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Political knowledge reduces hindsight memory distortion in election judgements

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Hindsight bias occurs when outcome information biases judgements. Previous studies have demonstrated hindsight bias in judgements of election outcomes, but few studies have examined the role of domain knowledge in hindsight bias. The present study examined the relationship between political knowledge and hindsight bias using both memory and hypothetical designs. Participants answered political knowledge questions and some made predictions before the 2012 US Presidential Election. After the election, participants were provided with the outcomes. Those who made predictions were asked to recall them, whereas those who did not make predictions were asked what they would have predicted. Both groups demonstrated hindsight bias: their recalled or hypothetical predictions were closer to the election results than participants' actual predictions. Political knowledge was negatively correlated with hindsight bias in recalled predictions but not significantly correlated with hindsight bias in hypothetical predictions. These findings help elucidate the role of domain knowledge in hindsight bias.

Keywords: Domain knowledge; Elections; Hindsight bias; Prediction.

Once an event has occurred, individuals tend to believe it was more predictable than it actually was, a phenomenon termed *hindsight bias*. Hindsight bias is typically studied with two different kinds of designs (e.g., Pohl, 2007). In memory designs, participants provide judgements, learn actual outcomes and attempt to recall their original judgements. Hindsight bias occurs when recalled judgements are closer to the actual outcomes than the original judgements were. In hypothetical designs, participants are given the actual outcomes and make judgements as if they had not been provided with those outcomes. Hindsight bias occurs when these hypothetical judgements are closer to the provided outcomes than are similar judgements made without outcome knowledge (either among the same participants in within-subjects designs or

from different participants in between-subjects designs).

These two hindsight designs may illuminate different aspects of hindsight bias. Blank, Nestler, von Collani, and Fischer (2008) claim that there are three separate components of hindsight bias: memory distortion, inevitability, and foreseeability. Memory distortion pertains to individuals' recollection of their original predictions after outcomes are learned; the inevitability component pertains to individuals' beliefs about the necessity of outcomes; and the foreseeability component pertains to beliefs about their ability to have predicted outcomes before they occurred. These three components have been demonstrated to be dissociable; various factors can selectively influence one of the components (e.g., Blank et al., 2008).

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Memory designs are usually used to assess the memory distortion component, whereas hypothetical designs are usually used to assess the inevitability and foreseeability components. With respect to foreseeability, participants who believe that they knew an outcome all along and believe that the outcome was predictable should provide hindsight judgements that are highly similar to the known outcome, and those who believe that the outcome was not foreseeable should provide judgements that are less similar to the known outcome. Foreseeability, however, is sometimes assessed more directly. For instance, Blank et al. (2008) asked participants to rate their agreement with a series of statements such as, “I knew all along how the election would turn out,” a self-report of beliefs about foreseeability. The present study used a traditional hypothetical design, asking participants what predictions they would have made prior to a known outcome, to indirectly assess foreseeability.

Hindsight bias has been shown to occur in the context of elections. Using memory designs, studies demonstrated hindsight bias for the 1998 and 2002 parliamentary elections and the 2000, 2003 and 2004 state elections in Germany (Blank, Fischer, & Erdfelder, 2003; Blank et al., 2008). Using hypothetical designs, studies demonstrated hindsight bias for the 1979 British General Election (Pennington, 1981), the 1980 US Presidential Election (Leary, 1982), and a 1982 US state gubernatorial election (Synodinos, 1986). A study using both memory and hypothetical designs demonstrated hindsight bias for the 1984 US Presidential Election and a state election (Powell, 1988); another had participants make judgements before and after the 1999 Israeli Prime Minister Election (Tykocinski, 2001), similar to a typical memory design with the exception that participants were not instructed to recall their original judgements but rather were asked to reassess the likelihoods of candidates winning in light of the actual results. Across these studies, outcome information biased participants’ judgements.

The goal of the present study was to examine the relationship between political knowledge and hindsight bias in memory and hypothetical designs. A meta-analysis on hindsight bias found that task familiarity moderates the magnitude of hindsight bias: studies with participants who were familiar with the tasks demonstrated less hindsight bias than studies with participants who were unfamiliar with the tasks (Christensen-Szalanski & Willham, 1991). A more recent meta-analysis on hindsight bias, however, compared studies with experts (e.g., accountants, physicians) to studies

with non-experts and found no difference in hindsight bias (Guilbault, Bryant, Brockway, & Posavac, 2004). Both of these reviews compared the magnitude of hindsight bias across studies; few studies have directly examined the relationship between expertise and hindsight bias. In a memory design, baseball expertise reduced hindsight bias in recalling predicted outcomes of participants’ swings (Gray, Beilock, & Carr, 2007). A computer simulation of a model of memory distortion, Reconstruction after Feedback with Take the Best, showed that domain knowledge (a proxy for expertise) decreased hindsight bias in a memory design (Hertwig, Faselow, & Hoffrage, 2003). Conversely, wine knowledge was unrelated to hindsight bias in judgements of the sweetness of wine in a hypothetical design (Pohl, Schwarz, Szesny, & Stahlberg, 2003). Thus, the relationship between domain knowledge and hindsight bias may be dependent on the hindsight design—i.e., the component of the hindsight bias that is being examined.

In memory designs, experts’ superior memory may increase the likelihood of accurately recalling their original predictions, thereby decreasing hindsight bias (Musch & Wagner, 2007). The stronger an individual’s memory for his or her predictions, the smaller the magnitude of hindsight memory distortion (e.g., Hell, Gigerenzer, Gauggel, Mall, & Müller, 1988) and experts possess greater memory for information within their domain of expertise (e.g., Chase & Simon, 1973) due to superior processing and organisation of domain-relevant information (e.g., Van Overschelde, Rawson, Dunlosky, & Hund, 2005). Experts may also make more accurate predictions, thereby restricting the magnitude of possible memory distortion. In hypothetical designs, on the other hand, experts’ greater ego involvement may increase concerns of self-presentation, thereby increasing hindsight bias (Musch & Wagner, 2007). Metacognitive factors may also increase the foreseeability component of hindsight bias in experts. After being provided with an outcome, experts’ ease of information processing may be attributed to the outcome appearing more foreseeable than it would to novices who require more effortful processing of outcomes (e.g., Musch & Wagner, 2007). Roese and Vohs (2012) suggested that expertise may *decrease* the memory distortion component and *increase* the foreseeability component of hindsight bias.

Data from Studies 1 and 2 of Blank et al. (2008) provide indirect support for this hypothesis. Study

1 recruited participants from political and psychology interest websites and Study 2 used an undergraduate psychology sample. The sample of Study 1, therefore, was likely more politically knowledgeable than that of Study 2. The memory distortion component appeared to be larger in Study 2 than Study 1, whereas the foreseeability component was slightly larger in Study 1 than Study 2. These comparisons, however, are made across studies and political knowledge was not assessed in either study.

The present study used judgements about the 2012 US Presidential Election to directly test the hypothesis that the relationship between domain knowledge and hindsight bias depends on the hindsight design. We assigned some participants to serve in a memory design and others to serve in a hypothetical design. We examined the relationships between political knowledge (assessed with questionnaires) and the two hindsight biases to test the prediction, derived from Roese and Vohs (2012), that political knowledge would be negatively correlated with hindsight bias in the memory design and positively correlated with hindsight bias in the hypothetical design.

Additionally, we compared two potential mechanisms by which political knowledge could reduce hindsight bias in the memory design. First, experts' superior memory for their predictions may result in their smaller hindsight bias (e.g., Musch & Wagner, 2007). Second, experts may make more accurate original judgements than novices so there may be less room for memory distortion to occur. We examined judgement recall and initial judgement accuracy to explore these possibilities.

METHOD

Participants

Participants ($N = 155$; 36.1% men) were students in an introductory psychology course at California State University San Marcos who ranged in age from 18 to 37 ($M = 19.85$, $SD = 2.56$) years. The self-reported ethnicities of the sample were 34.2% non-Hispanic White, 32.9% Hispanic, 13.6% Asian, 11.6% from multiple ethnicities, 4.5% Black and 3.2% other. Responses to an open-ended political affiliation question were 38.7% Democrat, 20.7% Republican, 17.4% "none," 7.7% "Independent," 1.3% Green Party, 1.9% Libertarian and 0.7% "undecided"; 11.6% did not respond to this question.

Materials and procedure

Participants were assigned to either the memory condition ($n = 71$) or the hypothetical condition ($n = 84$). All participants completed two political knowledge questionnaires on Friday, 26 October 2012 (11 days before the election). Political knowledge was assessed with a 10-item questionnaire taken from McGlone, Aronson, and Kobrynowicz (2006) and a 13-item Pew Political Knowledge Quiz from 29 March to 1 April 2012 (questions are available at <http://www.people-press.org/files/legacy-pdf/04-11-12%20Knowledge%20Release.pdf>).

Both measures assess political awareness in the USA. The 10-item questionnaire contains a mixture of political process (e.g., "How much of a majority is required for the U.S. Senate and House to override a presidential veto?") and current political information (e.g., "What is the name of the U.S. Senate majority leader?"), whereas the Pew Quiz assesses knowledge of the differences in political ideologies among the Republican and Democratic parties (e.g., "Which party is generally more supportive of increasing taxes on higher income people to reduce the federal budget deficit?"). We chose these two measures because they assess different aspects of political knowledge.

Participants in the memory condition predicted the outcome of the election after completing the political knowledge questionnaires. Specifically, they predicted the percentage of the popular vote that Barack Obama (the Democratic candidate) would receive, that Mitt Romney (the Republican candidate) would receive, and that all other candidates (combined) would receive. Because these are mutually exclusive and exhaustive alternatives, participants were instructed that their ratings should sum to 100. Participants in the hypothetical condition did not make these predictions. Percentage of the popular vote was chosen (rather than the Electoral College vote) because it was believed that the popular vote would be easier to understand and judge; it is frequently reported in pre-election polls, and is less subject to the noise produced by dichotomous results at the state level. Finally, all participants reported who they wanted to win the election (Obama, Romney or other), judged the importance of the election (on a seven-point scale anchored at *not at all important* and *very important*) and answered demographic questions.

On Friday, 16 November 2012 (10 days after the election), all participants were provided with the outcome of the election (i.e., the percentage of

the popular vote received by Barack Obama, Mitt Romney, and all other candidates). Participants in the memory condition were asked to recall the predictions they provided on 26 October. Participants in the hypothetical condition were asked how they would have predicted the outcome of the election if they had predicted it 11 days before the election (on 26 October). They were reminded that this was the day they took the political knowledge questionnaires.

RESULTS

The number of correct answers to McGlone et al.'s (2006) political knowledge questionnaire ($M = 3.97$, $SD = 1.73$; out of 10; $\alpha = .48$) and the Pew Quiz ($M = 8.97$, $SD = 2.35$; out of 13; $\alpha = .58$) were positively correlated, $r(153) = .29$, $p < .001$. These two scores were summed to create a political knowledge score for each participant ($M = 12.96$, $SD = 3.29$, $\alpha = .64$). Despite the relatively small correlation between these measures, we decided to sum them in order to provide a more comprehensive measure of political knowledge.

Although participants were instructed to make judgements for the three outcomes that summed to 100, not all of them did so. Judgements made by such participants were transformed to sum to 100 by taking each judgement and dividing it by the sum of all three judgements and multiplying this value by 100. This was done to prevent mathematical errors from inflating hindsight bias. (e.g., if a participant in the memory condition erroneously made predictions of 54, 54 and 12 at foresight, but realised the error when recalling his or her original judgements and reported predicting 45, 45 and 10, it would appear that the recalled predictions are more accurate than the foresight predictions—i.e., that hindsight bias was present—but this would likely be the result of mathematical error rather than bias.) Transformations were done for all memory condition participants' original predictions ($n = 22$) and recalled predictions ($n = 19$) and for all hypothetical condition participants' hypothetical judgements ($n = 33$) that did not sum to 100.

Memory condition

A hindsight index was computed for each participant in the memory condition. The absolute differences between original judgements and actual outcomes

were summed for all three options (Obama, Romney and others). This mean ($M = 16.68$, $SD = 17.38$) was significantly greater than the mean difference between participants' recalled judgements and the actual outcomes ($M = 12.51$, $SD = 14.26$), $t(70) = 2.92$, $p = .025$, $d = 0.26$. Thus, participants recalled having predicted the election results more accurately than they actually did. The difference between these means is an index of hindsight bias (termed the *proximity index*; Pohl, 2007). To examine the relationship between domain knowledge and memory distortion, we conducted correlational analyses. As predicted, the proximity index ($M = 4.17$, $SD = 15.33$) was negatively correlated with performance on the summed political knowledge questions, $r(69) = -.24$, $p = .047$.¹ Ratings of the importance of the election were positively correlated with political knowledge, $r(69) = .36$, $p = .002$, but unrelated to the proximity index, $r(69) = -.11$, $p = .377$. The proximity index did not significantly differ between participants identifying as Republicans ($n = 12$, $M = -3.71$, $SD = 13.57$) and those identifying as Democrats ($n = 27$, $M = 3.17$, $SD = 12.57$), $t(37) = 1.54$, $p = .132$, $d = 0.53$, or for participants who reported wanting Romney to win the election ($n = 15$, $M = 2.57$, $SD = 14.10$) and those wanting Obama to win ($n = 44$, $M = 3.87$, $SD = 15.03$), $t(57) = 0.29$, $p = .770$, $d = 0.09$.²

We next tested two candidate mechanisms for the relationship between political knowledge and memory distortion: that those high in domain knowledge recall their predictions more accurately and that those high in domain knowledge make more accurate predictions so there is less room for memory distortion. To test the first possibility, we examined the relationship between political knowledge and the number of exact recollections of the three original judgements. These analyses were performed on the actual judgements rather than

¹When analysed separately, the Pew political knowledge questionnaire was significantly correlated with hindsight bias in the memory condition, $r(69) = -.28$, $r = .019$, whereas the McGlone et al. questionnaire was not: $r(69) = -.08$, $p = .514$.

²The hindsight index for each candidate did not significantly differ based on which candidate participants wanted to win the election in the memory condition: the hindsight index for Obama among those who wanted Obama to win ($n = 44$; $M = -0.08$, $SD = 7.24$) was not significantly different from those who wanted Romney to win ($n = 15$; $M = 0.91$, $SD = 5.25$), $t(57) = 0.49$, $p = .629$, $d = 0.16$; the hindsight index for Romney among those who wanted Obama to win ($M = 1.00$, $SD = 5.87$) was not significantly different from those who wanted Romney to win ($M = -0.70$, $SD = 5.79$), $t(57) = 0.97$, $p = .335$, $d = 0.29$.

the transformed judgements because mathematical errors (i.e., the three judgements not summing to 100) could cause all of the transformed judgements to not match. (e.g., if a participant predicted 50% for Obama, 49% for Romney and 2% other, and the participant recalled the judgements as 50% for Obama, 49% for Romney and 1% for other, two of the three judgements are perfectly recalled but none of the three transformed judgements would match.) Most participants (70.4%) had zero perfect recollections of original judgements, 26.8% had one exact recollection, 1.4% had two exact recollections and 1.4% had all three exact recollections. There was not a significant relationship between political knowledge and the number of exact recollections, $r(69) = -.10$, $p = .398$. We also compared the political knowledge of participants who had at least one exact recollection ($n = 21$, $M = 12.10$, $SD = 2.88$) to those who had zero exact recollections ($n = 50$, $M = 13.36$, $SD = 3.72$) and found no significant difference between them, $t(69) = 1.39$, $p = .169$, $d = 0.38$.

To test the second possibility, that the relationship between expertise and hindsight bias occurs because experts are more accurate in their original judgements so there is less room for memory distortion, we examined the relationship between political knowledge and accuracy of participants' predictions. Political knowledge was negatively correlated with the difference between participants' predictions and the outcomes, $r(69) = -.38$, $p = .001$, demonstrating that those higher in political knowledge made more accurate predictions.³

Hypothetical condition

The absolute differences between hypothetical judgements and actual outcomes were summed for all three options (Obama, Romney and others) for participants in the hypothetical condition. In between-subjects hypothetical designs, hypothetical judgements from participants with outcome knowledge are compared to judgements from participants without outcome knowledge. We compared the sum of the absolute differences between judgements and actual outcomes for participants in the hypothetical condition

³ When analysed separately, both political knowledge questionnaires were negatively correlated with the accuracy of foresight judgments in the memory condition, McGlone et al.: $r(69) = -.29$, $p = .015$; Pew: $r(69) = -.34$, $p = .004$.

($M = 12.18$, $SD = 11.76$) to the mean of the sum of the absolute differences between predictions and actual outcomes for participants in the memory condition (16.68) and found a significant difference, $t(83) = 3.50$, $p = .001$, $d = 0.38$. Thus, participants in the hypothetical condition reported that they would have been more accurate than were the foresight judgements made by participants in the memory condition.

We computed a hypothetical proximity index by subtracting participants' summed absolute differences between hypothetical judgements and actual outcomes from the mean summed absolute differences between predictions and actual outcomes in the memory condition. This proximity index ($M = 4.50$, $SD = 11.76$) was not significantly correlated with political knowledge ($M = 12.92$, $SD = 3.12$), $r(82) = .11$, $p = .302$.⁴ As in the memory condition, ratings of the importance of the election were positively correlated with political knowledge, $r(82) = .22$, $p = .041$, but unrelated to the proximity index, $r(82) = .05$, $p = .646$. Furthermore, the hypothetical proximity index did not differ between participants identifying as Republicans ($n = 20$, $M = 5.92$, $SD = 9.46$) and those identifying as Democrats ($n = 33$, $M = 6.34$, $SD = 8.67$), $t(51) = 0.17$, $p = .869$, $d = 0.05$, or between participants who reported wanting Romney to win the election ($n = 20$, $M = 7.14$, $SD = 9.15$) and those who reported wanting Obama to win ($n = 52$, $M = 4.14$, $SD = 11.09$), $t(70) = 1.08$, $p = .286$, $d = 0.30$.⁵

DISCUSSION

In both memory and hypothetical conditions, participants displayed hindsight bias in the prediction of the 2012 US presidential election. In the memory condition, participants' foresight predictions were

⁴ When analysed separately, neither political knowledge questionnaire was significantly correlated with hindsight bias in the hypothetical condition, McGlone et al.: $r(82) = .09$, $p = .401$; Pew: $r(82) = .09$, $p = .426$.

⁵ The hindsight index for each candidate did not significantly differ based on which candidate participants wanted to win the election in the hypothetical condition: the hindsight index for Obama among those who wanted Obama to win ($n = 52$; $M = 0.48$, $SD = 4.56$) was not significantly different from those who wanted Romney to win ($n = 20$; $M = 1.15$, $SD = 4.33$), $t(70) = 0.58$, $p = .575$, $d = 0.15$; the hindsight index for Romney among those who wanted Obama to win ($M = 0.74$, $SD = 5.13$) was not significantly different from those who wanted Romney to win ($M = 1.80$, $SD = 4.70$), $t(70) = 0.42$, $p = .423$, $d = 0.22$.

further from the actual outcome than were their recalled predictions, replicating previous studies that examined other elections using memory designs (Blank et al., 2003, 2008; Powell, 1988). Likewise, participants in the hypothetical condition provided hindsight predictions that were more accurate than the memory condition participants' foresight judgements, replicating previous studies that examined other elections using hypothetical designs (Leary, 1982; Pennington, 1981; Powell, 1988; Synodinos, 1986).

The present study examined the role of domain knowledge in memory and hypothetical hindsight designs. In the memory condition, political knowledge was negatively correlated with the magnitude of hindsight bias. This finding is consistent with Gray et al.'s (2007) finding that baseball experts showed less memory distortion than novices and with Hertwig et al.'s (2003) computer simulation suggesting that domain knowledge decreased memory distortion. Additional analyses suggested that the relationship between domain knowledge and memory distortion was not the result of more accurate recollections of original judgements; this relationship appears to result from those higher in domain knowledge providing more accurate original judgements. Contrary to predictions, in the hypothetical condition, political knowledge was not significantly related to the magnitude of hindsight bias. This finding is not unprecedented in the literature; it is consistent with Pohl et al.'s (2003) findings from a hypothetical design that wine knowledge was unrelated to hindsight bias in wine judgements. Broadly, then, the current findings partially confirm the suggestion by Roese and Vohs (2012) that expertise decreases the memory distortion component of hindsight bias although increasing the foreseeability component of hindsight bias. In the current study, domain knowledge decreased memory distortion but was not significantly related to the foreseeability component of hindsight bias (although there was a small nonsignificant positive correlation). As previously discussed, however, the current study used a traditional hypothetical design as a proxy for the foreseeability component (in contrast to the direct assessment used by Blank et al., 2008), and we acknowledge that this may blur the relationship between domain knowledge and foreseeability. A more direct assessment of the foreseeability component could have revealed a relationship with domain knowledge. These results also provide evidence for the multiple components view of hindsight bias (e.g., Blank et al., 2008).

Domain knowledge appears to influence the memory distortion but not the foreseeability component of hindsight bias, providing further evidence that the components of the hindsight bias can be dissociated.

With respect to other moderators of hindsight bias, the present findings are partially consistent with extant research. In both the hypothetical and memory designs, hindsight bias did not differ by political affiliation or by who participants wanted to win the election. Previous studies have found hindsight bias to be greater after a negative outcome than after a positive one (e.g., Schkade & Kilbourne, 1991), but that was not the case in the present study; neither component of hindsight bias significantly differed among those who wanted Obama to win (experiencing a positive outcome) and those who wanted Romney to win (experiencing a negative outcome). Although some previous studies have found that self-relevance decreases hindsight bias (e.g., Mark & Mellor, 1991), a prior study reported that political involvement did not influence hindsight bias in judgements of an election (Synodinos, 1986). In the current study, the importance of the election to participants was not significantly related to either component of hindsight bias.

One limitation of the present study is that the between-subjects hypothetical design could mask a relationship between domain knowledge and the foreseeability component of hindsight bias. In within-subjects hypothetical designs, participants' judgements made with outcome knowledge are compared to their other judgements made without outcome knowledge. Thus, each participant serves as his or her own control. In between-subjects hypothetical designs, judgements from participants who have outcome knowledge are compared to judgements from participants who do not have outcome knowledge. Because these between-subjects designs compare all hindsight participants to a mean foresight value, they assume that all hindsight participants would have made an identical judgement without outcome knowledge. In the present study, however, participants in the hypothetical condition with greater political knowledge could have made more accurate predictions as the participants in the memory condition did. Because political knowledge predicts judgement accuracy, it remains possible that there is a positive relationship between domain knowledge and the foreseeability component of hindsight bias that would have been uncovered by a within-subjects hypothetical design. Unfortunately, the

event being examined in the present study, the 2012 US Presidential Election, did not allow for a within-subjects hypothetical design (i.e., there were no similar foresight judgements we could have had participants make to compare to their hindsight election predictions as no other election of comparable importance took place at this time). Future studies could examine the role of domain knowledge in foreseeability hindsight bias using within-subjects hypothetical designs.

Another limitation of the present study is the limited range of domain knowledge present in the sample. Our participants were undergraduate students enrolled in an introductory psychology course. Musch and Wagner (2007) claim that experts' greater ego involvement may result in increased hindsight bias. It is unlikely that many of our participants considered themselves to be political experts, and thus are unlikely to have had the ego involvement necessary to increase hindsight bias. The absence of a significant relation between foreseeability bias and political knowledge in the current study should be interpreted cautiously. Future studies could use samples that contain actual experts, such as political pundits, who are more likely to place real importance on their predictions.

The current study is one of the few to examine the role of expertise in hindsight bias. Expertise (assessed by political knowledge) predicted less memory distortion, consistent with the perspective advanced by Roese and Vohs (2012). However, expertise did not significantly predict the foreseeability component of hindsight bias. Collectively, these results help elucidate the role of domain knowledge in hindsight bias and suggest avenues for future investigation into the mechanisms and individual differences that underlie this phenomenon.

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