Available online at www.sciencedirect.com
SCIENCE DIRECT®
Journal of Experimental Social Psychology 40 (2004) 374–383
Journal of Experimental Social Psychology
www.elsevier.com/locate/jesp

Activating a mental simulation mind-set through generation of alternatives: Implications for debiasing in related and unrelated domains

Edward R. Hirt,[a,*] Frank R. Kardes,[b] and Keith D. Markman[c]

[a] *Department of Psychology, Indiana University, Bloomington, IN 47405, USA*
[b] *University of Cincinnati, USA*
[c] *Ohio University, USA*

Received 12 August 2002; revised 26 July 2003

Abstract

Encouraging people to consider multiple alternatives appears to be a useful debiasing technique for reducing many biases (explanation, hindsight, and overconfidence), if the generation of alternatives is experienced as easy. The present research tests whether these alternative generation procedures induce a mental simulation mind-set (cf. Galinsky & Moskowitz, 2000), such that debiasing in one domain transfers to debias judgments in unrelated domains. The results indeed demonstrated that easy alternative generation tasks not only debiased judgments in the same domain but also generalized to debias judgments in unrelated domains, provided that participants were low in the need for structure. The alternative generation tasks (even when they were easy to perform) showed no evidence of activating a mental simulation mind-set in individuals high in need for structure, as these individuals displayed no transfer effects. Implications of the results for understanding the role of the need for structure, ease of generation, and mental simulation mind-set activation for debiasing are discussed.

Keywords: Debiasing; Need for structure; Accessibility experiences; Mental simulation; Heuristics and biases

One of the best pieces of advice my father gave me was to consider all your options before making a decision. However, years of research have demonstrated that people rarely follow this advice. Indeed, several judgmental biases are characterized by a failure to consider alternatives and a corresponding tendency to prematurely settle on a focal hypothesis (Koehler, 1991). Fischhoff (1982) suggested that one of the most effective strategies for reducing judgmental biases is to prompt individuals to consider alternatives. Indeed, many subsequent studies have shown the consideration of alternatives to be an effective debiasing strategy for reducing the hindsight bias (Sanna & Schwarz, 2003; Sanna, Schwarz, & Stocker, 2002), the explanation effect (Hirt & Markman, 1995; Lord, Lepper, & Preston, 1984), and overconfidence (Hoch, 1985; Koriat, Lichtenstein, & Fischhoff, 1980).

* Corresponding author. Fax: 1-812-855-4691.
E-mail address: ehirt@indiana.edu (E.R. Hirt).

Consequences of evoking a mental simulation mind-set

But why is it effective? Koehler (1991) argued that the consideration of alternatives "breaks the inertia" created when one adopts and exclusively focuses on evidence consistent with the focal outcome. Indeed, evidence collected by Hirt and Markman (1995, Study 2) provided strong support for Koehler's argument. In their research, participants explained a focal event (a win by a particular football team) and then were asked to explain an alternative outcome. The nature of the alternative outcome was varied such that in some cases it was opposite to the first outcome (e.g., a convincing win by team B after explaining a convincing win by team A), but in other cases it was an alternative version of the same outcome (e.g., a convincing win by team B after explaining a narrow victory by team B). Importantly, the results indicated that in *all* cases the consideration of an alternative outcome debiased likelihood judgments.

0022-1031/$ - see front matter © 2003 Elsevier Inc. All rights reserved.
doi:10.1016/j.jesp.2003.07.009

Indeed, the consideration of an alternative to the focal outcome appeared to "prime the pump," leading participants to spontaneously consider and mentally simulate additional alternatives (beyond those they were explicitly asked to consider).[1] Thus, it appears that simply having individuals consider alternatives (even when the alternative does not undo the outcome) is sufficient to break the inertia, resulting in a more thorough evaluation of the evidence at the time of judgment.

Hirt and Markman's (1995) research suggests that the consideration of alternatives changes and improves the quality of the judgmental process. However, a more stringent test of this "break the inertia" hypothesis would be to examine whether considering multiple alternatives in one context generalizes to affect the generation of alternatives in a later, unrelated context. Recent work by Galinsky and Moskowitz (2000) has provided some initial evidence for this notion. In their research, participants read scenarios in which a target person almost won (or almost lost) a trip to Hawaii by switching seats at a rock concert (counterfactual prime conditions), or won or lost without switching seats (no counterfactual conditions). Priming counterfactual thinking in this way resulted in better performance on the Duncker candle problem (in which participants need to recognize that an object can serve multiple purposes), and on a trait hypothesis-testing task (in which participants need to recognize that disconfirming as well as confirming questions are informative). These researchers argued that their counterfactual priming task activates a mental simulation mind-set (Kahneman & Tversky, 1982) in which alternatives are generated and considered in completely unrelated judgment tasks.

Parameters influencing mental simulation mind-set activation

Clearly, the results of Galinsky and Moskowitz (2000) suggest that activation of a mental simulation mind-set in one context can transfer and debias later judgments in unrelated contexts. However, several important questions are raised by this work. First, this research did not examine the role that ease of generation plays in the successful activation of a mental simulation mind-set. Galinsky and Moskowitz (2000) had participants generate counterfactuals about a scenario in which it was easy to generate plausible alternatives that undid the outcome. However, recent research shows that the consideration of alternatives as a debiasing technique can sometimes backfire: when the consideration of alternatives is experienced as particularly difficult, bias is amplified rather than attenuated (Hirt & Markman, 1995; Sanna et al., 2002). Why? The process of generating or retrieving information from memory renders two sources of information accessible: the specific content that comes to mind (accessible content) and the subjective ease or difficulty with which that content comes to mind (accessibility experiences; Schwarz, 1998; Schwarz & Vaughn, 2002). When asked to consider alternatives that are easy to generate, judgmental biases are reduced, as individuals acknowledge that there are many other plausible alternatives to the focal outcome. However, when the consideration of alternatives is perceived as difficult, individuals conclude that few if any plausible alternatives exist and become more convinced that the focal outcome is inevitable.

Recently, Sanna et al. (2002) demonstrated the implications of these accessibility experiences for hindsight bias. Participants were provided with descriptions of the British–Gurkha war (cf. Fischhoff, 1975) and asked to generate two or 10 examples about how the war could have turned out differently. Participants asked to generate two examples found the task easy, leading them to infer that there were several viable alternative outcomes for this event, significantly reducing hindsight bias. By contrast, participants asked to generate 10 examples found the task difficult. Their negative accessibility experience led them to believe that there were few plausible alternatives to the focal outcome, thereby increasing hindsight bias.

Conceptually similar results were obtained in Hirt and Markman (1995, Study 3). Participants initially explained a division championship by a favored team, and then were asked to explain a championship by either another plausible contender or an implausible team. Results indicated that counterexplanation of a plausible alternative debiased probability judgments (that the favorite would win), but counterexplanation of the implausible alternative did not. Thus, it appears that any manipulation of accessibility experiences that renders generation of alternatives easy (small number, high plausibility) leads to successful debiasing; however, manipulations that make the generation of alternatives difficult (large number, low plausibility) maintain if not enhance judgmental bias.

The primary goal of the present research was to explore the role of ease of generation in the activation of a mental simulation mind-set and the generalization of its

[1] There may be some ambiguity regarding what we mean by the term "spontaneous" in this context. We use this term here for two reasons. First, this was the phrase originally used in Hirt and Markman (1995); thus, for the sake of consistency, we followed this precedent. Second, it is clear from our data that participants are considering alternatives that were not specified in the counterexplanation task. Even though participants were provided information about all of the teams, individuals given a plausible counterexplanation task go beyond what the other participants do, and "spontaneously" consider additional alternatives on their own, without prompting. It is this meaning of the term that we want to imply here. We do not mean to suggest that consideration of alternatives has features of a spontaneous or automatic process (such as lack of awareness, intentionality, or controllability).

debiasing effects to subsequent unrelated contexts. The literature reviewed above suggests that Galinsky and Moskowitz (2000) mind-set activation and transfer effects should be limited to conditions in which the generation of alternatives is easy. When the generation of alternatives is difficult, a mental simulation mind-set should not be activated and no transfer effects should be observed.

Individual differences in mind-set activation: The role of need for closure

A second goal of the present research was to investigate potential individual differences in the activation of a mental simulation mind-set. As an initial step, we investigated the moderating influence of need for closure primarily because this variable has been linked specifically to the motivation to generate and evaluate alternative hypotheses. The need for closure refers to a desire to form (''seize'') and to maintain (''freeze'') a definite opinion about an issue (Kruglanski & Webster, 1996). As need for closure increases, individuals are more likely to focus on information with straightforward implications and to avoid complex, inconsistent, or ambiguous information. The preference for easy-to-use information increases with the need for closure, regardless of whether this need is manipulated (e.g., time pressure, accountability concerns) or measured (Webster & Kruglanski, 1994).

High need for closure discourages individuals from generating alternative hypotheses, because focusing on one hypothesis facilitates closure and considering many possibilities delays closure. For example, Mayseless and Kruglanski (1987) presented enlarged photographs of everyday objects (e.g., comb, toothbrush) taken from unusual angles. Participants were asked to generate as many hypotheses as possible concerning the identity of each object and were asked to select the most plausible hypothesis and indicate their confidence about its validity. Fewer hypotheses were generated and higher levels of confidence were expressed in high than in low need for closure conditions. Extrapolating from this research, we predict that the need for closure should also influence sensitivity to manipulations designed to induce a mental simulation mind-set. These manipulations should be quite successful in activating a mental simulation mind-set for individuals low in need for closure, resulting in robust transfer effects; however, individuals high in need for closure should be more resistant to these manipulations, resulting in more persistent judgmental biases and little if any transfer effects.

We measured individual differences using Webster and Kruglanski's (1994) Need for Closure Scale. Neuberg, Judice, and West (1997) demonstrated that this scale can be psychometrically reduced into two orthogonal subscales: Need For Structure (NFS), assessing the preference to form and maintain simple knowledge structures; and Decisiveness (DEC), assessing the preference for quick answers at the expense of accuracy (fear of invalidity). Following Neuberg et al.'s advice, we treated the Need for Closure Scale as a multidimensional instrument, attempting to unconfound the judgmental effects of need for structure (''freezing'') and decisiveness (''seizing'').

The present research

The present research used a methodology similar to Hirt and Markman (1995, Study 3). Participants were initially given a focal outcome to explain (a divisional championship by the Portland Trail Blazers). We then activated a mental simulation mind-set by having participants complete an alternative generation procedure (generate 2 or 8 alternatives) modeled after Sanna and Schwarz (2003). This alternative generation task occurred in the context of either a related (football) or unrelated domain (TV), so that we could test the robustness of this manipulation in activating a mental simulation mind-set. Specifically, we were interested in assessing whether accessibility experiences in these other domains would transfer to affect judgments about professional basketball. We expected that the task of generating few alternatives would be easy and would successfully induce a mental simulation mind-set, resulting in debiasing effects on judgments in both the same as well as unrelated domains. However, we expected that the task of generating many alternatives would be difficult and would not evoke a mental simulation mind-set, fostering greater belief in the focal hypothesis and no transfer effects. We also predicted that the effectiveness of these debiasing manipulations would be moderated by individual differences in need for closure. Specifically, because our procedures examined the extent to which people would consider alternatives (''unfreeze'') from a focal hypothesis, we predicted that only the need for structure component of the Need for Closure Scale would be involved. Hence, we expected that only individuals low in NFS would have a mental simulation mind-set activated when the generation task was easy and would illustrate transfer effects.

Method

Participants

Participants were 240 introductory psychology students (156 males, 82 females) enrolled at Indiana University who considered themselves knowledgeable about

basketball. Participants received course extra credit for their participation. Participants were tested in groups from 2 to 30. Data from 12 participants were dropped because they failed to explain the proper event(s). Thus, data from 228 participants remained for inclusion in the analyses.

Procedure

Upon arrival, participants were told that the experiment concerned professional basketball. All participants then completed Webster and Kruglanski's (1994) 42 item Need for Closure Scale as well as a 10 item measure assessing their general knowledge of professional basketball. Scores on the measure of basketball knowledge could range from 0 to 10.

Next, all participants were given information about the upcoming divisional race in the NBA's Pacific Division. Participants received a packet containing detailed information about all seven teams in the division (Golden State Warriors, Los Angeles Clippers, Los Angeles Lakers, Phoenix Suns, Portland Trail Blazers, Sacramento Kings, and Seattle Supersonics). Participants were given 10 min to read the information.

Participants were then randomly assigned to one of eight conditions. The different tasks performed in these eight conditions are illustrated in Fig. 1. In the control condition, participants did no explanation task and simply completed the dependent measures. In the seven experimental conditions, all participants first wrote explanations for a division championship by Portland. After completing this task, subsequent instructions diverged, depending on condition. Participants in the Explain Portland only condition next completed the dependent measures. Participants in the remaining six conditions completed a second task prior to the dependent measures. As in Hirt and Markman (1995, Study 3), we included plausible and implausible counterexplanation conditions for comparison purposes. We chose the Los Angeles Lakers, a consistently strong team, for the plausible counterexplanation condition, and the Los Angeles Clippers, a consistently awful team, for the implausible counterexplanation condition. After writing their second explanations, participants in these two counterexplanation conditions completed the dependent measures.

Generalization conditions

Participants in the two counterexplanation conditions were asked to explain a specific alternative to the focal hypothesis (Portland) in the same domain (NBA basketball). Participants in the remaining four experimental

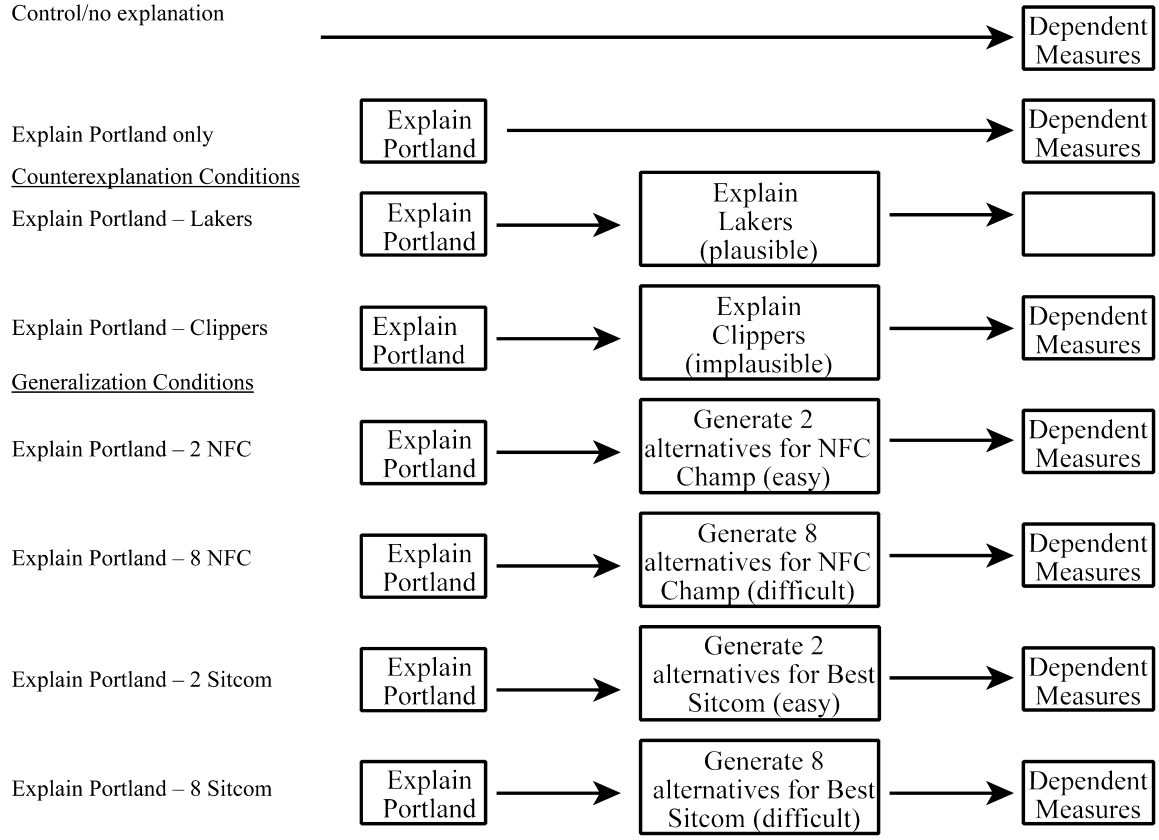

Fig. 1. Schematic of the eight experimental conditions.

conditions, however, completed a second task in which they were asked to consider alternatives to a focal hypothesis in an entirely different context. We manipulated the relatedness of the domain of this second task. In the related domain conditions, the task dealt again with sports, shifting from professional basketball to professional football. Specifically, participants were asked to predict the champion of the upcoming NFC Conference playoffs. The information listed all 15 teams in the conference and stated that, according to experts, the Saint Louis Rams were the favorite to win. Participants were then reminded that there were 14 other teams vying for this honor, and were asked to identify either two or eight other teams that had a legitimate shot to win the conference championship.

In the unrelated domain conditions, the task required participants to predict the likely winner of the title of Best TV sitcom. Participants were told that the upcoming millennium countdown had spawned numerous "best of" lists in a variety of categories. Participants were told that industry experts were meeting soon to determine the Best TV sitcom. The passage presented a list of the final 15 candidates and stated that, according to experts, M*A*S*H was the favorite. Participants were reminded that there were 14 other shows vying for this honor, and were asked to identify either two or eight other sitcoms that had a legitimate shot to win the title.

Thus, the four generalization conditions had participants generate either two or eight alternatives to the focal hypothesis in either a related (football) or unrelated (TV) domain. After completing this second task, participants in these conditions completed the dependent measures.

Dependent measures

The primary dependent measures were the estimated probability that the Portland Trail Blazers would win the division (ranging from 0 to 100%) and the predicted final rankings, made on a scale ranging from first place (1) to last place (7), of all seven teams in the division. Participants also reported their confidence in their predictions on a 1 (not at all confident) to 11 (extremely confident) scale.

Next, all participants made predictions about the likelihood that the Saint Louis Rams would win the NFC Conference title and that M*A*S*H would win the Best TV Sitcom award on a 0–100% scale. These data provided a manipulation check for the effectiveness of the generate 2 vs. 8 alternatives manipulation used in the generalization conditions. Finally, participants were asked to rate the ease or difficulty of each of the explanation/generation tasks they performed. This measure constituted a manipulation check of the ease/plausibility of each of the alternative explanation/generation tasks.

Results

Overview

We present the results in two main parts. First, we report analyses including only the first four conditions, excluding the four generalization conditions. These analyses allow us to test whether we replicate the findings of Hirt and Markman (1995, Study 3) as well as to investigate whether the debiasing effects of a plausible counterexplanation task are moderated by need for structure. Second, to address whether evoking a mental simulation mind-set in another domain will transfer, we report analyses conducted on the four generalization conditions.

Basketball knowledge measure

Participants were knowledgeable about basketball ($M = 6.66$), but the range of scores was substantial ($SD = 3.06$). An ANOVA revealed that level of basketball knowledge did not differ significantly across conditions, all Fs < 1, ns. However, to ensure that any differences across conditions were not due to differences in basketball knowledge, score on the knowledge measure serves as a covariate in all analyses reported.[2]

Need for closure measure

Following Neuberg et al. (1997), the Need for Closure scale ($\alpha = .83$) was subdivided into two subscales: Need for Structure (NFS, 27 items, combining the preference for order, preference for predictability, and discomfort with ambiguity facets of the Webster & Kruglanski (1994) measure, $\alpha = .86$) and Decisiveness (DEC, 7 items, $\alpha = .69$). These two components showed good internal reliability and were uncorrelated with each another ($r(238) = .08$, ns). Thus, in the analyses, both NFS and DEC are treated as predictors.

Part I: Analyses of the counterexplanation conditions

Probability of winning

The main dependent measure was the predicted probability that Portland would win the division. An

[2] In the reported analyses, the covariate (basketball knowledge) had a significant effect on the probability of winning measure ($\beta = .25$, $t = 3.02$, $p < .01$). Basketball knowledge significantly affected reported confidence in predictions ($\beta = .35$, $t = 3.92$, $p < .001$) as well the predicted final ranking assigned to both the favorite (Portland) ($\beta = .25$, $t = 2.85$, $p < .01$) and the Sacramento Kings ($\beta = .24$, $t = 2.69$, $p < .01$). To no surprise, more knowledgeable participants were more confident in their predictions and ranked the teams more consistently with their current level of performance than those who were less knowledgeable. However, all effects reported in the text obtain over and above any influence of the covariate.

ANOVA performed on the first four conditions revealed a main effect of condition, $F(3, 118) = 9.39$, $p < .001$. Participants in the Explain Portland only condition believed that Portland had a greater probability of winning than did control participants, $t(57) = 2.27$, $p < .05$, illustrating the standard explanation effect. The plausible counterexplanation (Lakers) condition reduced estimates significantly below that of the Explain Portland only condition, $t(55) = 3.64$, $p = .001$, to a level comparable to the control condition, $t(58) = 1.43$, $p = .15$. Conversely, the implausible counterexplanation (Clippers) condition augmented belief that Portland would win. Probability estimates in this condition were significantly greater than those in the control, $t(59) = 4.00$, $p < .001$, plausible counterexplanation (Lakers), $t(57) = 5.25$, $p < .001$, and even the Explain Portland only conditions, $t(56) = 2.34$, $p = .023$. These results nicely replicate the findings obtained by Hirt and Markman (1995, Study 3).

To examine the moderating role of need for closure, we conducted stepwise regression analyses. In the first step, the four level condition variable and the two individual difference variables, NFS and DEC, were included as predictor variables. All four possible interaction terms were computed and added in the second step. Following Aiken and West (1991), all variables were centered. This analysis revealed main effects of Condition ($\beta = .23$, $t = 2.97$, $p < .01$), NFS ($\beta = .57$, $t = 7.41$, $p < .001$), and a Condition X NFS interaction ($\beta = .21$, $t = 2.78$, $p = .006$). Participants lower in NFS as a whole estimated Portland's likelihood of winning to be less than did participants higher in NFS. However, as can be seen in Fig. 2, the magnitude of this difference varied across conditions. Although low and high NFS participants did not differ in the control condition (simple slope = .05, $t < 1$, ns), participants low in NFS displayed significantly less explanation bias in the Explain Portland only condition (simple slope = .55, $t = 2.92$, $p < .01$) and were particularly responsive to the plausible counterexplanation (Lakers) task (simple slope = .99, $t = 5.40$, $p < .001$), illustrating probability estimates significantly below those of control participants. Low NFS individuals were also less biased in the implausible (Clippers) condition (simple slope = .36, $t = 2.12$, $p < .05$). Thus, it appears that NFS moderated participants' sensitivity to the counterexplanation manipulations. Importantly, decisiveness did not show any effects, suggesting that the need for structure ("freezing") rather than decisiveness ("seizing") component is a factor in these debiasing results.

Predicted final rankings of the teams

Hirt and Markman (1995, Study 3) found that participants who explained a plausible alternative spontaneously considered additional alternatives. In this study, we found similar effects when we looked at the final rankings predicted for the Sacramento Kings, a team currently leading the division when we ran the study. Regression analyses performed on this measure revealed main effects of Condition ($\beta = .19$, $t = 2.06$, $p < .05$), NFS ($\beta = .19$, $t = 1.98$, $p = .05$), and a Condition X NFS interaction ($\beta = .20$, $t = 2.12$, $p < .05$). Specifically, we found that in the plausible counterexplanation (Lakers) condition, low NFS participants not only ranked the Kings significantly higher than high NFS participants (simple slope = .63, $t = 3.27$, $p < .01$), but also ranked them higher relative to low NFS participants in the control condition (see Fig. 3). High NFS participants demonstrated no evidence of spontaneously considering multiple alternatives in the plausible counterexplanation condition.

Confidence

A regression analysis on the confidence measure revealed only a main effect of NFS, $\beta = .20$, $t = 2.07$, $p = .04$. Low NFS participants reported less confidence

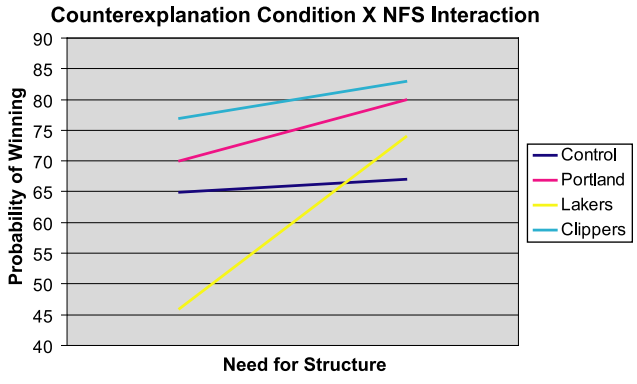

Fig. 2. Predicted scores for the probability of winning measure as a function of counterexplanation condition and need for Structure (NFS).

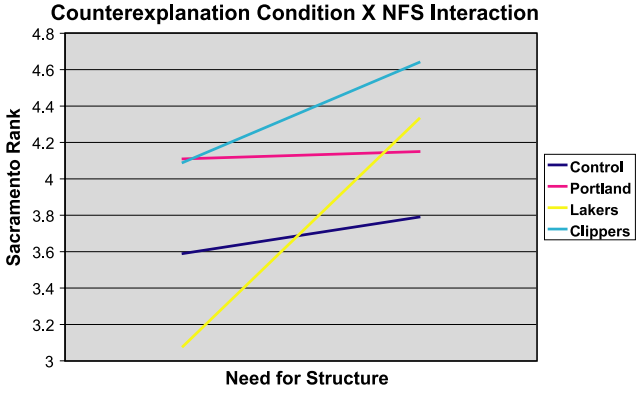

Fig. 3. Predicted rank assigned to the Sacramento Kings as a function of counterexplanation condition and need for structure (NFS). Note: Laver numbers indicate a higher ranking.

overall in their predictions than did high NFS participants, providing further validation that high NFS individuals tend to engage in epistemic freezing and prematurely fixate on a single alternative, whereas low NFS individuals acknowledge the inherent uncertainty in venturing a prediction in lieu of multiple plausible alternatives.

Part II: Transfer effects of mental simulation mind-set activation across domains

Manipulation check

First, we needed to establish that the Schwarz (1998) 2 vs. 8 manipulation was effective. A 2 (domain: NFL vs. TV sitcom) X 2 (generation task: 2 vs. 8) ANOVA on the ease of generation manipulation check revealed a main effect of generation task, $F(1, 102) = 5.12$, $p = .026$. Participants reported that generating two alternatives ($M = 7.20$) was easier than generating eight alternatives ($M = 6.30$). There were no effects or interactions with domain.

We next conducted stepwise regression analyses on the two prediction measures (NFL, TV Sitcom) to see whether this manipulation affected predictions of their respective outcomes. In these regressions, we included the two individual difference variables (NFS, DEC) as well as two dummy coded variables for domain and generation task as a first step, and all possible interaction terms of these four independent variables as a second step. For both the NFL and Sitcom prediction tasks, these analyses revealed significant NFS by generation task interactions (for NFL: $\beta = -.21$, $t = 2.21$, $p = .029$; for Sitcom: $\beta = -.22$, $t = 2.32$, $p = .022$). In both cases, low NFS participants rated the probability of the favorite winning as lower after generating 2 than after generating 8 alternatives (simple slopes = .38 and .41, ts > 3.0, ps $< .01$). This finding suggests that low NFS participants used ease of generation as a cue for predicting the likely outcome. Conversely, high NFS participants rated the probability of the favorite winning as higher after generating two than after generating eight alternatives (simple slopes = −.27 and −.31, ts > 2.3, ps $< .05$), implying that high NFS participants used the number of alternatives generated as the basis of prediction.

Generalization to the NBA prediction task

Given that low NFS individuals were influenced by ease of generation in making likelihood estimates for their respective tasks, we next examined whether exposure to this exercise evoked a mental simulation mind-set, resulting in less biased predictions on the NBA prediction task. To test this hypothesis, we conducted regression analyses on the probability of winning measure. This analysis revealed a significant main effect of generation task ($\beta = .36$, $t = 3.87$, $p < .001$), as well as an NFS by generation task interaction ($\beta = -.24$, $t = 2.37$, $p = .02$). Fig. 4 shows the plot for the interaction. Only the low NFS individuals showed evidence of generalization. Low NFS individuals predicted the probability of Portland winning to be significantly lower after generating two alternatives than after generating eight alternatives (slope = .28, $t = 2.54$, $p = .012$). High NFS individuals in the generate two and generate eight conditions did not differ (slope = −.16, $t = -1.47$, ns). No effects or interactions with domain or DEC were obtained. Thus, the experience of generating two viable alternatives in another completely unrelated domain was sufficient to produce debiased judgments for low NFS individuals, providing evidence of transfer. However, for high NFS individuals, the generation task showed no transfer effect.

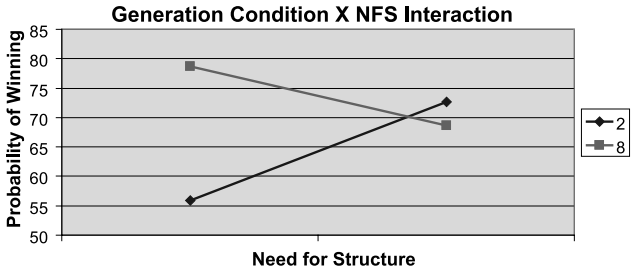

Fig. 4. Predicted scores for the probability of winning measure as a function of generation condition and need for structure (NFS).

Evidence of spontaneous consideration of multiple alternatives

Because the plausible counterexplanation task led participants to spontaneously consider another alternative (Sacramento Kings), we performed a similar analysis on the Kings' final divisional rank. This analysis revealed a main effect of NFS, $\beta = .27$, $t = 2.96$, $p = .004$, and an NFS by generation task interaction, $\beta = -.26$, $t = 2.83$, $p = .006$. Again, it was only the low NFS individuals who displayed evidence of spontaneously considering the Kings after generating two as opposed to eight alternatives (slope = .35, $t = 2.94$, $p < .01$). High NFS individuals showed no evidence of spontaneously considering the Kings, displaying a nonsignificant trend in the opposite direction (slope = −.16, $t = -1.21$, ns).[3]

[3] Interestingly, we also obtained a significant main effect of decisiveness on this measure, $\beta = .30$, $t = 3.15$, $p = .002$, as well as a three way NFS X DEC X generation condition interaction, $\beta = .22$, $t = 2.36$, $p = .02$. Inspection of this interaction revealed that it was the low NFS/low DEC participants who were particularly likely to show evidence of spontaneous consideration of the Sacramento Kings. However, given that no significant main effects of interactions with DEC were found on any of the other dependent measures, interpretation of these results must be viewed with some caution.

Confidence

A regression analysis on the confidence measure revealed only an NFS by generation task interaction, $\beta = -.30$, $t = 3.09$, $p = .003$. Low NFS participants reported less confidence after generating two as opposed to eight alternatives (slope = .44, $t = 3.39$, $p = .001$), whereas the confidence of high NFS participants was unaffected by the generation task (slope = −.17, $t = -1.3$, ns), paralleling the effects on the judgment measures.

Test of mechanism

The results provide clear evidence that activation of a mental simulation mind-set in an unrelated domain generalizes to debias subsequent likelihood judgments. However, we have not demonstrated empirically that it is the ease of generating alternatives that mediates these transfer effects. Baron and Kenny (1986) argue that evidence for mediation requires (a) that the independent variable should predict the outcome variable (probability of winning), (b) the independent variable should predict the hypothesized mediator (ease of generating alternatives), and (c) the mediator should predict the outcome variable even after controlling for the independent variable. Our previous regression analyses had already established steps (a) and (b). Therefore, a final regression analysis was conducted in which two possible mediators (ease of explaining Portland, ease of explaining alternatives) were added to the independent variable model. This analysis revealed that both variables significantly predicted probability estimates after controlling for the independent variables. That is, both the ease of explaining Portland ($\beta = .47$, $t = 3.64$, $p = .001$) and the ease of explaining the alternative ($\beta = -.36$, $t = -2.08$, $p = .04$) served as significant predictors of probability estimates. Moreover, the βs for the generation task main effect ($\beta = .01$, Sobel test $t = 1.99$, $p < .05$), and NFC X generation task interaction term ($\beta = .025$, Sobel test $t = 1.78$, $p < .07$) dropped to nonsignificance, indicating that ease of generation mediated these effects.

Recall, however, that the effects of ease of generation differed as a function of need for structure. Thus, we would expect these results to hold for low but not high NFS individuals. To test for the possibility of interactional mediation, we included two additional terms to this final mediational analysis, namely, the interactions of the two hypothesized mediators with NFS. This analysis revealed that the interaction of NFS and ease of explaining the alternative was indeed significant ($\beta = -.45$, $t = -.3.01$, $p = .004$), whereas the interaction of NFS and ease of explaining Portland was not ($\beta = -.02$, $t = -.15$, ns). The ease of explaining the alternative significantly predicted probability estimates for low NFS ($\beta = -.81$) but not for high NFS participants ($\beta = .09$). These analyses indicate that ease of generation significantly mediated the debiasing effects of our manipulations on probability estimates for low NFS individuals.

Discussion

Prior research (Sanna & Schwarz, 2003; Sanna et al., 2002) has suggested that the debiasing effects of considering alternatives on hindsight bias are moderated by accessibility experiences. These researchers found that people use the subjective ease of retrieval of alternatives as a basis for judgment. The present research extends this basic effect in several ways. We replicated the effects of accessibility experiences in the context of another judgmental bias (the explanation effect) and manipulated ease of retrieval in two different ways—by varying either the number of alternatives generated (2 vs. 8) or the plausibility of the alternative considered. In addition, we identified that individual differences in need for structure moderated the effects of accessibility experiences on judgment. Only individuals low in NFS showed evidence of the activation of a mental simulation mind-set. Furthermore, mediational analyses provided direct evidence that ease of generation mediated the effects of our independent variables on likelihood judgments for low NFS individuals. Conversely, high NFS individuals tended to rely on the number of alternatives generated, showing lower probability estimates after generating eight as opposed to two alternatives. Indeed, our data fit well with research by Tormala, Petty, and Brinol (2002), who found greater reliance on ease of retrieval under high elaboration conditions (high personal relevance, individuals high in need for cognition). Under low elaboration conditions, the effects reversed, reflecting a greater reliance on the numerosity heuristic.

The present results also found evidence that an easy alternative generation task led low NFS individuals to go beyond the specific exemplars generated and spontaneously consider additional alternatives. Hirt and Markman (1995) previously suggested that explaining a plausible alternative to a focal event might serve to "prime to pump," prompting the consideration of further possibilities. In the present study, we found that low NFS individuals who had experienced the generation of alternatives to be easy were more likely to consider the Sacramento Kings, a salient competitor to the focal Portland team. What makes this effect most interesting is that consideration of alternatives even in completely unrelated domains (football, TV) generalized to affect judgments about NBA basketball for low NFS individuals.

One might ask whether the effects also work the other way, such that positive accessibility experiences from the plausible counterexplanation task would generalize to affect judgments about the likely winners in NFL foot-

ball or TV sitcoms. We tested this possibility by examining likelihood judgments in these other domains as a function of NFS and counterexplanation condition. Paralleling the transfer effects obtained in the generalization conditions, we found NFS X condition interactions on both measures (for NFL: $\beta = -.22$, $t = 2.20$, $p < .05$; for TV sitcom, $\beta = -.25$, $t = 2.48$, $p < .05$). Low NFS participants in the plausible counterexplanation (Lakers) condition displayed significantly lower probability estimates for both prediction tasks (simple slopes = .50 and .58, ts > 2.0, ps < .05), illustrating that the debiasing effect of the plausible counterexplanation task also generalized to affect subsequent predictions in unrelated domains.

This evidence suggests that, for low NFS individuals, our alternative generation manipulations successfully evoked a mental simulation mind-set, much like the counterfactual prime manipulation in Galinsky and Moskowitz (2000). Importantly, though, the present research extends that work in several ways. First, our research suggests that there are alternative ways to induce a mental simulation mind-set beyond counterfactual priming. Positive accessibility experiences—either through generating few alternatives or being asked to explain a single plausible alternative—also appear to evoke this same mind-set and have the same generalization effects. Moreover, the present research also demonstrates that the generalization effects observed by Galinsky and Moskowitz (2000) are moderated by need for structure. Low NFS individuals indeed adopt a simulation mind-set, showing evidence of a generalized tendency to spontaneously consider alternative possibilities in a variety of domains. Conversely, high NFS individuals showed no evidence of considering additional alternatives in the same domain much less transfer effects to other domains, suggesting that these procedures fail to evoke a simulation mind-set in these individuals.

Our results attest to the powerful role that individual differences in need for structure play. In our study, decisiveness did not show any effects.[4] Only need for structure consistently influenced responsiveness to considering alternatives and subsequent debiasing. For low NFS individuals, simply getting them to consider a plausible alternative led them to adopt a mental simulation mind-set that extended to their consideration of broad range of judgment tasks. High NFS participants, on the other hand, were largely unresponsive to manipulations designed to foster the consideration of alternatives. Whether this reflects a general lack of ability or simply a lack of motivation to process more complex information on the part of the high NFS individuals (or both) is clearly an important question for future research. The use of situational manipulations of accountability or other conditions that discourage epistemic freezing might be particularly useful in this regard.

[4] It is tempting from these results to conjecture that need for structure may be pivotal to a number of other association-based judgmental biases (Arkes, 1991) like hindsight, overconfidence, priming, and anchoring, which involve the tendency to engage in epistemic freezing on some initial anchor or focal hypothesis. Indeed, many of these biases that have been shown to be affected by need for closure (cf. Kardes, Sanbonmatsu, Cronley, & Houghton, 2002; Kruglanski & Webster, 1996) may reflect primarily or exclusively the effects of need for structure. It remains to be seen whether other judgmental phenomena, in which no initial anchor is given, are related (to a greater extent or exclusively) to decisiveness (“seizing”). Given the importance of both of these components to the need for closure construct, this would seem to be a fruitful direction for future research.

References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.

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

Baron, R., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.

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

Fischhoff, B. (1982). Debiasing. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 422–444). Cambridge, England: Cambridge University Press.

Galinsky, A. D., & Moskowitz, G. B. (2000). Counterfactuals as behavioral primes: Priming the simulation heuristic and consideration of alternatives. *Journal of Experimental Social Psychology, 36*, 384–409.

Hirt, E. R., & Markman, K. D. (1995). Multiple explanation: A consider-an-alternative strategy for debiasing judgments. *Journal of Personality and Social Psychology, 69*, 1069–1086.

Hoch, S. J. (1985). Counterfactual reasoning and accuracy in predicting personal events. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 11*, 719–731.

Kahneman, D., & Tversky, A. (1982). The simulation heuristic. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 201–208). Cambridge, England: Cambridge University Press.

Kardes, F. R., Sanbonmatsu, D. M., Cronley, M. L., & Houghton, D. C. (2002). Consideration set overvaluation: When impossibly favorable ratings of a set of brands are observed. *Journal of Consumer Psychology, 12*, 353–361.

Koehler, D. J. (1991). Explanation, imagination, and confidence in judgment. *Psychological Bulletin, 110*, 499–519.

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

Kruglanski, A. W., & Webster, D. M. (1996). Motivated closing of the mind: “Seizing” and “freezing”. *Psychological Review, 103*, 263–283.

Lord, C. G., Lepper, M. R., & Preston, E. (1984). Considering the opposite: A corrective strategy for social judgment. *Journal of Personality and Social Psychology, 47*, 1231–1243.

Mayseless, O., & Kruglanski, A. W. (1987). What makes you so sure? Effects of epistemic motivations on judgmental confidence. *Organizational Behavior and Human Decision Processes, 39*, 162–183.

Neuberg, S. L., Judice, T. N., & West, S. G. (1997). What the need for closure scale measures and what it does not: Toward differentiating among related epistemic motives. *Journal of Personality and Social Psychology, 72*, 1396–1412.

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

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

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

Schwarz, N., & Vaughn, L. A. (2002). The availability heuristic revisited: Recalled content and ease of recall as information. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 103–119). Cambridge: Cambridge University Press.

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

Webster, D. M., & Kruglanski, A. W. (1994). Individual differences in need for cognitive closure. *Journal of Personality and Social Psychology, 67*, 1049–1062.