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BRIEF REPORT

Improving the Past and the Future: A Temporal Asymmetry in Hypothetical Thinking

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Current views of hypothetical thinking implicitly assume that the content of imaginary thoughts about the past and future should be the same. Two experiments show that, given the same experienced facts of reality, future imagination may differ from past reconstruction. When participants failed a task, their counterfactual thoughts focused on uncontrollable features of their attempt (e.g., "Things would have been better if the allocated time were longer/if I had better logic skills"). But their prefactual thoughts focused on controllable features of their ensuing endeavor (e.g., "Things will be better next time if I concentrate more/if I use another strategy"). This finding suggests that compared with prefactual thinking, counterfactual thinking may be less subject to reality checks and less likely to serve preparatory goals.

Keywords: hypothetical thinking, counterfactual thinking, prefactual thinking, controllability, preparatory functions

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Your last vacation was expensive. You may think, "My holiday would have been cheaper if I had booked it online" or "Next time, my holiday will be cheaper if I book it online." Imagining how things might have been different in the past (i.e., thinking counterfactually) and how they might be different in the future (i.e., thinking prefactually) are two crucial components of the human ability to carry out mental simulations (Kahneman & Tversky, 1982). Yet, compared with counterfactual thinking (Byrne, 2005; Roese, 1997), the imagination of future possibilities has been investigated in relatively few studies (e.g., McConnell et al., 2000; Sanna, 1996). Specifically, no study has compared the thoughts of individuals who just experienced a negative outcome and imagine a better past or a better future outcome. In fact, prevalent accounts of hypothetical thinking implicitly assume that the content of imaginary thoughts about the past and future should be the same. These accounts defend the view that the primary function of counterfactual thinking is preparative: Imagining a better past serves to prepare for a better future (Epstude & Roese, 2008; Markman, Gavanski, Sherman, & McMullen, 1993). Therefore, counterfactual thinking should yield alternatives that will lead to better outcomes in similar future situations. Indeed, individuals generate more counterfactuals after negative than after positive outcomes (Roese & Hur, 1997) and generate counterfactuals that improve reality more often when they expect to encounter similar situations again in the future than when they do not have this expectation (Markman et al., 1993). Accordingly, individuals should produce similar thoughts when they imagine how the past and future could be improved.

Van Boven, Kane, and McGraw (2009) have proposed an alternative hypothesis: The two sorts of thoughts may differ because reality concerns constrain future-focused thoughts more than past-focused ones. The hypothesis is intuitively appealing: Unlike the future, the past appears to be limited by what actually happened. Moreover, it may explain some temporal asymmetries in mental simulation. For example, individuals add more contextual details when they describe autobiographical past experiences than imagined future ones (D'Argembeau & Van der Linden, 2004). But could the hypothesis apply to mental simulations that occur in less of a vacuum? In other word, could it apply to cases in which

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individuals do benchmark imagined events against reality, like constructing a better past or a better future given a recently experienced failure?

We suggest not. In fact, we propose that the possibility to still realize a future outcome may constrain mental simulation of the future more than mental simulation of the past. When individuals fail to solve a task and think about how the past could have been better, they undo the features that have constrained their attempt, including the constitutive rules of the situation (e.g., "If the allocated time were longer") and their own permanent traits (e.g., "If I had better logic skills"; Girotto, Ferrante, Pighin, & Gonzalez, 2007; Pighin, Byrne, Ferrante, Gonzalez, & Girotto, 2011). This finding challenges the common view that counterfactuals involve minimal departures from reality (Byrne, 2005; Kahneman & Tversky, 1982; Roese, 1997) and suggests that they may be used to excuse poor performances (McCrea, 2008). Now, suppose that individuals instead imagine how things will be better in the future. The constraints that have governed their past attempt will continue to be present in the future one. Specifically, individuals will continue to be constrained by their own skills and psychophysical status, the task's demands, and the resources available to solve it. Because in reality these features cannot be changed, they are not plausible candidates for undoing in mental simulations of the future. Consequently, individuals will focus on controllable features, like their concentration level and the strategies they use. In sum, imagining how a recent failure could turn into a success should generate relatively more controllable alternatives than imagining how the same failure might have been a success in the past. We tested this prediction in two experiments by comparing the thoughts of individuals who failed a task and imagined a better outcome in an ensuing endeavor or in the past attempt.

Experiment 1

Method

In both experiments, participants were undergraduates from the University of Trieste in Italy and were tested individually. In Experiment 1, 88 of them participated for course credits. They were randomly assigned in equal numbers to one of two conditions: past and future. In both conditions, they had to solve 12 scramble-word quizzes (see the online supplemental materials). No participant solved all of the quizzes. After the task, participants had to rate their own performance on a 7-point scale ranging from −3 (*faulty*) to 3 (*perfect*). Next, they had to think about their failure after being informed that they would be asked to tackle another series of 12 quizzes in a few minutes. They were given the instructions (the parts reported in brackets concerned the future condition) "Things would have been better for me [Things will be better for me in the next game], if . . . . Please, write at least one way in which you would complete this sentence."

Results

The two conditions elicited similar rates of correct solutions (past = 3.25; future = 3.18) and negative self-evaluations (past = −1.18; future = −1.20). Responses that involved altering the participants' concentration and attention (e.g., "If I had concentrated better") as well as their reasoning strategies and tactics (e.g., "If I read all the letters quickly") were coded *controllable* modifications. Responses that involved altering the problem features (e.g., "If I had had more time"), the participants' psychophysical status (e.g., "If I were not tired"), their stable traits (e.g., "If I possessed more creative thinking"), the abilities that they could not improve before the following game (e.g., "If I trained more in this sort of quiz"), and the context (e.g., "If the lab were cooler") were coded *uncontrollable* modifications. The few remaining responses (1.6%) were noninformative or ambiguous and were not considered in the following analyses.

In both experiments, two independent judges, unaware of the hypotheses, coded the responses. Their agreement rate was 98% in Experiment 1, Cohen's $\kappa = .96$, $p < .001$, and 96% in Experiment 2, Cohen's $\kappa = .91$, $p < .001$. Disagreements were resolved by discussion.

In Experiment 1, we discarded the data of one participant in each condition because the only response each one gave was ambiguous. On average, the remaining 86 participants (43 in each condition) produced 1.35 modifications in the future condition and 1.49 modifications in the past condition. The future condition elicited more controllable modifications than the past one did, both when we considered the first modifications (51% vs. 23%, respectively), $\chi^2(1, N = 86) = 7.17$, $p = .007$, $\phi = .29$, and all of them (50% vs. 25%, respectively), Mann–Whitney $U = 680$, $p = .017$, $r = .26$. In both conditions, most response patterns were consistent, namely, they included only controllable or only uncontrollable modifications (future = 93%; past = 86%). This result suggests that participants did not answer in a superficial way: For each temporal focus, they considered one class of modifications rather than specific examples of each of them.

Experiment 2

In Experiment 1, participants failed an assigned task. In Experiment 2, we considered individuals who failed a chosen task. Typically, the negative outcome of a choice between two alternatives elicits counterfactuals focused on the rejected alternative (Camille et al., 2004; Girotto, Legrenzi, & Rizzo, 1991). For example, if you booked a vacation offline rather than online and that booking turns out to be wrong, you may think, "If I had booked it online . . .". However, the negative outcome of a choice that requires the performance of a task does not elicit counterfactuals focused on the rejected task. Indeed, individuals who choose the more difficult of two tasks and fail typically construct counterfactuals focused on their attempt (Girotto et al., 2007, Study 4; Pighin et al., 2011, Experiment 1B), probably because their attention is absorbed by the task-solving experience (Morewedge, Gilbert, Myrseth, Kassam, & Wilson, 2010). Suppose that these individuals imagine a better future. We assume that they are also absorbed by the task they just failed. Thus, they will not consider the rejected task, just as when they construct counterfactuals. Rather, they will focus on the features of their future endeavor. In particular, they will focus on the controllable ones, given that they could not change the uncontrollable constraints that will govern it. Accordingly, we predicted that we would replicate the temporal asymmetry: There will be more controllable modifications in the prefactual thoughts than in the counterfactual thoughts of individuals who have failed a chosen task.

Consequently, we also predicted that we would obtain an actor–reader role effect. Typically, readers of a story in which the protagonist fails a chosen task construct counterfactuals that undo the protagonist's choice (Girotto et al., 2007). Indeed, unlike acting individuals, readers are not absorbed by the task-solving phase. Moreover, they tend to undo elements of the story that are under the protagonist's control, such as the choice of a task (Girotto et al., 1991). Suppose that readers imagine a better future for the story protagonist. We assume that they will still not be absorbed by the task-solving phase. Consequently, unlike acting individuals, they will undo the choice of the task in their hypothetical futures, too. In sum, we predicted a reader–actor asymmetry in prefactual thinking similar to the one previously obtained in counterfactual thinking (Girotto et al., 2007). In both cases, readers will undo the protagonist's choice of the task more often than acting individuals will undo their own choice. We tested these predictions by comparing the thoughts of actors and readers who think about a failure to solve a chosen task.

Method

One hundred eighty-seven participants were assigned to one of four conditions in a 2 × 2 design of Role (actor vs. reader) × Temporal Focus (past vs. future). The two actor conditions were the same as in Experiment 1, except that the participants had to choose to tackle either an easy or a difficult syllogistic problem in 20 s (see the online supplemental materials). Solving the problems resulted in prizes of 25 photocopy cards (value = €1, approximately $1.30) for the easy problem or 150 photocopy cards (value €6, approximately $8) for the hard problem. Thirty-nine participants who preferred the easy problem and three who solved the difficult one were excluded from the study. The participants who failed to solve the syllogism were informed that in a few minutes they would have the opportunity to tackle another easy or difficult syllogism. They were then asked to think about either the past (n = 34) or the future (n = 31; the wording for the future condition is presented in brackets): "Things would have been better for me [Things will be better for me in the next game], if . . . . Please, write at least one way in which you would complete this sentence." In the reader conditions, participants read a story in which the protagonist (Anna) chose the same difficult problem chosen by the actors and failed. Participants had to think about the past (n = 40) or the future (n = 40): "Things would have been better for Anna [Things will be better for Anna in the next game] if . . . . Please, write at least one way in which you would complete this sentence."

Results

The responses resembled those in Experiment 1, with the exception that some modifications referred to the choice of the task. We discarded the few ambiguous responses (0.8%). The four conditions elicited a similar mean number of modifications (see Table 1).

The future actor condition produced more controllable modifications than did the past actor one, both when we considered the first modifications (74% vs. 47%, respectively), $\chi^2(1, N = 65) = 4.98$, $p = .026$, $\phi = .28$, and all of them (78% vs. 43%, respectively), Mann–Whitney $U = 342$, $p = .008$, $r = .33$. In both conditions, most response patterns were consistent (future = 90%; past = 76%). We also found a temporal asymmetry in readers: The future condition elicited more controllable modifications than did the past one, both when we considered the first modifications (93% vs. 73%, respectively), $\chi^2(1, N = 80) = 5.54$, $p = .019$, $\phi = .26$, and all of them (83% vs. 68%, respectively), Mann–Whitney $U = 604$, $p = .03$, $r = .24$.

Table 1
Mean Number of Modifications and the Percentages of First and All Modifications That Were Controllable in the Four Conditions of Experiment 2

Condition	Mean number of modifications	Controllable modifications: % first responses	Controllable modifications: % all responses
Actor past	1.85	47 (15)	43 (11)
Actor future	1.61	74 (16)	78 (10)
Reader past	1.85	73 (58)	68 (42)
Reader future	1.60	93 (78)	83 (55)

Note. Values in parentheses represent the percentages of choice modifications.

For choice modifications, because participants can produce only one, we analyzed first responses only. Readers undid the choice more often than actors did (see Table 1), both in the past condition, $\chi^2(1, N = 74) = 14.31$, $p < .001$, $\phi = .44$, and in the future condition, $\chi^2(1, N = 71) = 26.32$, $p < .001$, $\phi = .61$. Thus, we found a large actor–reader role effect for both counterfactuals and prefactuals.

General Discussion

In two experiments, participants who failed a task had to imagine a better outcome in an ensuing endeavor or in the past attempt. When they created hypothetical futures, they tended to focus on features that they could control, like their concentration level or the strategies they could use. But when they created counterfactuals, they tended to mutate uncontrollable features, like the task's features or even their own permanent traits. We obtained this effect when participants received the task they failed to solve (Experiment 1), when they deliberately chose it (Experiment 2), and when they read a story in which the protagonist chose and failed it (Experiment 2). Effect sizes were small to medium (ranging from .24 to .33) and similar in the two experiments, despite the different tasks used in the two cases.

The experiments provide the first demonstration that, given the same experienced failure, imagining a better past may differ from imagining a better future. This temporal asymmetry challenges current views of hypothetical thinking. Specifically, it necessitates a reappraisal of the dominant view that counterfactual thinking mainly serves to regulate behavior and improve future performance (Epstude & Roese, 2008; Markman et al., 1993). Following such a functional view, counterfactuals should focus on controllable features to the same extent that hypothetical futures do. Our respondents expected to immediately repeat the task they just failed. Thus, they were in the ideal situation to generate goal-directed thoughts (Markman et al., 1993). Yet, their counterfactu-

als focused on controllable features less often than their hypothetical futures. Petrocelli and Sherman (2010) pointed out that counterfactuals are unlikely to serve preparatory functions in situations such as gambles, in which individuals could not easily imagine effective means for doing better in future. Our results suggest that counterfactuals may fail to serve such functions even when individuals do imagine effective means of improving future performances. In sum, counterfactual thinking sometimes fails to include elements that could be useful in improving future performances even when useful alternatives to the past are readily available, and it may be less likely to fulfill preparatory goals than prefactual thinking. This finding extends previous evidence that counterfactuals often serve functions other the preparatory one, like excusing poor performance (McCrea, 2008) or providing a sense of meaning to an individual's life (Kray et al., 2010). Finally, the finding that readers' hypothetical futures may differ from actors' ones supports previous evidence that participants' roles shape their imaginary thoughts (Girotto et al., 2007; Pighin et al., 2011) and suggests that caution should be used when generalizing results about mental simulation obtained with scenario studies, in which participants occupy the role of readers.

The discovery of a temporal asymmetry in hypothetical thinking parallels the finding that the same events set in either the past or the future elicit different emotional reactions (e.g., Burns, Caruso, & Bartels, in press; Caruso, 2010; Caruso, Gilbert, & Wilson, 2008). Specifically, the finding that hypothetical futures focus on controllable features more than counterfactuals do parallels the finding that thinking about a future event (e.g., a birthday party) is more personally involving than thinking about the same event sets in the past (Pronin & Ross, 2006; Van Boven & Ashworth, 2007).

Our finding does not imply that individuals always bring reality constraints to their prospective experiences, nor does it imply that focusing on controllable features guarantees that future performances will be better than the past ones. On the one hand, individuals often fallaciously plan their future tasks by neglecting the future competition for their time (Zauberman & Lynch, 2005). On the other hand, participants who imagine using a better strategy or concentrating better may nevertheless fail to do it. Yet, when individuals imagine an immediate future experience and benchmark it against a current negative one, as in our experiments, they generate more goal-directed thoughts than do individuals who imagine a different past. In sum, contrary to the view that retrospection is more constrained than prospection (Van Boven et al., 2009), our results show that imagining future events may be more subject to reality checks than imagining past events.

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