

Conditioned Superstition: Desire for Control and Consumer Brand Preferences

ERIC J. HAMERMAN
GITA V. JOHAR

There are many opportunities in everyday life to associate consumer products with success or failure. For example, when a basketball fan drinks a particular brand of soda while watching her favorite team win a game, she may perceive that this consumption facilitated the victory. Subsequently, the fan may continue to purchase and consume this same item during future games, in an attempt to help the team. This behavior is known as "conditioned superstition." Data from five experiments indicate that preference for lucky products (i.e., those associated with positive outcomes) increases with higher levels of desire for control combined with lower levels of perceived ability to control outcomes (e.g., low generalized self-efficacy). People who express a preference for these lucky products form an illusion of control over future outcomes, so that they perceive superstitious behavior to be an effective strategy to achieve the desired result.

Several years ago, one of the authors and his friends acquired season tickets to watch the Dallas Mavericks (a professional basketball team). During one particular game when the Mavericks were losing badly at halftime, a member of the group visited the concession stand to purchase his usual halftime beverage of Coca-Cola. He returned to his seat holding a Dr. Pepper, explaining that the arena was temporarily out of his favorite drink. The team subsequently embarked on an unlikely rally in the second half and ended up winning in spectacular fashion. A few months later, the

same friends attended an important playoff game. After a poorly played first half, the Mavericks again trailed by a large margin. At that moment, this formerly loyal Coca-Cola drinker loudly proclaimed: "It's time to break out the Dr. Pepper!"

In this article, we focus on the conditioned superstitions that occur after consumers irrationally associate their purchase or consumption decisions with positive or negative outcomes. Extant research has focused primarily on superstition related to cultural beliefs. For example, priming lucky (vs. unlucky) numbers increased consumers' estimates of winning a subsequent lottery (Jiang, Cho, and Adaval 2009). Similarly, Taiwanese consumers were more likely to purchase—and expected higher levels of performance from—a red rice cooker compared to a green one, because they considered red to be lucky (Block and Kramer 2009).

These cultural superstitions largely occur with nonconscious priming (Kramer and Block 2008), but we hypothesize that conditioned superstitions may be formed and used at a conscious level. We expect superstitions to be successfully conditioned when contingency awareness (e.g., awareness of the link between drinking Dr. Pepper and the team winning; Bandura 1974) is present, and we predict that individuals opting for the newly designated lucky products will acknowledge that their preference reflects a conscious strategy to control future events.

If superstition is a conscious strategy to control the environment, the prevalence of superstitious behavior should be strongly related to perceptions of, and desire for, control. We hypothesize that individuals who score high (vs. low) on the

Eric J. Hamerman (ehamerma@tulane.edu) is assistant professor of marketing at the A. B. Freeman School of Business, Tulane University, New Orleans, LA 70118. Gita V. Johar (gvj1@columbia.edu) is Meyer Feldberg Professor of Business at the Graduate School of Business, Columbia University, New York, NY 10027. Correspondence: Eric J. Hamerman. The article was based on an essay from the first author's dissertation at the Graduate School of Business, Columbia University. The authors thank the other dissertation committee members: Donald Lehmann, Leonard Lee, Lauren Block, and Tor Wager, and they gratefully acknowledge funding from the Columbia Business School Research Fund and the A. B. Freeman School of Business. The authors acknowledge the helpful input of the editor, associate editor, and reviewers, and appreciate the thoughtful comments received from Stijn van Osselaer, Jeffrey Parker, Daniel Mochon, Janet Schwartz, Harish Sujan, and Mita Sujan, as well as participants in seminars at Columbia University, University of Chicago, University of Iowa, and York University.

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desire for control scale (Burger and Cooper 1979) or face a valued (vs. unimportant) outcome would be more likely to turn to superstition in order to control their environment. Conversely, we expect superstitious behavior to be reduced when individuals perceive sufficient internal resources to control their environment: if they possess high levels of generalized self-efficacy (GSE) or if they undergo a self-affirmation. Moreover, after engaging in superstitious behavior, we expect people to form an illusion of control over uncertain future events (e.g., if I drink Dr. Pepper, my team is more likely to win) similar to that expressed by Langer (1975). In other words, choosing a lucky product (i.e., one that is believed to create a favorable outcome) is likely to result in individuals predicting more positive future outcomes. The next section elaborates on our conceptualization.

CONCEPTUAL FRAMEWORK

The phenomenon of conditioned superstition derives from operant conditioning, in which the frequency of various behaviors is altered through reinforcement (Skinner 1948). For example, pigeons demonstrated “superstition” by repeating a series of random behaviors that they had associated with the presentation of food (Skinner 1948). The change in behavior—rather than its functionality—defined the conditioning process as successful (Skinner 1963).

The associative learning model explains that any cue that seems to accurately forecast an event can be considered predictive (Rescorla and Wagner 1972). This model also applies to human contingency judgment (Shanks et al. 1996), in that people learn to predict the results of future events based on the presence of features that occur simultaneously. It may seem surprising that cognitive processes in people—such as logical reasoning—don’t override associative learning when the result seems specious. For example, it should be obvious that purchasing Dr. Pepper does not influence the outcome of a basketball game, even if it appears to be correlated with victory. However, individuals often overestimate the influence of their own actions on future outcomes, even if the two are not logically related (Wegner 2002).

These spurious associations generally occur when people’s actions are especially salient: they occur prior to the outcome, the result is consistent with their intent, or there is no alternative explanation (Wegner and Wheatley 1999). This is consistent with Bandura’s (1974) finding that learning through paired associations is most likely to occur when participants consciously recognize that the events are correlated. In support of this notion, Allen and Janiszewski (1989) found that consumers preferred fictitious words that were associated with positive feedback on a language task but only when they reported awareness of this link.

Similarly, we expect conditioning to induce superstitious behavior when there is conscious awareness of the link between the product and outcome. Moreover, when individuals engage in superstitious behavior—by opting for a lucky (vs. unlucky) item—we expect them to acknowledge that their preferences are strategic. If acting on a conditioned super-

stition is a strategic attempt to influence the environment, then superstitious behavior should facilitate an illusion of control, such that individuals make more optimistic predictions about uncertain future outcomes. This is consistent with the findings of Damisch, Stoberock, and Mussweiler (2010) that superstition enhances performance expectations.

Extant literature provides support for the notion that illusion of control is related to optimism about future outcomes. Factors such as choice, competition, familiarity, and involvement lead people to reclassify games of chance as measures of skills that can be controlled (Langer 1975). Individuals were more optimistic about winning a random drawing if they chose—rather than were assigned—a lottery number and preferred a random draw from a deck of cards against an uninspiring (vs. intimidating) opponent (Langer 1975). Using a familiar (vs. exotic) deck of cards resulted in increased wagers (Bouts and Avermaet 1992), and TV viewers with higher levels of mental engagement during a Super Bowl broadcast perceived a greater responsibility for the outcome (Pronin et al. 2006).

Illusions of control have also been related to superstition in the literature. As an individual difference, illusion of control is correlated with belief in paranormal superstitions (e.g., broken mirrors bring bad luck), because such beliefs provide a sense of “controllability in people who frequently exhibit an external locus of control” (Rudski 2004). Superstitious beliefs reflect a desire to control outside circumstances (Jahoda 1969), as well as a perceived lack of ability to exert this control; anxious people “share with superstitious individuals a perceived inability to control the environment” (Zebb and Moore 2003).

Because superstitious behavior is expected to create an illusion of control, we examine the prevalence of superstition as it relates to the desire for, and perception of, control in the environment. First, we propose that superstitious behavior is used more often to influence a valued (vs. non-valued) event, because individuals have a high desire to control this outcome. For example, a basketball fan who perceives that drinking Dr. Pepper helps her team may be more likely to consume this brand while watching the team play (vs. during the off-season). Consistent with this idea, college students utilize lucky charms more often with higher stakes (Rudski and Edwards 2007), and athletes engage in superstitious rituals for more (vs. less) crucial competitive events (Schippers and Van Lange 2006).

Second, we expect desire for control—as an individual difference—to moderate superstitious behavior (Burger and Cooper 1979). Those with high (vs. low) desire for control were more likely to knock on wood when describing their health (Keinan 2002). Therefore, we expect individuals with high (vs. low) levels of desire for control to be more likely to attempt to influence their environment by making superstitious choices. Desirability of control has also been linked with the illusion of control; those with high (vs. low) desire for control who are victorious in a coin-toss game consider themselves more likely to correctly predict future coin tosses (Burger 1986).

Superstitious behavior is not the only method of exerting control over the environment. Those who perceive their internal resources as sufficient for controlling the environment should be unlikely to resort to superstition to do so. Therefore, we expect the constructs of self-affirmation and self-efficacy to serve as moderators of superstitious behavior. Self-affirmation boosts self-regard, increasing the personal resources that allow individuals to deal with the threat posed by uncertainty. For example, when they perceive a lack of control over their environment, people tend to see patterns in the environment that don't actually exist; this is eliminated after a self-affirmation (Whitson and Galinsky 2008).

In general, the affirmation process increases self-worth, protecting individuals from threats to their self-concept (Steele 1988). Self-affirmation reduces defensive behavior (Sherman and Cohen 2002), because reaffirming core values allows individuals to handle threatening information without resorting to extreme measures such as cognitive dissonance (Steele and Liu 1983; Steele, Spencer, and Lynch 1993). We hypothesize that self-affirmation reduces superstitious behavior because individuals who have their self-concept bolstered through the affirmation process should be unfazed by the threat of failure and, therefore, be willing to take on a challenging task without resorting to superstition.

Similarly, high levels of GSE are expected to decrease superstitious behavior. GSE is an assessment of one's own ability to succeed in a variety of situations (Smith 1989). People "fear and avoid" threatening situations until they perceive the ability to cope with them; perceptions of self-efficacy determine how much effort they will expend to combat these threats (Bandura 1977). It follows that high-GSE individuals should be less superstitious, due to their perceived ability to achieve desired outcomes on their own. In contrast, those with low GSE may engage in superstitious behavior to boost their chances for success. This is consistent with the finding that paranormal beliefs are less prevalent under high (vs. low) GSE (Tobacyk and Shrader 1991). Superstitious behavior also increases task-specific self-efficacy, as individuals were more likely to believe they could master a task after following instructions to "cross your fingers" (Damisch et al. 2010). Our conceptual model of conditioned superstition is illustrated in figure 1.

Five experiments test these predictions. In each study, participants undergo conditioning trials that pair a consumer behavior (use of a product) with an outcome. Experiment 1 examines whether participants who shift preferences toward the lucky option perceive an illusion of control over future events. Experiment 2 distinguishes the illusion of control related to the act of choosing from the illusion of control based on using a lucky product. Experiments 3 (desire for control), 4 (self-affirmation), and 5 (generalized self-efficacy) examine moderators of superstitious choice.

In all five studies, the outcomes are framed as uncertain, so that participants have an incentive to resort to superstition in the hope of influencing the result in a positive direction. This is consistent with prior research showing that superstition is more likely to occur for uncertain (vs. certain)

outcomes (Keinan 2002). For example, individuals are more willing to listen to a psychic for an uncertain (vs. certain) card-guessing task (Case et al. 2004), and college students resort to numerous superstitions—including rubbing the foot of a campus statue for good luck—before exams in particularly difficult courses (Vyse 1997).

EXPERIMENT 1: SUPERSTITIOUS CHOICE AND OUTCOME PREDICTION

The goal of this study is to determine whether individuals who have previously engaged in superstitious behavior perceive that their actions will increase their likelihood of future success. In other words, expressing a stronger preference for a brand that is associated with a positive outcome is expected to result in an illusion of control over future tasks.

Method

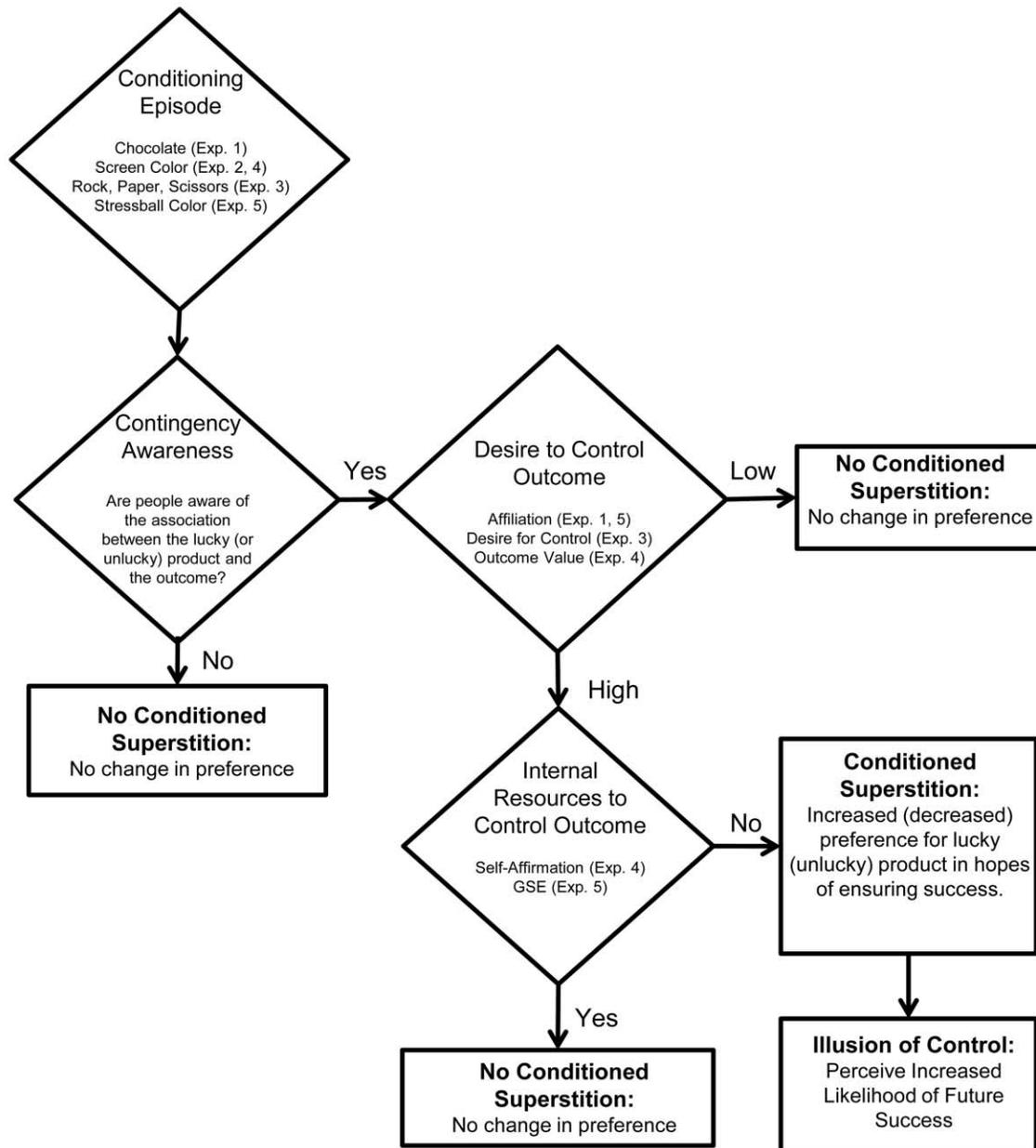
Procedure. A total of 94 student participants at Columbia University were compensated \$6 to complete a series of experiments, which took place in the Columbia Business School's behavioral laboratory. Three participants were dismissed due to behavioral issues (communicating with each other during the session). An additional six participants were excluded from the analysis after reporting that they were unfamiliar with the Kit Kat chocolate brand, leaving 85 participants.

Participants were informed that their university was in the finals of the Intercollegiate Quiz Bowl (an ostensibly real competition), and that they would receive updates from the match. Participants received a miniature Snickers upon arrival, in order to "accurately simulate" the experience of watching the event in person. Updates were provided whenever teams responded to a question. Points were awarded for correct answers and deducted for incorrect answers.

Twice during the competition, respondents were informed that competitors were pausing for a refreshment break. During both of these breaks, an additional mini-Snickers bar was distributed to each participant. When the updates began, the home team trailed by a substantial amount. Throughout the updates, the home team played extremely well, severely reducing the deficit. Respondents were asked during each refreshment break to evaluate the team's performance (using a 7-point scale). When the updates concluded, the match was still in progress. The home team was still trailing, but the score was very close, indicating that the outcome was uncertain.

At this point, half of the participants were informed that they could select another chocolate as a token of thanks. They expressed their preference for Snickers or Kit Kat on an 8-point bipolar scale and were later presented with the brand that they chose. Subsequently, these individuals were asked to predict (on a 7-point scale) the likelihood of their school winning the match. The remaining participants were asked to predict the winner of the match *before* being informed that they could choose another chocolate. At the

FIGURE 1
MODEL OF CONDITIONED SUPERSTITION



close of the study, participants were asked—using a 7-point scale—the extent to which they felt a sense of “affiliation” with their school. In this case, affiliation acts as a proxy of “desire for control.” Those with greater affiliation with their school should more strongly desire to control the outcome of the match and be more likely to form an illusion of control after selecting the lucky option.

Experimental Design. This between-subjects experiment included the dichotomous factors of order (predict score before vs. after selecting chocolate) and choice (superstitious = Snickers; nonsuperstitious = Kit Kat). Affiliation was a continuous variable, using a 7-point scale. The DV was the predicted likelihood that the participants’ university would win the match.

Results

Attention Check. Participants rated the team's performance during two refreshment breaks. As expected, these ratings were highly correlated ($r = .65, p < .0001$). On a 7-point scale—higher score indicating better performance—participants rated the team's performance as a 6.11, indicating that participants generally paid attention during the conditioning trials.

Superstitious Choice. Of the 85 participants in the analysis, 34 (40%) selected an extra Snickers bar instead of switching to Kit Kat. (On the 8-point bipolar scale, those who measured 5 or above were given a Snickers bar.) As expected, prevalence of choosing Snickers did not change based on order, that is, whether the predictions of team success were made before or after selecting a chocolate. Snickers was chosen by 16 of 41 (39%) of the respondents prior to predicting the score of the match, while 18 of 44 (41%) chose Snickers after they predicted the score. Affiliation did not affect the likelihood of choosing Snickers.

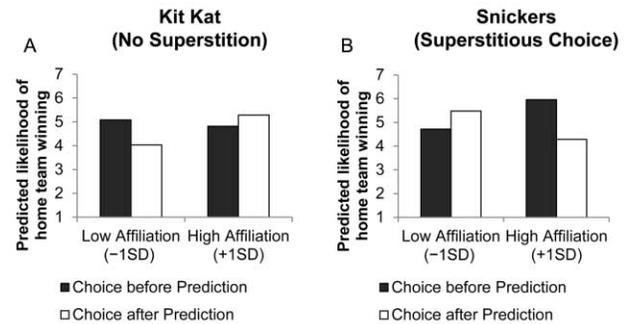
Likelihood of Predicting Future Success. A regression analysis with factors of order (prediction first or selection of chocolate first), choice (superstitious = Snickers; nonsuperstitious = Kit Kat), and affiliation (continuous variable) on predicted Quiz Bowl outcome revealed a significant interaction between order and choice ($\beta = -1.93, t = -2.36, p < .03$), which was qualified by an interaction between all three factors ($\beta = .35, t = 2.45, p < .02$). A spotlight analysis (Aiken and West 1991; Fitzsimons 2008) was conducted at one standard deviation above and below the mean for affiliation. Among those who engaged in superstitious behavior—choosing Snickers—participants with high levels of affiliation were more likely to predict that their team would win when they selected their chocolate before (vs. after) making this prediction ($\beta = 1.67, t = 2.00, p < .05$), while low-affiliation participants did not differ in their predictions based on order ($\beta = -.76, t = -0.94, NS$). Among participants who selected Kit Kat, those with high affiliation did not differ based on order ($\beta = -.47, t = -0.75, NS$), though low-affiliation participants were marginally more optimistic about the outcome when choosing Kit Kat prior to (vs. after) making their predictions ($\beta = 1.05, t = 1.70, p < .10$). Results are presented in figure 2.

Discussion

Among participants who selected Snickers (the lucky option), those with high levels of affiliation were more likely to predict the home team to win when they selected their chocolate before (vs. after) making their prediction. In other words, high-affiliation participants—who should seek to influence the outcome—formed an illusion of control over the match after engaging in superstitious behavior. Those with low affiliation who chose Snickers did not differ in their prediction based on order.

FIGURE 2

EXPERIMENT 1: PARTICIPANTS' PREDICTION OF QUIZ BOWL OUTCOME



Among those who chose Kit Kat, those with high affiliation did not differ in their prediction based on order, but those with low affiliation were marginally more likely to predict victory when selecting the chocolate prior to (vs. after) predicting the outcome. Given that low-affiliation participants should not be trying to influence the match—and choosing Kit Kat is not expected to create a perception of control—this result may be unrelated to superstition.

It is interesting that affiliation did not influence the likelihood of choosing the lucky option but did influence whether participants formed an illusion of control after making their choice. We expected affiliation with the school to be a proxy for the level of participants' desire to control the outcome. This may be an issue of calibration, as the selection of chocolate was categorized as binary (Snickers or Kit Kat), whereas predicted likelihood of victory was a continuous measure and therefore more sensitive to the influence of affiliation.

As expected, preference for Snickers (vs. Kit Kat) did not vary based on order. All participants associated Snickers with success, so it is unsurprising that both "order" conditions preferred Snickers at approximately equal rates. It should be noted that only about 40% of the respondents chose to receive the lucky brand of Snickers (vs. Kit Kat) at the end of the session. This may be due to variety-seeking; a post hoc test found that only 15% of individuals who imagined receiving three Snickers bars reported they would choose to stay with this brand (vs. Kit Kat) for a fourth selection. Hence, there is evidence that the conditioning was successful.

While experiment 1 indicated that the illusion of control can be formed as a result of superstitious behavior, an alternative explanation is that this illusion stems from the act of choosing (Langer 1975) rather than the identity of the chosen product. Experiment 2 attempts to establish that superstition and choice are two distinct routes to illusions of control.

EXPERIMENT 2: CHOICE VERSUS ASSIGNMENT

The autonomy to make personal decisions has been shown to increase perceptions of control and well-being. For example, nursing home residents with the power to make choices regarding their daily schedules—compared with those for whom daily itineraries were set for them—possessed a heightened sense of control and improved health (Langer and Rodin 1977).

Consistent with the illusion of control (Langer 1975), we predict that individuals who actively select a product for a future task will predict more positive results than if the item was assigned to them. For example, someone who *chooses* a blue or orange computer background to answer a set of trivia questions should be more confident in the outcome compared to when this background is *randomly assigned*. However, we also expect that regardless of whether the background has been selected or assigned, individuals will predict a more positive outcome when the background color has been associated with success (vs. failure).

We expect this latter illusion of control to occur more often in participants with higher levels of contingency awareness (i.e., an awareness of the association between the computer interface and subsequent success or failure). In experiment 1, participants were asked about the team's performance during the conditioning trials, but they did not report whether they associated Snickers with a pattern of improved performance compared to a baseline. In experiment 2, contingency awareness is measured by checking whether participants were aware of a pattern of better performance using one (vs. another) background. The measurement is taken at the end of the session, rather than during the conditioning trials, to determine whether this awareness was sustained throughout the decision-making process.

We predict that the act of choosing (vs. being assigned) a computer background will result in more optimistic predictions about future outcomes. Under high—but not low—contingency awareness, using the lucky option should also have a positive effect on these predictions, indicating that the selection method (choice vs. assignment) and selection outcome (lucky vs. unlucky background) are distinct illusions of control.

Method

Procedure. Three hundred fifty individuals were recruited from Amazon Mechanical Turk to complete an online task in exchange for a small monetary payment; they were instructed to use two separate background screen/font combinations while answering a series of trivia questions that were presented in multiple-choice format. The two background screen/font combinations consisted of (a) blue background with red font and (b) orange background with white font; these were counterbalanced to ensure that there was no bias toward a specific color.

Each participant answered two sets of six trivia questions using one background and two sets of six questions using

the other, for a total of 24 trivia questions. Participants received performance feedback after each set of six questions—positive feedback after answering questions with one background color (lucky background color) and negative feedback after answering questions with the other (unlucky background color).

After completing the four sets of trivia questions, participants were informed that there was one last set of trivia questions to be answered. Half of the respondents were informed that they would be *assigned* the computer background associated with success (failure), while the other half were allowed to *choose* the background to use while answering these questions. As the dependent variable, participants were asked how well (on a 7-point scale) they expected to perform on the last set of six trivia questions. After answering this final set of trivia questions, all participants were asked to report (on a 7-point bipolar scale) the color with which they performed better on the first four trials. This was used as a measure of contingency awareness.

Experimental Design. This study used a between-subjects design, with dichotomous factors of selection method (choice vs. assignment) and selection outcome (lucky vs. unlucky computer background color). Contingency awareness was a continuous independent variable. The DV was the predicted performance on future trivia questions.

Results

Superstitious Preference. As expected, significantly more than half (105/165; 64%) of those who were given the opportunity to choose a computer background for the final round of trivia questions selected the one associated with success ($Z = 3.50$; $p < .001$).

Illusion of Control. Using predicted future performance as the dependent variable, a regression analysis found a marginal main effect of selection outcome ($\beta = -.32$, $t = -1.70$, $p < .10$), which was qualified by an interaction between contingency awareness and selection outcome ($\beta = .09$, $t = 2.49$, $p < .02$). Consistent with the notion of superstition forming an illusion of control, a spotlight analysis (Fitzsimons 2008) at one standard deviation above and below the mean for contingency awareness revealed that those with high contingency awareness who prepared (i.e., chose or were assigned) to use the “lucky” background associated with success predicted more positive results than those who planned to use the “unlucky” background associated with failure ($\beta = .57$, $t = 3.14$, $p < .01$). Among participants with low contingency awareness, there was no difference in the predictions between those who were prepared to use either the lucky or unlucky background colors ($\beta = -.04$, $t = -.25$, NS).

Additionally, the regression analysis revealed an interaction between contingency awareness and selection method ($\beta = .08$, $t = 2.34$, $p < .02$). A spotlight analysis revealed that under high contingency awareness, participants who chose their computer background predicted a higher level

of future success compared to those who were assigned one ($\beta = .61, t = 3.38, p < .01$). With low contingency awareness, there was no difference in predictions of future success based on being assigned versus choosing a background ($\beta = .04, t = .21, NS$).

There was no interaction between selection outcome and selection method ($\beta = .13, t = 0.67, NS$), nor was there a three-way interaction between these two factors and contingency awareness ($\beta = -.03, t = -0.98, NS$). Results are displayed in figure 3. The actual number of questions answered correctly on the last round of trivia questions was higher for those who took the final round of questions using the lucky background screen ($M = 1.55$) versus the unlucky screen ($M = 1.31; F(1, 348) = 4.34, p < .04$).

Discussion

Preparing to use a computer background associated with success (vs. failure) led to an illusion of control, such that participants predicted a higher likelihood of future success. However, this only occurred under high contingency awareness, when participants were able to correctly associate their performance with one of the computer backgrounds.

This illusion of control occurred regardless of whether participants actively chose the background or had it randomly assigned to them. Because there was no interaction between the factors of selection method and selection outcome, we demonstrate that the illusion of control resulting from planning to use a lucky item is unique from the illusion of control that is formed after actively making a choice.

While contingency awareness was expected to interact with selection outcome, it is surprising that there was an interaction between contingency awareness and selection method. It may be that those who were unaware of the correct association between the background color and their trivia performance were uncertain as to which background color to choose, and therefore, they did not perceive an illusion of control after making their choice.

Interestingly, the expectation of higher performance was borne out by the actual number of trivia questions answered correctly. The computer background was counterbalanced, so this result cannot be explained by the actual superiority of one background over the other. Instead, it may be the case that choosing the lucky option created a placebo effect and facilitated performance, which is consistent with Damisch et al. (2010).

Experiment 1 found that the illusion of control was greatest for those who affiliate strongly with the home team (i.e., have a strong desire for them to win). In experiment 2, affiliation was kept constant, as the trivia scores reflected participants' individual performances. In experiment 3, participants again play for themselves, in the game of Rock, Paper, Scissors. Our hypothesis is that those with higher chronic levels of desire for control should be more likely to resort to superstition to influence the results. Moreover, those who act on these superstitions should form an illusion of control, predicting higher levels of success in future

matches. Unlike in the previous studies, we add a no-conditioning cell to experiment 3 as a baseline.

EXPERIMENT 3: DESIRE FOR CONTROL PREDICTS SUPERSTITIOUS CHOICE

Rock, Paper, Scissors requires players to make the hand symbol for a rock, a piece of paper, or a pair of scissors. Depending on which symbol your opponent "throws," the match may result in a win, a loss, or a draw.

Method

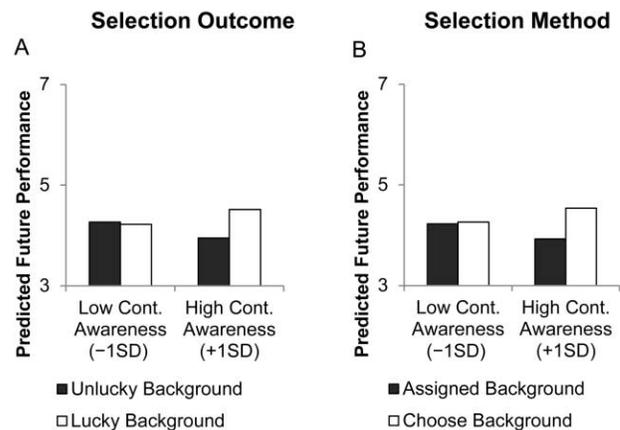
Procedure. In exchange for a \$0.50 payment, 275 right-handed adults were recruited from Amazon Mechanical Turk and agreed to complete a short online study purporting to investigate "handedness" in games. After reviewing the rules of the game, respondents played four series of five Rock, Paper, Scissors matches against the computer, for a total of 20 matches. They were instructed to play with their right hand during two of these series and their left hand for the other two. For each match, participants were instructed to choose rock, paper, or scissors by selecting from a visual menu of left (or right) hands in the shape of a rock, paper, or scissors.

After each choice, participants would be informed whether they won, lost, or tied the match. For example, after throwing a winning hand, they would be told, "You have chosen to play Rock (Paper/Scissors). The computer has chosen Scissors (Rock/Paper). You win this round!" At the end of each series of five matches, they were given performance feedback.

In the conditioning cell—where participants scored better with their left (vs. right) hand—feedback after playing left-handed was as follows: "Your overall score in 5 matches

FIGURE 3

EXPERIMENT 2: CONDITIONED SUPERSTITION AND ILLUSION OF CONTROL



while playing left-handed: 3 wins, 1 loss, 1 tie. Overall winning percentage: 60%. In general, this is a very good (above-average) result!" After playing right-handed, participants were informed: "Your overall score in 5 matches while playing right-handed: 1 win, 3 losses, 1 tie. Overall winning percentage: 20%. In general, this is a slightly below-average result." Those in the no-conditioning cell received exactly the same score—winning 40% of the time in the first round and 60% in the second round—when playing with their left or right hands.

After 20 matches, it was explained, "You will have one more opportunity to play a series of 5 matches against the computer." Participants chose to play using their right or left hands and then expressed this as a preference on an 8-point bipolar scale. Additionally, participants rated their expected future performance using a two-item scale ($r = .62$, $p < .001$), which included the questions: "How well do you expect to perform in your next five matches against the computer?" and "Compared to the average person, how well do you think you will do in these matches?" After playing the final five matches, participants completed the 20-item desire for control scale (Burger and Cooper 1979), which included such items as "I try to avoid situations where someone else tells me what to do." Finally, participants reported with which hand they played best during the conditioning trials (1 = right hand, 4 = equal, 7 = left hand).

Experimental Design. This was a between-subjects design, with conditioning as a categorical variable (no = same results with each hand; yes = higher winning percentage with left hand). The desire for control scale was a continuous independent variable. Dependent variables included superstitious behavior (preference for the lucky option) and illusion of control (predicted likelihood of future success).

Results

Attention Check. On a 7-point scale (1 = right hand, 4 = same score, 7 = left hand), those in the conditioning (vs. no-conditioning) cell reported that they were more successful using their left hand ($M_{\text{conditioning}} = 6.1$, $M_{\text{no-conditioning}} = 3.7$; $F(1, 271) = 253.5$, $p < .0001$). Two individuals in the conditioning cell mistakenly reported playing substantially better with their right hands, and they were dropped from the analysis, leaving a total of 273 participants.

Preference for Playing Left-Handed. Of those who had undergone conditioning trials in which they won more matches while playing with their left (vs. right) hands, 102 out of 130 participants (78%) chose to play left-handed for the final 5 matches against the computer, while only 36 out of 143 (25%) chose to do so from the no-conditioning cell. A logistic regression for this choice revealed a significant interaction between conditioning and desire for control ($\chi^2(1) = 5.94$, $p < .02$).

Preference for playing left- or right-handed was also measured as a continuous variable (1 = right-handed; 8 = left-handed). In this analysis, a marginal main effect of condi-

tioning ($\beta = -1.62$, $t = -1.75$, $p < .09$) was qualified by an interaction between desire for control and conditioning ($\beta = .02$, $t = 2.69$, $p < .01$). A spotlight analysis (Fitzsimons 2008) at one standard deviation above and below the mean revealed that at high levels of desire for control, participants who underwent conditioning had a greater preference for playing left-handed than those in the no-conditioning cell ($\beta = 2.69$, $t = 5.97$, $p < .0001$). At low levels of desire for control, conditioning did not significantly increase preference for the left-handed option over the no-conditioning baseline ($\beta = .68$, $t = 1.53$, NS). These results are displayed in figure 4.

Illusion of Control. With predicted likelihood of future success as the dependent variable, an ANOVA with factors of conditioning and hand choice found a main effect of conditioning ($F(1, 269) = 12.37$, $p < .01$), which was qualified by a significant interaction between these two factors ($F(1, 269) = 13.55$, $p < .01$). Within the conditioning cell—where the left hand was associated with winning—those who chose to play future matches with their left hand predicted that they would perform better ($M = 4.5$) than did participants who chose to play with their right hand ($M = 3.8$; $F(1, 269) = 12.34$, $p < .01$). However, those who did not undergo conditioning—and so received equal feedback with both hands—did not differ in terms of their predictions of future success based on choosing the left hand ($M = 4.4$) or right hand ($M = 4.7$; $F(1, 269) = 2.56$, NS). Among participants who chose to play left-handed, there was no difference in their predictions based on whether or not they underwent conditioning ($F(1, 269) < 1$). These results are illustrated in figure 5.

FIGURE 4

EXPERIMENT 3: PREFERENCE FOR PLAYING LEFT-HANDED IN ROCK, PAPER, SCISSORS

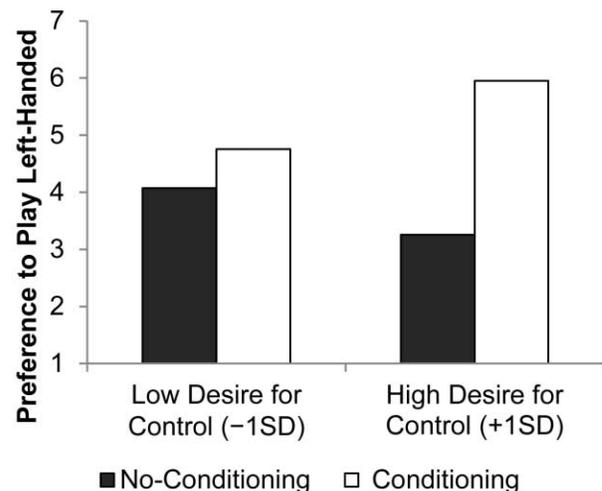
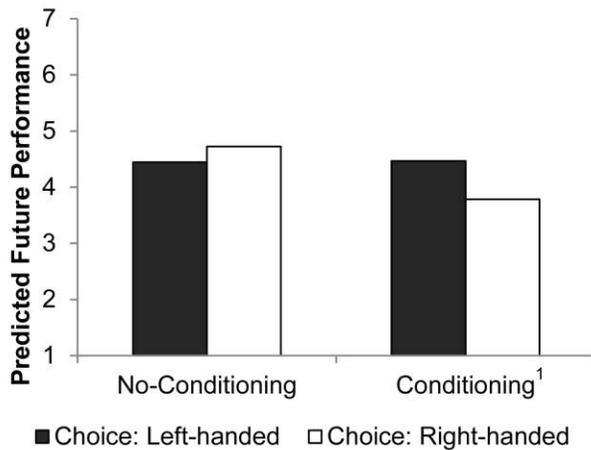


FIGURE 5

EXPERIMENT 3: PREDICTED LIKELIHOOD OF SUCCESS IN FUTURE ROCK, PAPER, SCISSORS MATCHES

NOTE.—The contrast is significant at $p < .01$.

Using the bootstrapping method (Preacher and Hayes 2008) on those participants who had undergone the conditioning episode, we found that preference for playing with the left (lucky) hand—measured as a continuous variable—served as a partial mediator between desire for control and predicting future success [.0001, .0079]. Following the reporting guidelines for bootstrapping (Zhao, Lynch, and Chen 2010), all three regression paths are significant and in the same direction, indicating complementary mediation. This analysis is displayed in figure 6.

Discussion

Participants who were conditioned to associate playing left-handed with winning at Rock, Paper, Scissors preferred to continue playing with their left (nondominant) hands. This was most likely to occur when individuals measured high (vs. low) on desire for control. As in experiments 1 and 2, participants who engaged in superstitious behavior (i.e., choosing to play left-handed) formed an illusion of control, predicting a higher likelihood of success for the final round of matches. Mediation results confirmed that for those who underwent conditioning (i.e., associating success with left-handed play), desire for control led to increased preference for using this hand, which then resulted in an illusion of control over the outcome of future matches.

Interestingly, among those who chose to play left-handed, predicted likelihood of success did not differ based on conditioning. In the last two sets of matches that the no-conditioning participants played before making a selection, they won 60% of the time with both their left and right hands.

Given that those in the conditioning cell also won 60% of their matches playing left-handed, it is unsurprising that there was no difference between them.

As a follow-up to experiment 3 (where all participants played Rock, Paper, Scissors), the task itself is manipulated in experiment 4 based on whether it promises self-relevant feedback (i.e., is valued). We expect individuals to go to greater lengths—such as engaging in superstitious behavior—to control the outcome of tasks that are considered to be of high (vs. low) value. In other words, the value of the task is a proxy for desire for control. Additionally, self-affirmation is included as a factor in experiment 4. Self-affirmation should bolster internal resources—buffering participants against the threat of a poor performance—and render them less likely to use superstition as a method of achieving a positive outcome on a valued task.

EXPERIMENT 4: SELF-AFFIRMATION AND OUTCOME VALUE

Experiment 4 uses similar experimental stimuli—answering trivia questions with different computer backgrounds—as experiment 2. As was the case in experiment 2, we expect that contingency awareness will moderate the results. Additionally, in order to demonstrate whether preference for the lucky item is a conscious strategy, participants will rate the computer backgrounds on objective attributes.

Method

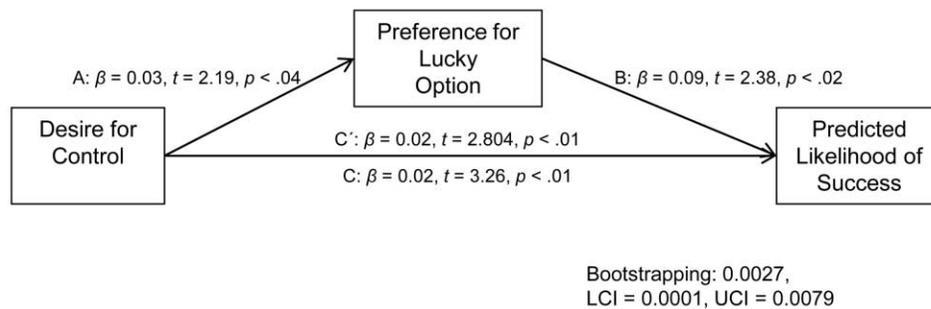
Procedure. A total of 201 adults were recruited from Amazon Mechanical Turk in exchange for a \$0.50 payment. Participants were given two separate studies: one about personality, the other about preference for colors and fonts. For half of the participants, the “personality” study consisted of a self-affirmation manipulation adapted from Reed and Aspinwall (1998), while the other half were presented with an unrelated task (labeled “Opinion Survey”) as a no-affirmation control. The self-affirmation manipulation—labeled “Personal Attributes Inventory”—consisted of seven questions designed to elicit affirmative responses. Respondents were asked whether they had ever engaged in various kind and compassionate behaviors (e.g., “Have you ever tried to make someone feel good when they were sad?”) and, if so, to write about one instance of such behavior. Kindness is well established as an important personal value, so answering affirmatively to these questions should induce self-affirmation (Reed and Aspinwall 1998).

The no-affirmation participants answered a personal opinion survey consisting of seven agree/disagree questions (e.g., “The weather in the spring is nicer than the weather in the fall”), followed by a brief elaboration. None of these questions related to the values of kindness or compassion, so this survey served as a no-affirmation control (Reed and Aspinwall 1998).

After completing this task, participants were presented with the following cover story: while research studies are routinely administered online, “little testing has been done

FIGURE 6

EXPERIMENT 3: MEDIATION ANALYSIS



to identify the preferred color/font combinations that are most aesthetically pleasing.” Participants were exposed to two combinations of fonts and screen colors: a blue screen with red font and a green screen with gray font. The blue background was intended to be objectively superior to the green background in terms of its physical appearance.

Participants were instructed to experience these computer backgrounds by answering four sets of trivia questions: two sections for each background. As in experiment 2, participants were given 90 seconds to complete each group of six questions. The questions themselves—and wording of the feedback—also were taken from experiment 2. All participants received positive feedback with the green background and negative feedback with the blue background.

After receiving feedback on their fourth set of trivia questions, participants were asked to select a color/font combination. Half of the participants were told that the selected background was to be used in answering a fifth set of trivia questions, and that they would receive additional feedback on their subsequent performance. The remaining participants were asked to read a short passage about online research. They were informed that “you will have the choice to read this passage using one of these two background color/font combinations. There will not be any questions to answer, so there will not be any type of performance feedback on this task.”

After expressing a preference for using either the blue or green background on their next task (on an 8-point scale: 1 = blue, 8 = green), participants were asked to rate both screens on three dimensions: aesthetic appeal, ease of reading, and strain on the eyes. Those in the high-value task condition were then asked to predict how well they would perform on the next set of trivia questions (two items; $r = .75, p < .01$) before being presented with the questions themselves. Those in the low-value condition were immediately presented with the reading passage. As in experiment 2, contingency awareness was measured by asking participants with which color they performed better on the first four trials (using a 7-point scale).

Experimental Design. This was a between-subjects design, with two categorical factors: self-affirmation (yes or no) and outcome value (low = reading; high = trivia questions). Contingency awareness was a continuous independent variable. Dependent variables included superstitious behavior (preference for the lucky option), as well as illusion of control (predicted likelihood of future success).

Results

Screen Evaluation. Confirming our expectation, the blue screen was rated as objectively superior ($M = 4.8$) to the green screen ($M = 3.4; t(200) = 7.62, p < .0001$). This rating was based on three dimensions—esthetic appeal, ease of reading, and strain on the eyes—that were highly correlated within each color scheme ($\alpha_{\text{blue}} = .900; \alpha_{\text{green}} = .903$). These ratings did not differ across conditions. Hence, the lucky green screen reflected an “inferior” choice.

Preference for Superstitious Option. A regression analysis with factors of self-affirmation (yes or no), outcome value (low = reading; high = trivia questions), and contingency awareness (low or high) revealed main effects of outcome value ($\beta = .70, t = 2.16, p < .04$) and contingency awareness ($\beta = -.50, t = -5.06, p < .01$). An interaction between self-affirmation and outcome value was also revealed ($\beta = -.82, t = -2.53, p < .02$), as was a marginally significant interaction between contingency awareness and outcome value ($\beta = -.17, t = -1.80, p < .10$), both of which were qualified by a significant interaction between all three variables: self-affirmation, outcome value, and contingency awareness ($\beta = .20, t = 2.01, p < .05$).

To interpret these results, a spotlight analysis (Fitzsimons 2008) was conducted at one standard deviation above and below the mean for contingency awareness. Participants who were to answer additional trivia questions indicated a lower preference for the lucky green screen after a self-affirmation (vs. no-affirmation) when contingency awareness was high ($\beta = -1.63, t = -2.12, p < .04$), but this did not occur

with low contingency awareness ($\beta = -.34$; $t = -.43$, NS). Participants who planned to read a passage about online research did not differ in their preference for the green screen based on self-affirmation, under both low ($\beta = -.77$; $t = -1.0$, NS) and high contingency awareness ($\beta = 1.04$, $t = 1.40$, NS). These results are displayed in figure 7.

Illusion of Control. Among those participants who were going to answer trivia questions (a high-value task), the level of preference for the lucky, green screen (on a continuous scale) was significantly related to how likely the participant was to predict a positive outcome ($\beta = .08$, $t = 2.31$, $p < .03$). This is consistent with our earlier results. However, self-affirmation did not have a significant direct effect on predicted likelihood of future success ($\beta = -.01$, $t = -0.14$, NS).

Discussion

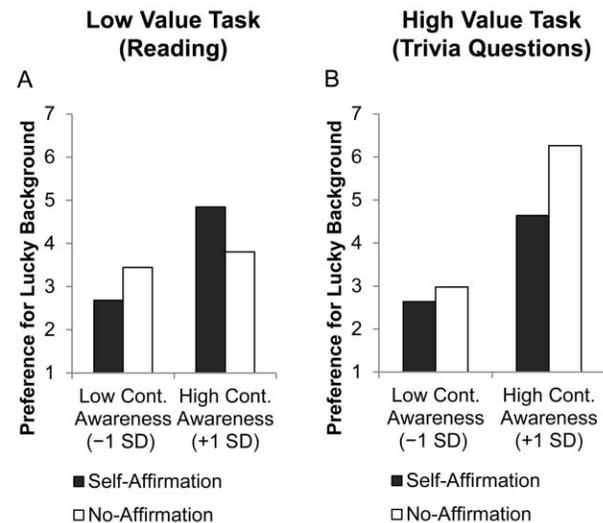
Participants in experiment 4 altered their preferences in favor of a lucky computer background after they became aware of its association with positive outcomes on a trivia quiz. The quiz was a high-value task that should elicit behaviors designed to exert control over the outcome. However, this superstitious behavior was eliminated among participants who completed a self-affirmation exercise. Additionally, it did not occur among participants who demonstrated low contingency awareness. There was no difference in preferences for the various computer backgrounds among those respondents who were preparing to complete a low-value reading task, which did not offer performance feedback.

To check the valued outcome manipulation, we performed a separate post hoc test. (In order to avoid a cognitive dissonance effect, we did not ask participants in experiment 4 to assess the task's value after they completed it.) In a between-subjects study, 51 adults (via Amazon Mechanical Turk) were presented with a description for one of the two tasks from experiment 4: taking a trivia quiz (with performance feedback) or reading about online research (no feedback). A two-item scale was used to measure value ($r = .79$; $p < .0001$): "Compared to an average task that you would complete for online research, could the results of this task be personally valuable?" and "In general, do you think this task provides something of value to you?" As expected, answering a set of trivia questions—with performance feedback—is considered more valuable ($M = 5.1$) than reading about online research ($M = 3.9$; $F(1, 49) = 7.69$, $p < .01$).

Note that, on average, the blue background was considered more aesthetically pleasing than the green background based on the dimensions of aesthetic appeal, ease of reading, and strain on the eyes. Pairing the less pleasing background with a positive outcome was done purposefully, in order to avoid a ceiling effect and to demonstrate that superstition could lead to objectively inferior choices. Moreover, because the objective ratings of both screens did not vary across conditions, this indicates that participants were cognizant

FIGURE 7

EXPERIMENT 4: PREFERENCE FOR LUCKY COMPUTER BACKGROUND



that their expressed preference for the green screen did not match their rating of its attributes.

Consistent with our previous studies, participants who were planning to answer additional trivia questions were likely to predict higher levels of success after expressing stronger preferences for the lucky green (vs. blue) background screen. However, self-affirmation did not directly affect participants' predictions of future success. While self-affirmation bolsters internal resources—allowing people to directly confront threatening information and making them less likely to resort to superstition—it did not reflect the same direct influence on perceptions of control as did the desire for control measurement in experiment 3.

Experiment 5 investigates whether GSE—a measure of whether individuals perceive sufficient internal resources to solve problems on their own—affects the likelihood of engaging in conditioned superstition. Experiment 5 also addresses the question of whether superstitious behavior can occur when failure, rather than success, follows the use of a brand or object.

EXPERIMENT 5: GSE AND NEGATIVE SUPERSTITION

The goals of this study were (1) to extend the results of the previous experiments to a negative (rather than positive) association and (2) to demonstrate that conditioned superstition is more likely to occur among individuals with low (vs. high) GSE. In this experiment, affiliation (which serves as a proxy for desire for control) was manipulated by whether or not participants were attending schools that were

involved in a stock trading competition. This factor is expected to be moderated by GSE. Low-GSE individuals should perceive their internal resources as inadequate to control the outcome of the competition. Therefore, when affiliation is high, they are expected to resort to superstition in order to exert this control.

Method

Procedure. Eighty-seven participants at Columbia University were compensated \$6 to complete a series of studies at the Columbia Business School's behavioral laboratory. Three individuals were eliminated from the data analysis due to their behavior during the sessions. Seven additional respondents reported the cover story to be "implausible" and were also dropped from the analysis, leaving a total of 77 participants.

At the start of the session, respondents completed a "color evaluation task" that was purportedly separate from the day-trading stock experiment, in which they were asked to rank their preferences among four colors. Subsequently, participants were asked to begin a different study that featured "live" updates from the final round of a five-school day-trading stock competition. As a cover story, participants were asked to evaluate this competition for use as a teaching tool. For half of the participants, the fictitious competition included their home university. The remainder were informed that the competition that consisted of other schools.

Respondents were told that a stress ball would be provided to them while they viewed updates from the competition, because "researchers have found that keeping their hands busy (such as when squeezing a stress ball) helps keep people focused whenever they perform strategic evaluations." A stress ball—in the color that each individual participant indicated was his or her favorite during the color evaluation task—was given to each participant.

Competing schools were said to be reallocating their portfolio every few minutes, and participants were shown four real-time stock portfolio allocations for each school. After reading through these allocations, participants then viewed ostensibly live reports of how each team's investments performed, as well as the overall standings of the competition.

Participants who were told that their university was participating were provided information showing that their team was in first place at the start of this final session. However, in the four subsequent portfolio reallocations during the ongoing final round, the team lost money. At the end of the fourth round, when all teams were ready to reallocate their portfolio one final time, the home team was in third place (out of five), but they were still close to the leader. In the condition where the home university was not participating, the stock portfolios and scores mirrored those of the other cells, but the names of the schools competing in the event consisted of universities in a different part of the United States.

At this point, participants were informed that they would be allowed to keep a stress ball at the close of the session. They had the option to retain their current stress ball, or to

switch to one of three different colors (all of which they rated lower during the color evaluation task). This stress ball preference was measured on an 8-point bipolar scale. Participants were informed that immediately following their decision, the final scores for the competition would be revealed.

After the final score was displayed (the home university finished second in the fictitious competition), participants completed a 10-item, 4-point scale to measure GSE (Schwarzer and Jerusalem 1995). This scale included items such as "I can always manage to solve difficult problems if I try hard enough."

Experimental Design. This study used a between-subjects design, with a categorical factor of affiliation (low = home university is NOT playing; high = home university is playing). GSE was a measured as a continuous independent variable. The dependent variable was the willingness of participants to engage in superstitious behavior by exchanging a stress ball in their favorite color for one in a lower-rated color.

Results

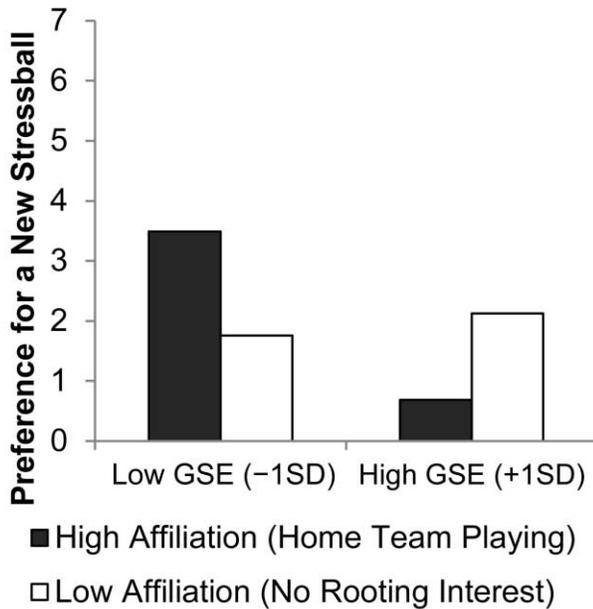
A regression analysis found a significant main effect for affiliation ($\beta = 4.74, t = 2.60, p < .02$) and a marginally significant main effect for GSE ($\beta = -.11, t = -1.96, p < .10$), both of which were qualified by an interaction between affiliation and GSE ($\beta = -.15, t = -2.55, p < .02$). To interpret this interaction, a spotlight analysis (Fitzsimons 2008) was performed at one standard deviation above and below the mean GSE score. As expected, low-GSE participants were more likely to give up their preferred stress ball color under high (vs. low) affiliation ($\beta = 1.73, t = 2.44, p < .02$). High-GSE participants appeared marginally less likely to give up their preferred stress ball under high (vs. low) affiliation ($\beta = -1.44, t = -1.88, p < .10$). These results are illustrated in figure 8.

Discussion

The results of experiment 5 extend the findings from the first four studies to a paradigm of negative superstition, where individuals are willing to give up an unlucky product. The interaction of affiliation—a proxy for desire for control—and GSE predicted the likelihood of superstitious behavior. Those with low GSE—who are vulnerable to superstition—were more likely to shift preferences away from the current stress ball when their team was playing (high affiliation), compared to when their team was not participating (low affiliation). Those with high GSE—who are expected to reduce their superstitious behavior—were marginally less likely to give up their preferred stress ball when affiliation was high (vs. low). These results indicate that when internal resources are perceived as sufficient for success, superstitious behavior is reduced. This is consistent with experiment 4, which showed that boosting internal resources (through self-affirmation) reduced superstitious behavior.

FIGURE 8

EXPERIMENT 5: PREFERENCE FOR SWITCHING TO A NEW STRESS BALL



While some participants shifted preferences away from the unlucky option, most opted to keep their original stress ball. Presumably, this occurred because switching meant taking a stress ball in a color that they deemed inferior at the start of the session. It seems likely that those who switched made a conscious decision to do so in order to help their team.

To further investigate the conscious nature of superstition, a post hoc test was conducted on 264 right-handed individuals, who played Rock, Paper, Scissors in a manner similar to experiment 3. All participants received more positive feedback when playing with their left (vs. right) hands. GSE is correlated with motivation, achievement, and perseverance (Pajares 1997), so we expected high (vs. low) GSE participants to display greater contingency awareness. Consistent with this expectation, GSE was positively related to awareness of performing well with the left (vs. right) hand ($\beta = .04$, $t = 2.45$, $p < .02$). Replicating experiment 5, GSE was negatively related to preference for playing with the left hand ($\beta = -.06$, $t = -2.05$, $p < .05$). In other words, individuals with high (vs. low) GSE were again less likely to engage in superstitious choice. It is possible that the heightened awareness resulting from high GSE may be overshadowed by high-GSE participants' perceived ability to exert control without a boost from superstitious choice.

To further shed light on whether superstition is a conscious strategy to control an outcome, half of the 264 individuals were asked to respond to the following open-ended

question: "To the best of your knowledge, why do you think you made the choice to play either left- or right-handed?" Of the 133 participants who were asked to provide a response, 107 (80.5%) chose to play left-handed. Moreover, 86 of these 107 participants (80.4%) indicated that they were aware of the feedback from their conditioning trials, and that this was a strong influence on their decision (e.g., "because I'd won more matches playing left-handed").

GENERAL DISCUSSION

In five studies, we find that associating consumer items with success or failure can result in the formation of conditioned superstitions. Operationalizing desire for control in multiple ways, we find that the conditioning episodes are most likely to shift consumer preferences for these items when participants have a high desire to control the outcome, yet a low perceived ability to do so. Moreover, preparing to use a lucky item promotes the illusion that consumers can exert control over an uncertain outcome, leading to increased prediction of future success.

Consistent with our definition of superstition, any conclusions of causality based on the correlations established in the conditioning trials of these experiments would be spurious. For example, few (if any) people could rationally believe that a spectator's choice of a chocolate could influence the results of a Quiz Bowl competition occurring hundreds of miles away.

In our experiments, the stimulus (i.e., chocolate, left or right hand, computer background color, stress ball color) was clearly associated with the outcome in question. Conditioning can be facilitated when people are aware of the relationship between conditioned and unconditioned stimuli (Sweldens, Van Osselaer, and Janiszewski 2010), and we claim that contingency awareness also facilitates the development of conditioned, idiosyncratic superstitions.

Previous literature claims that superstition is largely non-conscious, as cognitive load did not influence the effect of a negative superstition (Friday the 13th) upon risk aversion (Kramer and Block 2008). In addition to claiming that contingency awareness is required for conditioned superstitions to form, we find that participants who act on these superstitions do so as a conscious strategy. For example, participants in experiments 3, 4, and 5 shifted preferences to a lucky option despite it being inferior. Superstitious respondents chose to play a game with their nondominant hand in experiment 3, chose the lucky computer background for their trivia matches in experiment 4 despite rating its attributes as objectively inferior, and shifted preferences away from a stress ball in their favorite color to help the team during experiment 5.

Cumulatively, these results indicate conscious awareness; participants did not rationalize their superstitious behavior by artificially bolstering the perceived quality of their selection. Open-ended responses from our post hoc test indicate that participants were not only aware of the associations that they formed during the conditioning trials but cognizant of acting on this information. Kramer and Block

(2011) explain that the level of consciousness in superstitious behavior varies based on whether a stimulus in the environment prompts an individual to access a superstitious belief, and whether this individual accepts the belief as relevant to the decision. Conditioned superstitions—based on personal experiences—should be easily accessible, and it may be the case that the illusion of control that they facilitate should prompt individuals to perceive these superstitious beliefs as worthy of consideration.

In each study, conditioned superstitions were formed and acted upon in the same experimental session. Future research may determine if superstitions are more likely to be applied unconsciously when they are temporally removed from the learning episodes (i.e., more difficult to access). Additionally, future research may examine the role of social desirability in superstition. A recent Bud Light commercial shows the odd ways in which NFL fans root for their teams, with the tag line: “It’s only weird if it doesn’t work.” However, in domains where superstitious behavior is less acceptable, it may take on a more nonconscious role.

In all five experiments, superstitions were created through conditioning trials. In experiment 1, respondents who acted on the association between Snickers chocolate and their university’s Quiz Bowl performance were more likely to form an illusion of control, predicting a higher likelihood of their team winning. This only occurred when high-affiliation participants—who should have had a stronger desire to control the match—made their prediction after (vs. before) choosing the lucky option.

Experiment 2 explained that this “illusion of control” can occur after a series of conditioning episodes, regardless of whether the item paired with success was actively chosen or assigned randomly. Consistent with Langer (1975), actively choosing the background screen on which to answer trivia questions led to a heightened sense of control, but so did using a randomly assigned background that has previously been associated with positive feedback. When contingency awareness was present, the act of choosing and preparing to use the superstitious option led to distinct illusions of control.

Experiment 3 replicated experiments 1 and 2, as playing Rock, Paper, Scissors with the left (nondominant) hand—after previously achieving success with this hand—led to an illusion of control over future matches. Moreover, actual choice of (and preference for) the left hand was related to high levels of desire for control. Preference for the superstitious option mediated the relationship between desire for control and predicting future success.

Experiment 4 demonstrated that self-affirmation reduced superstitious behavior. After associating a green computer background with positive feedback on a trivia quiz, those with high contingency awareness were less likely to prefer this background for answering additional trivia quizzes if they received a self-affirmation (vs. no-affirmation). This difference did not occur when preparing to read a passage about online research, which was a less-valued task.

Experiment 5 extended these results to a negative (rather

than positive) association, while identifying GSE as a moderator for superstition. When desire for control was high—such as when a stress ball was associated with poor performance by the participants’ university in a stock trading competition—low-GSE (vs. high-GSE) respondents were more likely to prefer replacing this stress ball with one of another color.

The cumulative results suggest that individuals are willing to respond to the formation of a new superstition by altering their purchase behavior as a strategy to control their environment. This is likely to occur less often when individuals have a lower desire for control, or when they possess sufficient internal resources (after undergoing a self-affirmation, or with high GSE). Engaging in superstitious behavior creates a subsequent illusion of control over future outcomes.

Future experiments may further investigate this relationship between illusion of control and superstitious behavior. Superstition has been termed a secondary method of exerting illusory control over chance outcomes, rather than a primary form of controlling skill-based outcomes (Rothbaum, Weisz, and Snyder 1982). This is consistent with Wegner and Wheatley (1999), who suggested that people are less likely to perceive illusory control over a situation when alternative explanations are available. By making salient a skill-based method of control—such as studying being a prerequisite for answering trivia questions—it may be the case that the illusion of control resulting from superstitious behavior would be reduced.

Other factors that could affect the prevalence of superstitious behaviors may include individual differences that share the same larger construct as self-efficacy, such as self-esteem, locus of control, and neuroticism (Judge et al. 2002). Belief in good luck (Darke and Freedman 1997), as an individual difference related to the stability (vs. randomness) of luck, may also affect the likelihood of engaging in conditioned superstition, as well as the perception that superstition can influence future outcomes.

It remains to be seen whether superstitions can be created in the absence of conditioning, such as by advertising a product as lucky. For example, stores that sell winning lottery tickets often publicize this fact and experience subsequent sales increases (Guryan and Kearney 2008). Future research may relate these findings to the idea of contagion, such as if a retail store was enhanced when it stocked jerseys of winning (vs. losing) teams. This is consistent with products becoming more appealing after being worn or handled by attractive (vs. unattractive) individuals (Argo, Dahl, and Morales 2006, 2008).

Finally, it is an open question as to whether superstitious behavior is healthy. Taylor and Brown (1988) argue that positive self-evaluations, exaggerated perceptions of control, and unrealistic optimism promote mental health. Those who report low GSE or high levels of desire for control—candidates for superstitious behavior—would seem to be in need of a boost of optimism. Between its mental health benefits and the possible increase in actual performance due

to the placebo effect, superstitious behavior may in fact be an adaptive process.

Given how easily superstitions are formed and how strongly they can increase perceived likelihood of a positive outcome, future research may investigate the positive and negative trade-offs of using superstition. For example, the increased perception of control stemming from the use of superstition may be helpful, while the opposite may be said about diverting energy to superstitious behaviors that could be better spent in pursuing more rational strategies for success.

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