unfortunately, focusing exclusively on content misses that human thinking is accompanied by a variety of subjective experiences, including ease or difficulty of recall and generation (Schwarz, 1998), perceptual and conceptual fluency (Jacoby, Kelley, & Dywan, 1989), and bodily feedback (Stepper & Strack, 1993; for a review see Schwarz & Clore, 1996). Paralleling these observations, research into the "psychology of memory accuracy" also suggests the importance of phenomenal

experiences (see Koriat, 1993, for a review). We suspect that our understanding of additional phenomena, like the perseverance effect resulting from explanations (e.g., Ross, Lepper, Strack, & Steinmetz, 1977), could similarly benefit from the distinction between accessible content and accessibility experiences when suggesting debiasing strategies. Which conclusions people draw from accessibility experiences depends on their subjective theories, which are themselves malleable and context dependent (Skurnik, Schwarz, & Winkielman, 2000). Unless researchers take these metacognitive processes into account, many apparently straightforward suggestions may produce surprising results, as the present studies into debiasing hindsight illustrate.

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