

Changing Myself, Changing My Fate:

How anticipating negative outcomes prompts self-relevant change

Adelle Xue Yang

adelle.yang@chicagobooth.edu

and

Oleg Urminsky

oleg.urminsky@chicagobooth.edu

The University of Chicago Booth School of Business

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Abstract

People often spontaneously apply “recency beliefs” to form predictions of future outcomes based on prior outcomes. Different recency beliefs in the same context (e.g. that future outcomes are either positively or negatively correlated with recent outcomes) can lead to starkly different anticipations for the same future outcome. We propose that these anticipations of future outcomes can have a dramatic impact on people’s preference for self-relevant change. We show that in both hypothetical and real settings, when recency beliefs and prior outcomes lead people to pessimism about future outcomes, they make self-relevant changes, as if they were “thwarting fate” by shifting the salient aspect of their identity. However, when circumstances instead lead to optimism about future outcomes, they make self-consistent choices, as if “embracing fate,” by emphasizing the currently salient identity. (130 words)

In many aspects of life, the future is uncertain. People often spontaneously form predictions for future outcomes by applying some naive “recency” heuristic, assuming that future outcomes will tend to either positively or negatively relate to recent outcomes. These beliefs, in turn, can influence the appeal of choices that represent change. Choosing change can be beneficial, particularly when a person is pessimistic about controllable future outcomes (e.g., a baseball player practicing harder for a game). However, such choices are often irrelevant to the outcome (e.g., a player wearing his cap inside-out and backwards when falling behind in a game, Gmelch 2003).

We propose that people will prefer changes involving self-representation when they are pessimistic about future outcomes, even in the absence of a causal link, and will avoid such changes, preferring consistency in self-representation, when they are optimistic. First, we validate a framework in which the attribution of outcomes to either skill or chance impacts “recency” beliefs about how anticipated future outcomes can be predicted by prior outcomes. We then show that the anticipation of future outcomes has an important and novel impact on unrelated but self-relevant choices, as if the choice could serve as a “switch” between fates. When the combination of prior outcomes and recency beliefs yield pessimism about future outcomes, people prefer options representing a shift in the salient aspect of self-identity, as if to “thwart fate”. However, when the combination of prior outcomes and recency beliefs instead yield optimism for future outcomes, people prefer self-consistency, as if to “embrace fate”.

Recency beliefs and predictions of the future

People often use prior outcomes to inform their predictions for the future, based on a recency belief. The positive recency belief (hot-hand, Gilovich, 1985; hot-outcome, Edwards, 1961) implies that past outcomes are more likely to repeat in the future. The negative recency belief (gambler’s fallacy, Tune, 1964; stock-of-luck, Leopard, 1978) implies that future outcomes are more likely to differ from past outcomes. Many factors have been shown to contribute to differences in people’s recency beliefs, including perceived intentionality (Caruso, Waytz & Epley 2010), randomness and causation (see

Oskarsson, Van Boven, McClelland & Hastie, 2009 for a review). These factors can generally be understood as representing a broader distinction between attributing outcomes primarily to skill or chance. In many common activities, this distinction is important but difficult to judge, even requiring empirical study (e.g. playing poker, Croson, Fisherman & Pope 2008, Levitt & Miles 2011; financial fund management, Fama & French 2010). Different people may, in fact, reach different conclusions about whether skill or chance determines a specific future outcome.

As we will confirm in a pilot study, differences in people's attributions of a given outcome to skill or chance will affect that person's recency beliefs. When skill is emphasized, people may infer that, since recent outcomes can be informative of the current level of skill, future outcomes will reflect recent outcomes, yielding positive recency. However, when chance is emphasized instead, people may anticipate that outcomes will balance out, even in a short sequence (per the "law of small numbers", Tversky & Kahneman 1971), and thus predict future outcomes that differ from recent outcomes, yielding negative recency. Although this framework is intuitive and is suggested by prior findings, a thorough literature review failed to reveal any research relating beliefs in skill vs. chance in a single context to the adoption of different recency beliefs. Therefore, in the pilot study we will manipulate recency beliefs by merely framing the mechanism of a specific task in a fixed context as either skill or chance. Confirming the effect of this manipulation on recency beliefs will facilitate testing our main hypothesis, that the anticipation of future outcomes impacts preference for options representing self-relevant change.

“Managing” the future – from predictions to self-relevant change

Given that the self is central in causal inferences (Langer & Roth 1975; Ross & Sicoly, 1979), the change (vs. consistency) of the actor's identity may be highly relevant to recency inferences. While the past and future outcomes of a given person will usually be seen as constituting the same sequence, we propose that a change in the person can disrupt the coherence of the perceived sequence, impeding

recency inferences. As a result, when one player literally replaces another in a game, we predict that recency beliefs will be suppressed, which we test in the pilot study.

Further, we propose a parallel between inter-personal and intra-personal change, such that self-relevant changes which signify a shift in personal identity may similarly suppress recency inferences. As a result, when people are pessimistic about future outcomes due to the combination of prior outcomes and their recency beliefs, self-relevant change will seem more appealing. This proposition is consistent with current views of personal identity which describe a multi-faceted and malleable conception of the self (Markus & Wurf 1987), such that people shift their identity in response to external cues (Brewer & Gardner 1996; Ramírez-Esparza et al. 2006) and anticipated changes in identity can, in turn, affect choices for the future (Bartels & Urminsky 2011).

Our proposed hypothesis implies that people will select change in the self when they are pessimistic about a future outcome, but avoid change in the self when optimistic. To test this, we manipulate recency beliefs to induce pessimism or optimism after a given outcome and compare people's choices for self-relevant options that represent change or consistency. Choices constitute a common means of self-representation (Ariely & Levav 2000; Kim & Drolet 2003), with different choices reflecting different aspects of one's identity (Stephens, Markus & Townsend, 2007). We test our hypothesis with consumption choices in Study 1, and with choices between consistency and change in self-description in Study 2. We find that options representing a change in self-representations are chosen differently in pessimistic vs. optimistic situations. When a pessimistic future outcome is anticipated, people prefer options reflecting self-relevant change, as if to "thwart fate", but when an optimistic future outcome is anticipated, people prefer options reflecting self-consistency, as if to "embrace fate". Thus, our proposed framework (see Figure 1) incorporates insights from two literatures that have previously been treated as largely unrelated: personal identity and belief formation in sequences of outcomes, enabling us to better understand how people predict and "manage" future outcomes.

Pilot Study: Recency effects disrupted by identity-change

In this pilot study, we employed a hypothetical ball-throwing game, manipulating the mechanism framing (skill vs. chance), recent outcomes (success vs. failure), and identity consistency (same vs. different) in a 2x2x2 between-subjects design. The purpose is to confirm that, per our framework, the combination of mechanism beliefs and recent outcomes determines people's anticipations of uninterrupted future outcomes but, a shift in the player's identity suppresses these recency effects.

Method

Students (N=170) from a large public university in China filled out a brief questionnaire in exchange for a candy snack. Participants were asked to imagine visiting an amusement park with a friend and playing a game in which they could win a prize. The goal of the game was to throw a ping-pong ball into a basket that was moving back and forth at a random speed (stimuli for all studies are in the Appendix). All participants were told that the probability of scoring a basket each time was roughly 50%, so that the perceived game difficulty would be held constant.

We framed the game as either determined by chance or skill, based on the name of the game ("*Lucky Shooting*" vs. "*Master Shooting*") and the accompanying promotional slogan. Participants were told to imagine that they and the friend decided to play six rounds together, that either they had initially started to play or the friend had started, and that the first player got either two hits or two misses. In the same-player conditions (N=87), participants were asked to predict the outcome of the next shot (hit or miss), performed by the same player. In the different-player conditions (N=83), they were told that they had switched places with their friend and were asked to predict the next shot performed by the other person (i.e., the participant taking over for the friend or the reverse). Since, we found no effect of who the initial player was (self vs. other), we collapsed across the initial player's identity.

Results

When participants predicted the same player's future performance, analyses validated our prediction: more participants in the skill-framing condition predicted the same future outcome as the prior outcomes (71.4%, Figure 2a), while slightly more participants in the chance-framing condition predicted that the next outcome would be the opposite of the prior outcomes (57.8%). Logistic regression of the predicted outcome revealed the predicted two-way interaction between mechanism framing and recent outcomes ($\beta=-2.48$, Wald=7.30, $p<.01$). When the other player took over after the first two rounds, however, the recency effects were suppressed, such that all the predictions across the four conditions were highly similar and close to 50% (Figure 2b), and the two-way interaction between mechanism framing and recent outcomes was no longer significant ($\beta=.693$, Wald=.612, n.s). Overall, we found the predicted three-way interaction among mechanism framing, recent outcomes and identity consistency ($\beta=3.17$, Wald=6.19, $p<.05$).

Our findings confirm that when an outcome's mechanism is ambiguous, people's recency beliefs are highly malleable, such that merely reframing the same game as based on skill or chance reverses judgments of the next outcome. More importantly, these beliefs hold when the same player will continue the game, but recency beliefs are eliminated when a different player will take over for the next outcome.

Based on these results, in the next two studies we use variation in recent outcomes and manipulations of mechanism beliefs to induce pessimism or optimism about future outcomes. We then test our hypothesis that people prefer choices symbolizing a shift in self-representation when circumstances imply pessimistic future outcomes, but not when circumstances imply optimistic future outcomes.

Study 1: Recency effects on self-relevant choices between the usual and the novel

In many everyday choices, selecting a usually-chosen option signals consistency of identity, whereas choosing a novel but equally preferred option can signal a shift in the salient aspect of one's

identity. Our framework therefore predicts that a novel option will be preferred over the usually-chosen option in pessimism-inducing circumstances, but not in optimism-inducing circumstances. Furthermore, if the anticipation of a negative future outcome underlies a preference for identity-relevant change, as proposed, then this pattern should only hold when an uncertain future outcome is anticipated. Conversely, if our findings are instead explained by other factors, such as negative affect due to pessimism, the effects should persist even without the presence of a future outcome.

We test these hypotheses in a hypothetical setting (a gambler at a casino ordering a drink) with a 2 (mechanism framing) X 2 (recent outcomes) X 2 (future outcome present vs. absent) between-subjects design. In the future-outcome conditions, we predict a two-way interaction between mechanism framing and recent outcomes on the choice of drink. The outcome-absent conditions are predicted to represent a boundary condition, in which the independent variables will have no effect on choices.

Method

We collected 203 complete and valid surveys from U.S. adult online participants paid \$1¹. Participants were asked to imagine they were playing blackjack in a Las Vegas casino, a game which plausibly contains aspects of both skill and chance (Wagenaar 1988). They were shown a pamphlet which introduced the rules of blackjack, featuring photos and quotes from previous winners that emphasized either skill or chance.

Participants then read a scenario in which they had bought five (future-outcome conditions) or four (outcome-absent conditions) \$10 chips, and would play each chip in one round. In the scenario, after having lost (or won) in each of the first four rounds, they felt thirsty and chose between a usual option (“*the drink that you usually like and often order*”) and a novel option (“*an unusual drink that you have never tried before but have always wanted to*”). A separate pretest confirmed that this choice between usual and novel options is seen as identity-relevant (see Appendix). In the future-outcome conditions, this

¹ A few participants (detailed in the Appendix) failed a test of reading attention (Study 1 and Study 2 Pretest) or guessed that components of the study were related (Study 2) and were excluded.

choice occurred before playing the last chip, while in the outcome-absent conditions, the choice occurred before leaving the casino.

Results

In the future-outcome conditions, we found the predicted two-way interaction between mechanism framing and recent outcomes on choice. When the game was either framed as skill and the player had been losing or the game was framed as chance and the player had been winning, participants were more likely to choose the novel drink (logistic regression $\beta=1.78$, Wald=4.22, $p<.05$, Figure 3.) However, in the outcome-absent conditions, we found no interaction ($\beta=-1.51$, Wald=2.20, n.s.) The absence of a future outcome debiased the effect of recency on choice, as demonstrated by a three-way interaction among mechanism framing, recent outcomes and the presence of a future outcome ($\beta=-3.29$, Wald=6.07, $p<.05$). None of the findings were attributable to differences in the characteristics of the drinks participants were considering (e.g., healthiness, indulgence).

In Study 1, we found that when and only when a future outcome is present, the factors affecting participants' recency beliefs influenced their preference between usual and novel options, although the choices could not influence the future outcome. We theorize that these choices reflect participants' preference to either maintain or shift the salient aspect of their self-identity. To more directly test this proposition, participants in Study 2 were given either a choice regarding self-descriptions or a control choice task when facing actual impending outcomes in an unrelated game.

Study 2: Choosing change in self-representation

For this study, we designed a ball-rolling game that participants could play for real rewards. A table was marked with a red starting line and ten small rubber erasers were scattered in a blue target area at the opposite end (Figure 4). Players rolled an irregularly shaped rubber-band ball from behind the red

line, trying to land the ball inside the target area. Based on initial testing, participants were told that approximately 50% of rolls succeed. This game incorporates elements that represent both skill (the participant's aim and force of the roll) and chance (the irregular ball and the rubber erasers).

First, in a pretest, we manipulate mechanism framing and recent outcomes and measure observers' anticipation about the next outcome (degree of optimism or pessimism), to confirm that the recency effects found in the pilot study extend to this setting. Then, in the main study, we investigate the impact of these factors on participants' decisions whether to change self-descriptions during the game (Version A). We predict that, after providing an initial self-description and starting to play the game, people would be more likely to describe a different aspect of themselves (vs. elaborating on the same aspect) if their recency beliefs and recent outcomes implied pessimism (vs. optimism) about the next outcome. We also conducted two control conditions to test whether self-relevance is crucial for the finding. In Version B, participants instead chose whether to change descriptions of other people's identity, and in Version C participants instead chose between different colors of balls to use in the game.

Pretest: Recency framing impacts the anticipation of future outcomes

Sixty-one adult U.S. participants completed an online survey for \$1.50. Participants first saw pictures of the game and the basic rules, and then read additional information emphasizing either the role of skill or of chance in the game. They rated their degree of pessimism vs. optimism about the next outcome on a 10-point Likert scale after imagining making two hits, and again after imagining two misses (counterbalanced within-subjects). ANOVA analysis predicting the outcome anticipation rating revealed the same predicted two-way interaction as in the pilot study between manipulated mechanism framing and recent outcomes ($F(1, 59)=6.82, p<.05, \eta_p^2=.12$, Figure 5).

Main study: Recency impacts change in identity-descriptions

Method

232 U.S. participants completed the experiment at a research lab for \$3. A single research-assistant, who was blind to the hypotheses, conducted the two seemingly unrelated studies with each participant individually. In Version A (N=76), participants first filled out a one-page “self-identity” survey, in which they were asked to list three different aspects of their personal identity and briefly describe one of the three. Then, in another room, each participant played the ball-rolling game, described as a pretest for a future study. Participants were told that after one practice roll they would do seven rolls in the game and could win \$1 for scoring at least four times. After the practice roll and three “real” rolls, the experimenter asked the participant to stop and give feedback on their impressions of the game. They read a page of information characterizing the game as based on either skill or chance (as in the pretest) and were asked to list other games that they thought were similar.

Next, the experimenter asked the participant to complete Part Two of the “self-identity” survey, before resuming the game. The survey asked participants to write in detail about an aspect of personal identity, either the aspect already briefly described earlier or one of the other two aspects initially listed. Participants then played the last 4 rolls of the game, completed demographics and potential covariate measures, and were paid based on their performance.

Versions B (N=78) and C (N=78) were conducted in subsequent waves in the same lab, under the exactly same conditions (see Appendix). In Version B, participants instead described aspects of *another* person’s identity (a self-irrelevant task). They first listed three different strangers they have seen for a moment that day and briefly describe one of the people. Then, during the mid-game break, they chose whether to describe in detail the same person or one of the other people they had listed.

In Version C, instead of the writing task, participants were asked to choose among rubber-band balls of different colors to use in the game (an identity-irrelevant task). At the start of the game, participants were shown three otherwise identical rubber-band balls (yellow, orange and blue), and were randomly assigned to use one. During the mid-game break, they chose whether to continue using the same ball, or to replace it with one of the other two.

We predicted that participants would be more open to (or even proactively express) change specifically in the self (Version A, but not Versions B or C) when their recency beliefs implied pessimism about the future outcome, as if such change could “thwart fate”. However, if participants instead favored change in the writing task as a means to reestablish control (Whitson & Galinsky 2008), then we should replicate our findings in Version B. Moreover, if non-self-relevant changes likewise disrupt recency effects, we should replicate our findings in Versions B and/or C. The comparison among the versions provides a critical test of the necessity of self-relevance to our findings.

Results

Manipulation checks confirmed that the game was seen as involving more skill and less chance after the skill-framing than after chance-framing (see Appendix). In Version A, consistent with our prediction, most participants (75%) who did poorly (0 or 1 hits) in the skill condition and most of those (65%) who did well (2 or 3 hits) in the chance condition chose to describe a different identity aspect, compared with those doing well in the skill condition (50%) or those doing poorly in the chance condition (56%). We found a two-way interaction between mechanism belief and the number of recent hits in a logistic regression of choice to change ($\beta=.575$, Wald=4.56, $p<.05$, Figure 6a.)

In contrast, we found no interaction between mechanism framing and recent outcomes on participants’ choice of consistency vs. change in Version B (logistic regression $\beta=-.087$, Wald=.036, n.s., Figure 6b) or in Version C (logistic regression $\beta=-.229$, Wald=.684, n.s., Figure 6c). Comparing Version A to the two control versions (B and C), we find the predicted three-way interaction among mechanism belief, recent outcomes, and self-relevance of change ($\beta=-1.352$, Wald=4.561, $p<.05$).

Discussion

These results support our claim that the effect of pessimism-inducing (vs. optimism-inducing) circumstances on the preference for change in Version A was due to a desire for specifically self-relevant

change. Contrary to the view that participants in pessimistic circumstances were motivated to exert control over the situation by making any symbolic change, the effect did not occur when participants could make a self-irrelevant change.

The results of the pretest and main study suggest that preferences for self-relevant change are enhanced by pessimistic anticipations, which arise from a combination of mechanism belief and recent outcomes. In conditions yielding pessimism, our participants shifted the self-representation they chose to write about, while in conditions yielding optimism, they described a consistent self-representation. These findings are consistent with the intuition that self-relevant changes may be perceived as an intuitive “switch” of fate, such that if the person’s identity changes, then “fate” also changes. Notably, these changes did not affect the outcome: success in the last four rolls was the same whether participants chose to describe the same or a different identity-aspect (40.3% vs. 41.8%, $t=-.23$, n.s.).

A potential concern is that, for participants anticipating negative outcomes, the choice to describe a different identity aspect might have been affected by a desire to enhance themselves (Dagrou, Gauvin, & Halliwell 1992; Hardy 2006), or to protect self-integrity by affirming an alternative aspect of the self (Steele 1988). Contrary to these accounts, we find no difference in an independent coder’s ratings of the participants’ first versus second identity-descriptions (overall or by condition) as positive, confident, virtuous or in-control. Furthermore, based on the lack of moderation by relevant individual difference measures, our findings are also not explained by superstition, perceived control, mood or novelty-seeking (see Appendix).

General Discussion

Our findings shed light on how anticipations of future outcomes are formed, and how these anticipations can affect seemingly irrelevant decisions. An interesting unanswered question is whether participants’ choices represented a conscious and deliberate attempt either to “thwart fate” or to “embrace fate”. Alternatively, pessimism may simply have made self-relevant change seem more attractive,

perhaps because change is often followed by a reduction in pessimism as recency-based inferences become less persuasive.

Some prior research has shown that imposing changes to the mechanism can attenuate certain recency effects (e.g., swapping coins in a coin flipping game attenuates the gambler's fallacy, Gold & Hester 2008). In contrast, we speculate that the self-relevant change studied here may need to be freely chosen to effectively disrupt recency inferences, since imposing a shift in one's self-identity may be externalized as part of the unfolding outcomes.

One challenge for future research is the difficulty inherent in simultaneously measuring predictions, intentions and choices. Eliciting participants' predictions before choice could affect the perceived inevitability of the outcome and thereby impact subsequent choices. Moreover, people may either refrain from optimistic predictions due to reluctance to "tempt fate" (Risen & Gilovich, 2007) or favor optimistic predictions due to desirability bias (Windschitl et al, 2009).

Our findings have interesting implications for several related domains. For research on self-identity, we show that expressions of one's identity can be affected by cues from private decision contexts, beyond the widely-studied impact of social and cultural expectations. For decision making, our research suggests that the identity-expressive aspect of choice may play a surprising role in seemingly unrelated decision phenomena, such as recency effects. We believe the theoretical implications and the boundaries of these effects, among others, are important topics for future research.

Anticipated future outcomes may also affect self-relevant choices more broadly, ranging from how people publicly describe and represent themselves, to their loyalty to identity-relevant brands and services, and even to choices between highlighting or changing salient in-group or out-group social identities. Both the person who holds an optimistic view of her future and values stability, and the person who anticipates a bleaker future and is tempted by any fresh start may be motivated by the same fundamental intuition: with a different me comes a different fate, for better or worse.

APPENDIX A

Notes on study design and data

The pilot study was conducted at a large public University in China during summer vacation. We found no effect of the initial player's identity on the prediction of the future outcome (Version A: $\text{Hit}_{\text{self}}=48.8\%$ vs. $\text{Hit}_{\text{other}}=50.0\%$, $F(1, 85) = .011$, n.s.; Version B: $\text{Hit}_{\text{self}}=51.3\%$ vs. $\text{Hit}_{\text{other}}=50.0\%$, $F(1, 81) = .013$, n.s.), and we collapsed across this variable.

Study 1 and the Study 2 Pretest used a quality-screened U.S. online (Mechanical Turk) sample. In both studies, we included a test of reading comprehension at the end. Eight participants in Study 1 (3.8%) and four participants in the Study 2 Pretest (6.1%) failed the test and were excluded. The results with these participants included are very similar.

Study 2 was conducted in three sequential waves (first Version A, then B, then C) in a research lab in a large Midwestern city. All participants were from the same subject population and were run individually using the same lab rooms and experimental setup, by the same research assistant. Comparison of all common measures (demographics, game outcomes, manipulation checks and other individual differences) revealed no significant differences across the three waves.

Study 2 was presented to participants as two unrelated studies (in Versions A and B), among other studies being conducted in the same lab. We tested to see whether participants suspected a link between the two parts and we eliminated nine participants (4 in Version A, 1 in Version B and 4 in Version C) who indicated suspicion. The findings were similar when these participants were included.

Manipulation checks

In Study 1, to confirm that the choice between usual and novel drinks corresponded to different self-representations, we conducted a brief online pretest ($N=60$) with the same population. In one version ($N=30$), 77% agreed that choosing an option that the person usually chooses over one that the person has never chosen before represents more of a shift in self-identity (vs. 50%, $p<.01$). In the other version ($n=30$), specifically in the context of choosing a drink in a casino, 90% agreed that the novel drink would represent more of shift in self-identity (vs. 50%, $p<.001$).

In addition, we developed a 6-item measure ($\alpha = .65$; see Appendix B), and found that participants were more likely to agree with statements suggesting that making different choices represents different aspects of people's self-identity ($M=5.04$, on a 7-point scale) than with statements suggesting that different choices have no bearing on identity ($M=2.94$, paired $t(59)=11.64$, $p < .001$).

In Study 2, we confirmed that our manipulation affected beliefs about whether the outcomes of the ball-rolling task were determined by skill or chance. First, we asked participants (after the DV) to rate on a 7-point chance-to-skill scale which they believed played more of a role in the game. Participants' ratings were consistent with the manipulation intention in both the pretest ($M_{\text{skill}}=5.9$, $M_{\text{chance}}=2.7$, $F(1,59)=86.0$, $p<.001$) and in the main study ($M_{\text{skill}}=5.42$, $M_{\text{chance}}=4.38$, $F(1, 228)=26.17$, $p<.001$).

Secondly, during the mid-game break in Study 2 we asked participants to list another game similar to the one they were playing. A research assistant (who was blind to the condition) rated the listed games on a chance-to-skill scale and confirmed the effect of the manipulation ($M_{\text{skill}}=3.46$, $M_{\text{chance}}=3.05$, $F(1, 184)=11.12$, $p<.05$).

Alternative accounts of shifts in choices

In the paper, we argue that participants' preference for choices representing a shift in the salient aspect of self-identity is driven by the pessimistic anticipation of future outcomes. Alternatively, it may be argued that the preference for change in situations which yield pessimism occurs for unrelated reasons, such as feeling a lack of control, coping with self-threat, superstitious beliefs, or negative mood. First, we have identified two boundary conditions that are broadly inconsistent with these accounts: our results do not extend to choices in the absence of future outcomes (Study 1) or to choices that are not self-relevant (Study 2). We also rule out these accounts more directly.

For the lack of control account, we measured locus of control (LoC) in Study 1 and Study 2. We find no effect of our manipulations on LoC and no moderation of our findings by LoC. Further, in Version A of Study 2, the independent coder rated the participants' first and second self-descriptions on several dimensions (in-control, positive, virtuous, boastful). Between participants who chose to describe the same vs. another aspect of the self, the degree to which the first description indicated more or less control than the second descriptions did not differ ($F(1,74)=.01$, n.s.). This suggests that participants' choices could not be explained by an intention to describe oneself as more in-control.

Likewise, we found that the degree to which the first description was more or less boastful, positive or indicative of virtuousness than the second did not differ by condition or between choices to describe the same vs. another identity aspect in any version of Study 2. This suggests that the results cannot be explained by change of self-description being used for either mood repair or spontaneous self-affirmation. The results in Study 1 were also incompatible with such alternative explanations, since a response to self-threat should also occur in the absence of a future outcome.

Another possibility is that the observed choices reflect superstitious beliefs about luck. As a general test, we measured participants' beliefs about the existence of luck and their own personal luck in Studies 1 and 2, and neither moderated our findings. We also tested whether our results could be

explained by a specific superstition that virtuousness would yield more positive outcomes (Converse, Risen & Carter, 2011). In Study 1, a subset of the participants (N=118) identified the specific drinks they were thinking of, for the “usual” and “novel” drink options. We found no difference between participants’ ratings of the two drinks on indulgence or healthiness, and no effect of our manipulations on the ratings of the drinks. Similarly, we found no relationships between our findings and the relative virtuousness of participants’ first and second self-descriptions in Study 2.

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APPENDIX B

1. Stimuli used in the studies

Pilot Study

The game used in Study 1 was adapted from a popular Chinese amusement park game. The goal was to shoot a ping-pong ball into a basket moving back and forth at a random speed on a 1.5-meter horizontal bar, 2 meters away from the player. It costs ¥5 to play 6 shots. The prize for 4 successful hits out of 6 shots was 2 movie tickets in the amusement park theater (about ¥20 market value each). The game was either introduced with the tag-line “*Master Shooting – Some people are good at it, others are not. Want to try?*” which stresses the role of skill, or “*Lucky Shooting – Sometimes one is good at it, other times not. Want to try?*”, which stresses the role of chance. In both versions, the name of the game and the accompanying logos were printed in bold, size 20 font.

Study 1

The mechanism framing information was given in the pamphlet introducing the rules of blackjack. Three photos of previous winners were shown with quotes emphasizing skill in one condition, and chance in the other condition:

Skill Condition

Chance Condition

Blackjack Rules

- The cards from 2 through 9 are valued at their face value;
- The 10, Jack, Queen, and King are all valued at 10; an Ace can count as either 1 or 11, depending on which is more favorable;
- Every player draws cards for an initial two card hand, and after seeing those cards decides whether to draw more;
- The player bringing the total hand value closest to 21 without exceeding it wins.
- *Note: Of course a certain degree of luck plays a role in this game, but all it takes is just a little skill!*

The Top 3 Blackjack Winners in 2010



“This is amazing! I had what it took to win!!!”

“I can’t believe I made it happen!”

“Following your strategy is everything. Play well, everyone!”

Blackjack Rules

- The cards from 2 through 9 are valued at their face value;
- The 10, Jack, Queen, and King are all valued at 10; an Ace can count as either 1 or 11, depending on which is more favorable;
- Every player draws cards for an initial two card hand, and after seeing those cards decides whether to draw more;
- The player bringing the total hand value closest to 21 without exceeding it wins.
- *Note: Of course a certain degree of skill plays a role in this game, but all it takes is just a little luck!*

The Top 3 Blackjack Winners in 2010



“This is amazing! I had luck on my side to win!!!”

“I can’t believe it happened to me!”

“Following your hunch is everything. Good luck, everyone!”

Participants then read:

“You decide that if you win, you’ll put the reward in your pocket, and if you lose, you’ll play another round with a new chip, but you won’t bet any chips you’ve won and put in your pocket.

In each round, you’re the only player at the table. You plan to play only five rounds and redeem whatever you have in your pocket when you leave.”

Lastly, they were asked:

“But before you make your last bet, you suddenly feel thirsty. A waitress comes over and asks you if you want to be served. Which drink would you order now?

A. The drink that you usually like and often order

B. An unusual drink that you have never tried before but have always wanted to”

The two options were counterbalanced across all participants.

Pretest for Study 1

We conducted three different versions of pretests. The results of all three versions supported the identity relevance of the choice used.

1. Choice between usual and novel options:

“Consider a person choosing between two options, one that the person usually chooses and one which the person has never chosen before. Which option would make the person choosing it more of a different person?”

- A. The drink that you usually like and often order*
- B. An unusual drink that you have never tried before but have always wanted to”*

2. Choice between usual drink and novel drink:

“Imagine that you are on vacation in Las Vegas. While at a casino, you feel thirsty. You have two options to choose from for a drink:

- A. The drink that you usually like and often order*
- B. An unusual drink that you have never tried before but have always wanted to*

Between these two options, which choice do you think would make you feel like a more different person?”

3. Five-point scale:

“Indicate the degree to which you agree with each of the statements below:

- 1. The more different people are, the more different their choices will be, even in the same situation*
- 2. When a person makes inconsistent choices, the choices may reflect different facets of the person's identity*
- 3. The choices a person makes does not reflect what kind of a person he or she is at all (-)*
- 4. Choices only reflect a person's tastes, but not the person's personality or identity (-)*
- 5. When someone starts making very different choices from before, they start to seem almost like a different person*
- 6. When someone changes as a person, there is usually very little difference in the choices the person makes (-)”*

Study 2: Pretest

After participants learned about the game, they read:

“To better help you understand the game, we have some additional information summarized by players of this game.”

The mechanism framing information either stressed the role of skill,

“In this game, skill plays a vitally important role. Each time you roll the ball, your strength and choice of direction may determine the result. Having a clear goal in mind before rolling may also help with the result. What you need to do is to plan carefully where you want the ball to land. Your outcome in this game will depend on both your skill and your precision.”

or the role of chance:

“In this game, chance plays a vitally important role. Although it may feel as if how you roll the ball determines where it will go, where the ball ends up and its path each time is essentially random. This is because of the irregular shape of the ball, and because minor differences in the angle and the speed at which the ball hits each of the erasers can send it in a completely different direction. So, no matter how you roll the ball, every play of the game can be different by chance. What you can do each time is to try your luck and see what happens. The outcome will depend on whether the ball happens to go in the right direction each time it encounters an obstacle.”

Then they were asked to report their anticipation of the next outcome:

“Suppose you tried three times, and had three hits [misses] in a row. How optimistic are you about the next outcome?”

They indicated their answer using a sliding bar, on a scale from 0 (very pessimistic) to 10 (very optimistic).

Study 2: Version A

The game was designed on a 52" X 20" table, using colored tape, a rubber band ball and 10 rubber erasers.

In the self-identity questionnaire, participants read:

"People have multiple aspects of self-identity. For example, a person may describe herself as a first-year medical student, a daughter, a firm environmentalist, and so on. Please write down the identities that you think represent you, and list at least three different aspects of your identity."

After they listed three aspects of their identity, they read:

"Please select the one of the identities that represent who you are at the moment, and briefly describe that identity: _____"

During the mid-game break, participants read the same skill (or chance) manipulation used in the pretest. Then they were asked:

"Does this game remind you of any other games you know? If so, what's the name of the game?"

On the second questionnaire that participants received in the mid-game break they read:

"Now please again take some time to think about your multiple identities. Please choose one of your multiple identities and describe yourself in detail about one of them below. What would you like to write about?"

A. I'd like to write more about the identity I have described earlier.

B. I'd like to write about a different identity of myself:

_____ "

Study 2: Version B

In the “Social Cognition” questionnaire, people read:

“People see numerous strangers in passing every day. For example, a doorman, a busy cashier, a passenger on the bus or train, and so on. Please think about the strangers that you have seen for a moment today, and list at least three different persons you have noticed.”

After they listed three aspects of their identity, they read:

“Please select the one of the persons listed above, and briefly describe that person.”

Then on the second questionnaire that participants received in the mid-game break they read:

“Now please again take some time to think about the strangers you have described. Please choose one of your listed strangers and describe him/her in detail about one of them below. What would you like to write about?”

- A. I’d like to write more about the person I have described earlier*
- B. I’d like to write about a different person I have seen:*

-----”

Study 2: Version C

In the beginning of the game, participants were given one of three rubber-band balls (blue, orange, or yellow), chosen at random. Then, during the mid-game break the second questionnaire read:

“Now you have a chance to switch the rubber band ball you use in the game. We have 3 of them in different colors: yellow, orange, blue. Would you like to use the same one or change for a different one from now on?”

- A. I’d like to use the same rubber band ball*
- B. I’d like to switch to another rubber band ball in the*

-----color”

2. Additional data analyses

Pilot Study Analyses

Table A1: Logistic regression for the proportion of participants predicting a hit when the *same* person will make the next shot.*

	Beta	S.E.	Wald	<i>P</i>
Belief manipulation	-1.317	0.683	3.725	0.054
Number of hits	-0.312	0.302	1.065	0.302
Belief x hits	1.240	0.459	7.301	0.007
Constant	0.288	0.441	0.426	0.514

Table A2: Logistic regression for the proportion of participants predicting a hit when the *other* person will make the next shot.*

	Beta	S.E.	Wald	<i>p</i>
Belief manipulation	0.105	0.627	0.028	0.867
Number of hits	0.044	0.306	0.020	0.887
Belief x hits	-0.347	0.443	0.612	0.434
Constant	0.095	0.437	0.048	0.827

Table A3: Logistic regression for the proportion of participants predicting a hit.*

	Beta	S.E.	Wald	<i>P</i>
Belief manipulation	0.105	0.627	0.028	0.867
Number of hits	0.044	0.306	0.020	0.887
Switching	0.192	0.621	0.096	0.757
Belief x hits	-0.347	0.443	0.612	0.434
Belief x switching	-1.423	0.927	2.357	0.125
Hits by switching	-0.356	0.43	0.683	0.408
Belief x hits x switching	1.587	0.638	6.189	0.013
Constant	0.095	0.437	0.048	0.827

*Belief manipulation = 1 if skill, 2 if chance
 Number of hits = either 0 (loss) or 2 (win)
 Switching = 1 if same player, 2 if different player

Study 1 Analyses

Table A4: Logistic regression for the proportion of participants choosing the novel drink when a future outcome *is* anticipated.*

	Beta	S.E.	Wald	<i>p</i>
Belief manipulation	-0.750	0.623	1.453	0.228
Number of wins	-0.188	0.156	1.453	0.228
Belief x wins	0.446	0.217	4.224	0.040
Constant	-0.754	0.429	3.091	0.079

Table A5: Logistic regression for the proportion of participants choosing the novel drink when a future outcome *is not* anticipated.*

	Beta	S.E.	Wald	<i>p</i>
Belief manipulation	0.276	0.675	0.167	0.683
Number of wins	0.147	0.168	0.761	0.383
Belief x wins	-0.377	0.254	2.200	0.138
Constant	-1.030	0.521	3.906	0.048

Table A6: Logistic regression for the proportion of participants choosing the novel drink.*

	Beta	S.E.	Wald	<i>P</i>
Belief manipulation	0.276	0.675	0.167	0.683
Number of wins	0.147	0.168	0.761	0.383
Future outcome	0.276	0.675	0.167	0.683
Belief x wins	-0.377	0.254	2.200	0.138
Belief x future outcome	-1.026	0.918	1.249	0.264
Future outcome x wins	-0.335	0.229	2.128	0.145
Belief x wins x future outcome	0.823	0.334	6.065	0.014
Constant	-1.030	0.521	3.906	0.048

*Belief manipulation = 1 if skill, 2 if chance
 Number of hits = either 0 (loss) or 4 (win)
 Future outcome = 1 if future outcome, 2 if no future outcome

Study 2 Pretest Analyses

Table A7: Within-subjects ANOVA analysis of anticipated outcome*

	Sum of Squares	Df	Mean Square	F	<i>p</i>
Number of hits	3.576	1	3.576	1.007	0.320
Belief x hits	24.199	1	24.199	6.814	0.011
Error	209.5	59	3.551		

Table A8: Between-subjects ANOVA analysis of anticipated outcome*

	Sum of Squares	df	Mean Square	F	<i>p</i>
Intercept	4317.6	1	4317.6	771.5	0.000
Belief manipulation	0.538	1	0.538	0.096	0.758
Error	330.2	59	5.596		

*Belief manipulation = 1 if skill, 2 if chance
Number of hits = either 0 (lose frame) or 2 (win frame)

Study 2 Analyses

Performance statistics (main study)

Participants' success rate in the practice roll and first three rolls (34.9%) was slightly lower than anticipated, based on success in a pre-test of the game (48.3%). The numbers of hits scored out of the first four were: 0 hits, 19.8%; 1 hit, 35.3%; 2 hits, 31.0%; 3 hits, 12.9%; 4 hits, .9%.

Table A8: Logistic regression for the proportion of participants choosing to change their own identity description (Version A).*

	Beta	S.E.	Wald	<i>p</i>
Belief manipulation	1.671	0.864	3.742	0.053
Number of hits	0.696	0.415	2.804	0.094
Belief x hits	-1.150	0.539	4.557	0.033
Constant	-0.377	0.592	0.405	0.525

Table A9: Logistic regression for the proportion of participants choosing to change the other person they were describing (Version B).*

	Beta	S.E.	Wald	<i>p</i>
Belief manipulation	-0.270	0.785	0.118	0.731
Number of hits	0.149	0.311	0.229	0.632
Belief x hits	0.087	0.462	0.036	0.850
Constant	-0.332	0.580	0.327	0.567

Table A10: Logistic regression for the proportion of participants choosing to change the ball they were using (Version C).*

	Beta	S.E.	Wald	<i>p</i>
Belief manipulation	-0.624	0.972	0.412	0.521
Number of hits	-0.616	0.475	1.681	0.195
Belief x hits	0.501	0.561	0.799	0.371
Constant	1.270	0.792	2.573	0.109

*Belief manipulation = 1 if skill, 2 if chance
 Number of hits = between 0 and 4

Table A11: Comparison of key variables across the three versions.

		Hits	Gender	Age	Check1	Check2	Own luck	Believe luck	Mood
Version A	Mean	1.33	1.51	30.65	3.23	4.75	2.19	1.24	5.33
	(SD)	(.952)	(.503)	(12.1)	(.915)	(1.70)	(1.93)	(1.22)	(1.39)
Version B	Mean	1.39	1.44	27.91	3.34	4.75	2.42	1.13	5.26
	(SD)	(1.03)	(.499)	(10.9)	(.829)	(1.62)	(1.47)	(1.11)	(1.47)
Version C	Mean	1.50	1.44	29.59	3.28	5.16	1.96	1.11	5.46
	(SD)	(.933)	(.499)	(10.6)	(.875)	(1.63)	(1.76)	(.914)	(1.27)
One-way ANOVA	F	0.010	0.756	1.771	1.584	0.751	0.147	0.016	0.265
	<i>p</i>	0.990	0.473	0.177	0.212	0.475	0.864	0.984	0.768

*Hits= the number of hits participants made in the first four rolls (one practice roll and three “real” rolls)

Check1= the first manipulation check: *“Does this game remind you of any other games you know? If so, what’s the name of the game?”* An independent coder then coded the games on a 5–point Likert scale for how much skill vs. chance were involved in each game, 1= purely chance, 5=purely skill.

Check2= the second manipulation check: On a 7–point likert scale, *“Please rate on the following scale which of the two you agree with more as it relates to the game described earlier”*: 1= luck is the determinant of the outcome, 7=skill is the determinant of the outcome

Own luck = Mean of four ratings on a 5–point Likert scale, *“Please rate the degree to which you personally agree with each of the following statements.”* 1= strongly disagree, 5= strongly agree

- I consider myself to be a lucky person. (+)*
- I tend to not win in games of chance. (-)*
- I consider myself to be an unlucky person. (-)*
- I tend to win games of chance. (+)*

Believe luck = Mean of two ratings on a 5–point likert scale, *“Please rate the degree to which you personally agree with each of the following statements.”* 1= strongly disagree, 5= strongly agree

- Some people are consistently lucky, and others are unlucky. (+)*
- There is no such a thing as luck that favors some people, but not others. (-)*

Mood = Mean of three Likert scales: happy/unhappy, pleased/annoyed, good mood/bad mood