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Reliance on Luck: Identifying Which Achievement Goals Elicit Superstitious Behavior

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Abstract

People often resort to superstitious behavior to facilitate goal achievement. We examined whether the specific type of achievement goal pursued influences the propensity to engage in superstitious behavior. Across six studies, we found that performance goals were more likely than learning goals to elicit superstitious behavior. Participants were more likely to engage in superstitious behavior at high than at low levels of chronic performance orientation, but superstitious behavior was not influenced by chronic learning orientation (Studies 1 and 2). Similarly, participants exhibited stronger preferences for lucky items when primed to pursue performance goals rather than learning goals (Studies 3 and 4). As uncertainty of goal achievement increased, superstitious behavior increased when participants pursued performance goals but not learning goals (Study 5). Finally, assignment to use a lucky (vs. unlucky) item resulted in greater confidence of achieving performance goals but not learning goals (Study 6).

Keywords

superstition, luck, goal orientation, achievement goals, performance goals

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People employ a wide variety of strategies to achieve their goals. Some strategies are rational, such as investing to provide for a stable retirement or studying before an exam. Other strategies are less rational, such as resorting to superstition to create the illusion of control over uncertain outcomes. President Obama, for example, has explained his Election Day basketball games as a superstitious ritual that solidified after he skipped a game on the day he lost a primary in 2008 to Hillary Clinton (Ahern, 2012). Superstitious beliefs are widespread across cultures (Jahoda, 1969; Kramer & Block, 2008; Vyse, 1997), and people resort to superstitious behaviors in an attempt to facilitate goal achievement across a variety of domains, including politics, sports, gambling, and education (e.g., Risen & Gilovich, 2008; Vyse, 1997; Wohl & Enzle, 2002).

In this article, we investigate which achievement goals elicit superstitious behavior. Performance goals are those in which people seek to be judged by others as competent, whereas learning goals are those in which people seek to master a new field or increase their current level of competence (Dweck, 1986). We suggest that people will not resort to superstition to facilitate all achievement goals. Rather, people will be inclined to use superstition to facilitate the achievement of performance goals, as did President Obama on Election Day, but will not be inclined to use superstition to facilitate the achievement of learning goals.

Superstition and Control

Superstitions consist of irrational or supernatural beliefs (Vyse, 1997), influencing behavior when paired with the desire to control an uncertain environment. People who report a strong desire for control (Burger & Cooper, 1979) are more likely to knock on wood when discussing their health (Keinan, 2002) and play Rock, Paper, Scissors (RPS) with their non-dominant hand after conditioning trials established it as "lucky" (Hamerman & Johar, 2013). Superstition is particularly likely to occur under high levels of uncertainty. As the outcome of a card game becomes more uncertain, people are more willing to rely on the strategy suggested by a psychic (Case, Fitness, Cairns, & Stevenson, 2004). Job seekers attempt to build "karma" through charitable giving when they perceive high uncertainty in the application process (Converse, Risen, & Carter, 2012). Athletes increase their use of superstition for more crucial and uncertain

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sporting events (Gmelch, 1992; Schippers & Van Lange, 2006; Wright & Erdal, 2008). College students engage in superstitious behaviors before more difficult exams (Vyse, 1997) and use lucky charms more often as the stakes get higher (Rudski & Edwards, 2007).

Superstitious rituals are used to compensate for a lack of personal control over the outcome (Kay, Whitson, Gaucher, & Galinsky, 2009), which is consistent with the finding that anxious people tend to possess high levels of superstitious beliefs to assuage their fears (Rudski, 2004; Wolfradt, 1997; Zebb & Moore, 2003). After undergoing a self-affirmation—reducing the threat posed by uncertainty (Sherman & Cohen, 2002; Steele & Liu, 1983)—people are less likely to attempt to control this uncertainty through superstitious behavior (Hamerman & Johar, 2013) or by perceiving illusory patterns in the environment (Whitson & Galinsky, 2008). By contrast, generalized self-efficacy—the self-perception that one is able to successfully navigate a variety of situations (Judge, Erez, Thoresen, & Bono, 2002)—is negatively correlated with paranormal beliefs (Tobacyk & Shrader, 1991) and superstitious behaviors (Hamerman & Johar, 2013). When anxiety is crippling, superstitious behaviors may be effective as they can increase task self-efficacy (Damisch, Stoberock, & Mussweiler, 2010) and performance expectancies (Block & Kramer, 2009).

Performance and Learning Goals

Dweck and Leggett (1988) distinguish between achievement goals that are related to performance and learning. Performance goals are typically achieved when others positively evaluate one's competence, whereas learning goals are typically achieved when one gains an internal perception of competence and mastery (Dweck, 1986). Performance goals tend to be extrinsically motivated (Heyman & Dweck, 1992) and consistent with the idea of externally regulated objectives, which are "performed to satisfy an external demand or reward contingency" (Ryan & Deci, 2000). Generally, externally regulated goals are perceived to be susceptible to influence from outside forces (Deci & Ryan, 1985). We suggest that people consequently believe superstition will effectively increase their (perceived) likelihood of achieving performance goals, and use superstition as a (irrational) strategy to achieve them.

In contrast, learning goals—based on internal perceptions of competence and mastery—are intrinsically motivated (Dweck, 1986). Intrinsic motivation leads to a perception of internal (rather than external) locus of control (Ryan & Deci, 2000), which is consistent with the idea that learning goals are judged internally—by oneself. We suggest that this internal sense of judgment and control for learning goals means that people do not believe that superstition (contingent on external forces such as luck) will facilitate the achievement of learning goals, and will not use superstitious behavior to facilitate their achievement.

The Present Research

Six experiments tested whether the type of achievement goal pursued would moderate the likelihood of engaging in superstitious behavior. Across a variety of domains and different types of superstitions, we predicted that both chronic and temporary performance goals would be more likely to elicit superstitious behavior than comparable learning goals.

Studies 1 and 2 examined how chronic performance and learning orientations influence reliance on luck to facilitate goal achievement. Study 1 examined reliance on luck by testing preferences for items that were established as lucky or unlucky in a series of conditioning trials, and then participants made a consequential choice of which item to use in the pursuit of an achievement goal. In Study 2, participants chose whether to view a "lucky charm" before pursuing an achievement goal.

Studies 3 and 4 manipulated whether participants pursued a performance or learning goal, and examined the extent to which participants engaged in superstitious behavior to facilitate goal achievement. In Study 3, a vignette described an item as lucky (or not), and participants rated their preference to use this item while pursuing a performance or learning goal. In Study 4, conditioning trials formed associations between items and positive or negative outcomes, and then participants chose one item to use in an attempt to achieve a performance or learning goal.

Studies 5 and 6 explored the drivers and consequences of this effect. In Study 5, conditioning trials established positive or negative associations with several items. Participants then chose one item to use in pursuit of a performance or learning goal that they were certain or not certain to achieve. Study 6 assigned participants to use an item that had previously been established as lucky or unlucky and measured their confidence in achieving a performance or learning goal. Across the experiments, we predicted that participants would be more likely to use (and believe) superstition to facilitate the achievement of chronic and temporary performance goals than chronic and temporary learning goals.

Study 1: Chronic Goal Orientation and Conditioned Superstition

Participants in Study 1 used two different background color/font combinations to answer a series of trivia questions. Participants assigned to the superstition treatment underwent conditioning trials, receiving false feedback that they answered more questions correctly with a (less attractive) gray font/green background combination than with a (more attractive) red font/blue background combination. Other participants were assigned to a neutral condition in which the color combinations were not associated with more success or failure. All participants then chose to use either the gray/green or red/blue combinations while answering additional trivia questions.

Because learning and performance orientation are orthogonal constructs (Ames & Archer, 1988; Wolters, Yu, & Pintrich, 1996), we examined the elicitation of superstition by both performance and learning goal orientations. We expected that participants with higher levels of chronic performance orientation would exhibit superstitious behavior and prefer the less attractive gray/green combination when it had been established as lucky more than when there was no such association. We expected that this preference reversal would not be elicited by higher or lower chronic learning orientation because mastery of skills or concepts should not be influenced by the use of an item associated with success or failure.

Method

Participants. Two hundred forty-eight adult Americans (123 female; M_{Age} = 35.70, *SD* = 13.15) were recruited from Amazon Mechanical Turk (AMT) in exchange for 50 cents.

Design. Study 1 used a between-subjects design, with one manipulated factor of superstition (yes, no). Chronic goal orientation was a measured, continuous factor.

Procedure. A cover story explained that the research aimed to determine the ideal font/background colors for online questionnaires. Therefore, "to get a feel for the various font/background color combinations, you will be asked to answer a series of trivia questions using two different font/background color combinations."

Participants completed four sets of trivia questions, each consisting of six multiple-choice items (e.g., "In what state are the Blue Ridge Mountains located?"). They had 90 s to submit answers to each set of questions. Two sets of questions were presented in a gray font on a green background, and two sets were presented in a red font on a blue background. The questions and font/color combinations were adapted from Hamerman and Johar (2013).

Participants received false feedback after each round of trivia. Participants in the superstition condition were given positive feedback for the trivia questions they answered with the (less attractive) gray/green combination, and negative feedback for questions answered with the (more attractive) red/blue combination. Positive feedback was,

> You have answered four out of six correctly. Way to go! This score is significantly higher than what you would score if you were just guessing. It ranks in the 85th percentile among those who have attempted to answer these questions previously.

Negative feedback was,

> You have answered two out of six correctly. Because these questions are multiple choice, this score is only equivalent to what you would score if you were just guessing. It ranks in the 35th percentile among those who have attempted to answer these questions previously.

Controls were given positive feedback after all four rounds.

All participants then chose a font/color combination for their final (fifth) round of trivia questions by indicating their preference on an 8-point bipolar scale with endpoints, *blue* (1) and *green* (8). Participants who responded 1 to 4 were assigned the red/blue combination, and participants who responded 5 to 8 were assigned the gray/green combination.

Before answering the final set of trivia questions, participants rated the font/background combinations on visual appeal: aesthetic appeal, ease of reading, and strain on the eyes were each evaluated on 7-point scales with endpoints, *very bad* (1) and *very good* (7). Next, participants completed a 16-item goal orientation scale (Button, Mathieu, & Zajac, 1996) that included eight items measuring performance orientation (e.g., "I like to work on tasks that I have done well on in the past") and eight items measuring learning orientation (e.g., "I prefer to work on tasks that force me to learn new things"). Participants rated each item on a 7-point scale with endpoints, *strongly disagree* (1) and *strongly agree* (7). Finally, they provided demographic information and were dismissed.

Results and Discussion

Goal orientation. As expected, chronic performance orientation was not correlated with chronic learning orientation, $r(247) = .07$, $p = .25$.[1]

Manipulation checks. The three aesthetic evaluations of the red/blue and gray/green combinations were highly correlated ($\alpha_{Red/Blue} = .88$; $\alpha_{Gray/Green} = .91$), and averaged into an index of visual appeal. As expected, the red/blue combination (M = 4.78, SD = 1.36) was more visually appealing than the gray/green combination (M = 3.55, SD = 1.57), $t(247) = 8.32$, $p < .0001$. Superstition did not influence the visual appeal of either combination, Fs < 1.

Preference for the lucky (less attractive) combination. A regression was conducted on the relative preference for the gray/green combination, using a dichotomous factor of superstition, a continuous factor of performance orientation, and the interaction between these two factors, with learning orientation included as a covariate. This revealed significant main effects of superstition, $\beta = -2.49$, $t = -2.25$, $p < .03$, and learning orientation, $\beta = 0.05$, $t = 2.00$, $p < .05$, qualified by a significant Superstition × Performance orientation interaction, $\beta = 0.07$, 95% confidence interval (CI) = [.019, .118], $t = 2.74$, $p < .01$. The main effect for performance orientation was not significant, $t < 1$. The spotlight analysis (Aiken & West, 1991; Figure 1) revealed that at one standard deviation above the mean for performance orientation, there was a

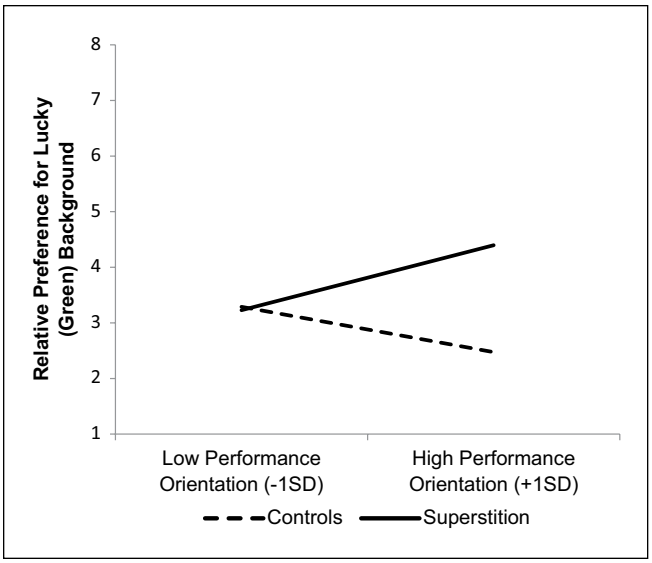

Figure 1. Participants high in performance orientation exhibited a stronger preference for a less aesthetically appealing font/background when it was associated with positive outcome in Study 1.

stronger preference for the lucky (green) background under superstition than in the control treatment, $\beta = 1.92$, 95% CI = [0.99, 2.85], $t = 4.06$, $p < .001$. However, at one standard deviation below the mean for performance orientation, there was no difference in this preference based on superstition, $\beta = -.06$, $t < 1$.

A regression with superstition, learning orientation, and the interaction between these factors—with performance orientation as a covariate—found only a marginally significant main effect for learning orientation, $\beta = 0.05$, $t = 1.83$, $p < .07$. There were no main effects for superstition, $t < 1$, or performance orientation, $t < 1$, nor was there an interaction between superstition and learning orientation, $t < 1$.

When assessing choice of combination dichotomously, a logistic regression with factors of superstition, performance orientation, and the interaction between these factors—again using learning orientation as a covariate—revealed marginally significant main effects of superstition, $\chi^2(1, N = 248) = 3.41$, $p < .07$, and learning orientation, $\chi^2(1, N = 248) = 3.52$, $p < .07$, but no main effect of performance orientation, $\chi^2(1, N = 248) < 1$. As expected, the interaction between superstition and performance orientation was significant, $\beta = 0.05$, 95% CI = [0.007, 0.093], $\chi^2(1, N = 248) = 5.24$, $p < .03$. A logistic regression with learning orientation, superstition, and the interaction between these factors—with performance orientation as a covariate—found only a marginally significant main effect for learning orientation, $\chi^2(1, N = 248) = 2.96$, $p < .09$. There were no main effects for superstition, $\chi^2(1, N = 248) < 1$, or performance orientation, $\chi^2(1, N = 248) < 1$, nor was there an interaction between learning orientation and superstition, $\chi^2(1, N = 248) < 1$.

In short, participants who were high in performance orientation were more likely to rely on superstition—preferring the lucky color combination over the more visually appealing one—to facilitate goal achievement than participants low in performance orientation. This relationship was evident in both continuously measured preferences and dichotomous choice. Learning orientation unexpectedly had an influence on font/background combination preferences, but this preference was unrelated to whether combinations were paired with success or had no such association.

Study 2: Culturally Ingrained Superstitions and Goal Orientation

In Study 1, chronic goals were measured after all dependent variables were collected so as not to make salient either learning or performance goals. To reduce the possibility of superstition influencing reported goal orientation, we reversed the order of measurement in Study 2. To test the generalizability of our theory, we used a stimulus imbued with superstitious status through cultural beliefs—common good luck charms—rather than conditioning trials.

After completing the goal orientation inventory, participants in Study 2 completed a filler task before choosing whether to view a "good luck charm" prior to playing a card game. We expected participants with higher performance orientation to be more likely to choose to view the lucky charm, whereas we did not expect learning orientation to influence this choice.

Method

Participants. One hundred fifty-one Americans (93 women, $M_{Age} = 34.42$, $SD = 12.30$) recruited from AMT received 35 cents for their participation.

Design. This was a single-cell design. All participants saw the same stimuli.

Procedure. Participants completed the 16-item goal orientation inventory (Button et al., 1996) used in Study 1. Next, they performed a filler task that consisted of a two-question reading comprehension test for a George Orwell essay.

Subsequently, participants were presented with an ostensibly unrelated study about "choices and games." Each participant was given the opportunity to briefly view a "good luck charm" on the computer screen before playing a card game. The dependent variable was the extent to which participants wanted to view this good luck charm, measured on an 8-point scale with endpoints, *skip to the card game* (1) and *good luck charm* (8). Participants who wanted to view the good luck charm (ratings 5-8) saw a picture of a four-leaf clover inside a horseshoe, framed by the words "Good Luck!" Participants who gave a rating of 1 to 4 did not see the charm.

All participants then played a brief computer game in which they drew one card, as did the computer, and the holder of the high card was declared the victor. All participants drew an ace, defeating the seven drawn by the computer. After providing demographic information, participants were dismissed.

Results

Goal orientation. As expected, there was no significant correlation between chronic performance orientation and chronic learning orientation, $r(150) = .13$, $p = .12$.

Preference for viewing lucky charm. Consistent with Study 1, a regression using performance orientation and learning orientation as independent variables revealed a significant effect of performance orientation on continuously measured preferences, $\beta = 0.10$, 95% CI = [0.031, 0.174], $t = 2.84$, $p < .01$, but none for learning orientation, $t < 1$.

When assessing dichotomous choice behavior, a logistic regression with factors of performance orientation and learning orientation revealed that participants with higher performance orientation were more likely to choose to view the lucky charm, $\beta = 0.08$, 95% CI = [0.022, 0.131], $\chi^2(1, N = 151) = 7.64$, $p < .01$. Learning orientation did not appear to influence their choice, $\chi^2(1, N = 151) = 1.49$, $p = .22$.

Discussion

The results demonstrate that the perceived goal-specific facilitation of superstitious behavior extends to culturally acquired superstitions. In addition, the results suggest that superstition is positively related to performance orientation but not related to learning orientation in a context where the behavior was a choice between engaging with a stimulus with positive connotations or not engaging with the stimulus (rather than engaging with a stimulus with negative associations, as in Study 1). Of course, for our conceptualization of superstition (i.e., shifting preferences based on spurious associations with luck), it does not matter whether one chooses a lucky stimulus or avoids an unlucky stimulus in the pursuit of goal achievement.

Study 3: Manipulating Learning and Performance Goals

In the first two studies, chronic levels of performance orientation and learning orientation were measured as individual differences. Study 3 investigated whether the same goal-specific effect on superstitious behavior would be observed when achievement goals were directly manipulated. Participants were randomly assigned to either the superstition condition, in which they were informed that a pen had been associated with prior success (i.e., was lucky), or to a control condition (i.e., no reference was made to its past history). Subsequently, all participants indicated whether they would use this pen when pursuing a performance or learning goal. We expected participants pursuing a performance goal to exhibit stronger preferences for the pen when it was described as lucky, whereas participants pursuing a learning goal should not exhibit different preferences for the pen whether or not it was lucky.

Method

Participants. A total of 100 Americans (31 women, $M_{Age} = 29.73$, $SD = 10.33$) recruited from AMT received 50 cents for their participation.

Design. This was a 2 (superstition: yes, no) × 2 (goal type: learning, performance) between-subjects design.

Pretest. To verify the effectiveness of the goal manipulation, definitions for performance and learning goals from Dweck (1986) were presented to 48 participants recruited from AMT. On a 7-point scale with endpoints, *performance* (1) and *learning* (7), pretest participants indicated that the statement "get a good enough grade to have it count toward your degree" was more reflective of a performance goal than a learning goal ($M = 2.46$, $SD = 1.44$), $t(47) = -7.40$, $p < .001$. The statement "master the material that the professor is teaching" was more reflective of a learning goal than a performance goal ($M = 6.21$, $SD = 1.68$), $t(47) = 9.13$, $p < .001$.

Procedure. In the superstition condition, study participants imagined that they were college students who received two "A" grades when taking final exams last semester with a "lucky" pen. Controls imagined that they were college students who received a pen embossed with a Mensa logo ("an international society of geniuses"). All participants then imagined that they could use the aforementioned pen to write a class assignment.

The goal manipulation mirrored the pretest: the class was related to either a learning goal ("master the material that the professor is teaching") or a performance goal ("get a good enough grade to have it count toward your degree"). The dependent variable was the extent to which, compared with a standard pen, (a) they would prefer to use the target pen to complete the assignment, (b) the target pen might help them achieve the goal that they set for the class, and (c) the target pen might influence whether their goal was achieved. Ratings were made on 7-point scales with endpoints, *not at all* (1) and *very strongly* (7).

Results

The three scale responses were internally consistent ($\alpha = .90$), and averaged into an index of superstitious preferences. Submitting this index to a 2 (goal type: learning, performance) × 2 (superstition: yes, no) between-subjects analysis

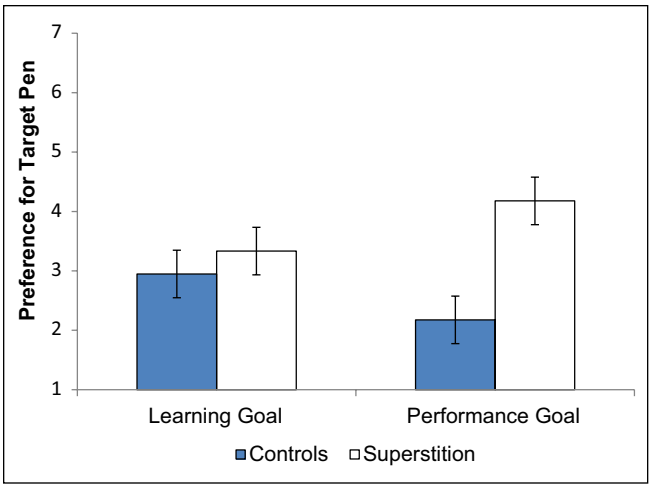

Figure 2. In Study 3, superstition influenced preference for a target pen among participants pursuing a performance goal but not participants pursuing a learning goal.

of variance (ANOVA) did not reveal a main effect of goal type, $F < 1$. It did reveal a significant main effect of superstition, $F(1, 96) = 12.57$, $p < .01$, $\eta_p^2 = .12$, which was qualified by a Superstition × Goal-type interaction, $F(1, 96) = 5.77$, $p < .02$, $\eta_p^2 = .06$, 95% CI = [0.001, 0.161]. Planned contrasts (Figure 2) revealed that participants primed with a performance goal exhibited a greater preference for the target pen in the superstition condition ($M = 4.18$, $SD = 1.54$) than in the control condition ($M = 2.18$, $SD = 1.65$), $F(1, 96) = 17.47$, $p < .0001$, $\eta_p^2 = .15$, 95% CI = [0.043, 0.278]. Participants pursuing a learning goal did not differ in their preference for the target pen based on superstition ($M_{\text{Superstition}} = 3.33$, $SD = 1.71$; $M_{\text{Controls}} = 2.95$, $SD = 1.66$), $F < 1$.

Discussion

To conservatively test our hypothesis, we compared the lucky pen with a target that was semantically associated with academic success. Participants still exhibited a greater preference for the lucky pen than the Mensa pen when primed with a performance goal, but exhibited similar preferences for these two targets when primed with a learning goal. Thus, Study 3 conceptually replicated Studies 1 and 2 in a context in which achievement goals were primed rather than measured.

Study 4: Conditioned Superstition and Manipulated Goals

In Study 4, we sought to extend the scope of the investigation by establishing an item as lucky or unlucky through a set of conditioning trials, and then giving participants an opportunity to use the item in the pursuit of a performance or learning goal. We associated video game avatars with success or failure in the game RPS, and examined subsequent preferences between those avatars when pursuing a performance or learning goal. Participants who experienced success with one avatar and failure with another were expected to prefer the "lucky" avatar to the "unlucky" avatar when pursuing a performance goal in an unrelated science quiz. Participants pursuing a learning goal in that same science quiz were not expected to vary their preference for the avatar based on whether or not it was lucky.

Method

Participants. Two hundred two Americans (73 women; $M_{\text{Age}} = 29.82$, $SD = 8.67$) were recruited from AMT in exchange for 50 cents.

Design. This was a 2 (superstition: yes, no) × 2 (goal type: learning, performance) between-subjects design.

Pretest. A pretest was conducted among 165 Tulane University undergraduates participating for course credit. As in the Study 3 pretest, all pretest participants viewed definitions of performance and learning goals adapted from Dweck (1986). Each participant then rated two statements for whether they reflected learning and performance goals on 7-point scales with endpoints, *strongly disagree* (1) and *strongly agree* (7). The first statement was,

> You will be judged against your peers based on a series of multiple-choice questions about science . . . Therefore, your goal on this quiz is to do a better job at guessing the right answers than other people.

This was rated above the scale midpoint for performance goals ($M = 6.00$, $SD = 1.60$), $t(164) = 16.02$, $p < .001$, and below the scale midpoint for learning goals ($M = 2.39$, $SD = 1.41$), $t(164) = -14.71$, $p < .001$. The second statement was,

> For this next task, we would like to see how you learn new material based on a series of multiple-choice questions about science . . . Therefore, your goal on this quiz is to increase your knowledge of science. The process of learning is much more important than whether your initial answer is right or wrong.

This was rated below the scale midpoint for performance goals ($M = 2.87$, $SD = 1.80$), $t(164) = -8.05$, $p < .001$, and above the scale midpoint for learning goals ($M = 6.00$, $SD = 1.48$), $t(164) = 17.39$, $p < .001$.

Procedure. Study participants were informed that research was being conducted on video game avatars, which are "the graphical representation of the user or the user's alter ego or character. It is typically a two-dimensional figure that represents the user as an icon in games and other online communities." Participants in the superstition condition played 20

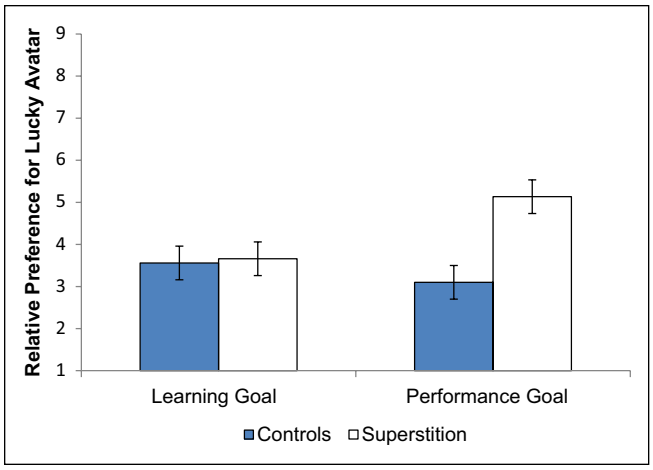

Figure 3. In Study 4, superstition influenced avatar preference among participants pursuing a performance goal but not those pursuing a learning goal.

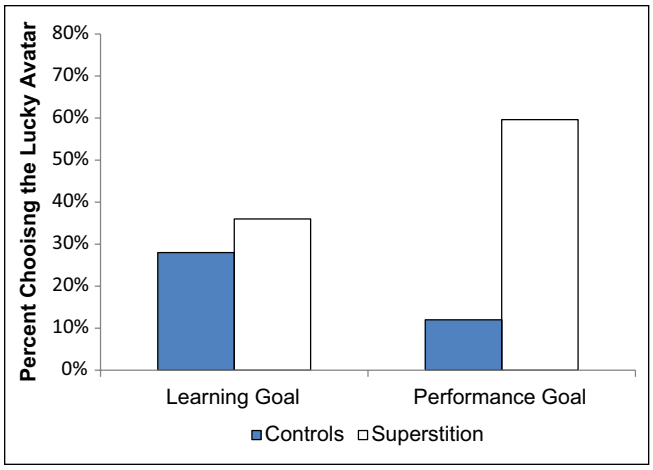

Figure 4. In Study 4, superstition influenced avatar choice among participants pursuing a performance goal but not for those pursuing a learning goal.

matches of RPS against a computer program, which were divided into four rounds that each contained five matches. Participants used two different avatars while playing these matches: a male teenager and an elderly male scientist in a lab coat. Each avatar was present during two of the four rounds. The results were fixed so that participants in the superstition condition won 60% of the matches in the two rounds with the teenage avatar, but only won 20% of the matches in the two rounds with the scientist avatar.

Similarly, controls played four rounds (20 total matches) of RPS. Controls also won 60% of their matches in two rounds, and 20% in the remaining two. However, no avatars were present during these matches.

All participants then completed a "science quiz," for which they were given either the performance goal ("do a better job at guessing the right answers than other people") or the learning goal ("increase your knowledge of science") described in the pretest. As the dependent variables, participants first chose an avatar to represent them during this science quiz—the teenager or the scientist—and then separately indicated the strength of their preference on a 9-point scale, with endpoints corresponding to pictures of the *scientist* (1) and *teenager* (9). Afterward, participants took the science quiz (items from a Pew Research study) using their preferred avatar. Finally, participants provided demographic information and were dismissed.

Results

Relative preference. A 2 (superstition: yes, no) × 2 (goal type: performance, learning) ANOVA revealed a main effect of superstition on the continuous bipolar scale, $F(1, 198) = 8.34$, $p < .01$, $\eta_p^2 = .04$, which was qualified by a Superstition × Goal-type interaction, $F(1, 198) = 6.85$, $p < .01$, $\eta_p^2 = .03$, 95% CI = [0.002, 0.094]. Planned contrasts (Figure 3) revealed that for participants with a performance goal, preference for the teenage avatar was higher among participants in the superstition condition ($M = 5.13$, $SD = 2.94$) than in the control condition ($M = 3.10$, $SD = 2.30$), $F(1, 198) = 15.29$, $p < .001$, $\eta_p^2 = .07$, 95% CI = [0.017, 0.147]. For participants with a learning goal, however, there was no difference in preference based on superstition ($M_{\text{Superstition}} = 3.66$, $SD = 2.72$; $M_{\text{Controls}} = 3.56$, $SD = 2.49$), $F < 1$.

Choice. A similar pattern of results was obtained for dichotomous choice. A logistic regression with factors of superstition and goal type (Figure 4) found no main effect of goal type, $\chi^2(1, N = 202) < 1$, but did reveal a significant main effect of superstition, $\chi^2(1, N = 202) = 16.62$, $p < .0001$, which was qualified by a Goal-type × Superstition interaction, $\beta = 0.50$, 95% CI = [0.173, 0.833], $\chi^2(1, N = 202) = 8.90$, $p < .01$. Among those with a performance goal, 59.6% of superstition participants choose the teenage avatar, which is significantly greater than the 12.0% who chose that avatar in the control condition, $\beta = 1.19$, 95% CI = [0.682, 1.700], $\chi^2(1, N = 102) = 21.07$, $p < .01$. Participants with a learning goal selected the teenage avatar at the same rate in the superstition (36.0%) and control (28.0%) conditions, $\chi^2(1, N = 100) < 1$.

Discussion

Results from Study 4 expand the scope of the investigation by demonstrating that superstition is perceived to facilitate performance goal achievement even when the association is formed in an unrelated domain. The conditioning trials (i.e., RPS outcomes) were unrelated to the achievement goal (i.e., the science quiz), yet participants still believed the lucky avatar would facilitate performance goal (and not learning goal) achievement. It is worth noting that participants

exhibited a preference for the avatar for which a superstition had been established (the teenager) over an avatar that was more semantically related to the science quiz (the scientist).

Prior research has established that people are more willing to resort to superstition to facilitate more "valuable" goals (Hamerman & Johar, 2013; Vyse, 1997). To verify that these findings were not due to the greater importance of performance than learning goals, an ancillary survey conducted with participants from AMT ($N = 50$) compared the performance and learning goals in Studies 3 and 4. (Goals were held constant in Studies 1 and 2 across conditions.) Half of the survey respondents rated the performance goals for "value" and "worth," on 9-point scales, while the other half of respondents rated the learning goals on these scales. Ratings of value and worth were highly correlated, $r(49) = .91$, $p < .001$, and combined into one index of importance.

Suggesting that the results of the previous studies were not due to greater importance of performance goals, respondents perceived learning goals to be as or more important than the performance goals. The learning goal to "master the material that the professor is teaching" was rated more important ($M = 7.94$, $SD = 1.19$) than the performance goal of receiving "a good enough grade to get credit for taking the course" ($M = 6.96$, $SD = 1.78$), $F(1, 48) = 5.21$, $p < .03$. On a quiz, the learning goal to "increase your knowledge of the topic area by thinking hard about the questions" was rated equally important ($M = 5.44$, $SD = 2.25$) as the performance goal of "answering more questions correctly than other people" ($M = 4.78$, $SD = 2.22$), $F(1, 48) = 1.09$, $p = .30$.

Taken together, then, the first four studies demonstrate that people use superstitious behavior to facilitate achievement of both chronic and temporary performance goals, but not to facilitate achievement of learning goals. One possible explanation for these findings is that performance goals might be inherently more uncertain than learning goals. Because superstitious behavior is a method of exerting control over an uncertain situation, it occurs more frequently as people perceive that the likelihood of achieving their goals is more uncertain (c.f. Case et al., 2004; Vyse, 1997). In Study 5, we attempted to address this alternative explanation by manipulating the uncertainty of achieving both performance and learning goals.

Study 5: The Interaction of Goal Uncertainty and Goal Type

In this study, we manipulated goal type and goal uncertainty. All participants underwent conditioning trials in which two video game avatars were paired with either success or failure. We predicted that superstitious behavior (i.e., preferring the lucky avatar) would occur more often as performance goals were described as more uncertain. However, we did not expect superstitious behavior to vary as a function of the uncertainty of learning goals.

Method

Participants. One hundred sixteen undergraduates at Tulane University (60 women; $M_{Age} = 18.38$, $SD = 0.49$) received course credit for participating. One student failed a comprehension check and was excluded from all analyses.

Design. This was a 2 (goal type: learning goals, performance goals) × 2 (uncertainty: low, high) between-subjects experiment.

Procedure. Participants were informed that they would play 20 RPS matches against a computer program. After the rules were presented, participants were quizzed: "If your opponent throws a 'rock,' which gesture do you need to throw to defeat him/her?" Next, they played their matches using two different avatars: a teenage male (as in Study 5) and a male lawyer (holding a book labeled "law"). In the 10 matches played with the teenage avatar, participants were given false feedback informing them that they won 60% of the matches. In the 10 matches played with the lawyer avatar, participants won 20% of the time.

All participants were then presented with a series of multiple-choice questions about "laws and statutes in the United States." The performance goal manipulation was "your goal on this quiz is to do better than other people who take it." The learning-goal manipulation was, "your goal on this quiz is to increase your knowledge about legal issues in the United States."

In the low-uncertainty condition, participants with performance goals were informed that

> all college students who take this test have reported that it is extremely straightforward and very easy. Especially because so few college students take the quiz, you're basically guaranteed to achieve the goal of scoring in a very high percentile.

Those with learning goals were presented with the statement that

> when participants were surveyed afterwards, every single one of them reported an increase in their knowledge, so when someone attempts to increase their knowledge by thinking about these issues, it's fairly certain they will accomplish this.

By contrast, the high-uncertainty manipulation informed participants in the performance condition that

> the questions are written so that there is a lot of variation: some people intuitively see the right answers, while others do not. In other words, when someone takes the quiz, it's very uncertain as to whether they will get a good score.

Those in the learning condition were informed that

> when participants were surveyed afterwards, about half of them reported that they did achieve the goal to their satisfaction, while

the other half did not. So when someone attempts to increase their knowledge by thinking about these issues, it's uncertain if they will accomplish this.

For the dependent variables, participants chose one of the two avatars to represent them for the law quiz, and separately indicated the strength of their preference on a 9-point scale with endpoints corresponding to pictures of the *lawyer* (1) and *teenager* (9). As a manipulation check, participants answered "how confident are you that you will successfully accomplish the goal that was presented to you" on a 7-point scale with endpoints, *not at all* (1) and *very confident* (7). Afterward, participants used their selected avatar to take the law quiz, which consisted of questions about silly U.S. laws (e.g., "In Hawaii, it is illegal to . . . put pennies in your ear").

As additional manipulation checks, participants evaluated the "importance" and "value" of accomplishing their goal on 7-point scales with endpoints, *not at all important/no value* (1) and *very important/high value* (7). Next, definitions for performance and learning goals were displayed, and participants indicated whether both goals were more reflective of performance or learning objectives, on 7-point scales with endpoints, *learning goal* (1) and *performance goal* (7). Finally, participants provided demographic information and were dismissed.

Results and Discussion

Comprehension check. One participant incorrectly indicated which of the RPS gestures would defeat a "rock," and was excluded from further analyses.

Manipulation checks. The measures of goal importance and value were highly correlated, $r(114) = .73$, $p < .0001$, and averaged into one index of importance. As expected, when this index was analyzed in a 2 (goal type: performance, learning) × 2 (uncertainty: low, high) ANOVA, there were no differences in importance based on goal type, uncertainty, or the interaction of these factors, all Fs ≤ 1.06, $p \geq .31$, indicating that the learning and performance goals were matched in importance.

Confirming the effectiveness of the uncertainty manipulation, a similar analysis on confidence revealed that participants in the high-uncertainty condition were less confident that they would achieve their goal ($M = 4.67$, $SD = 1.01$) than participants in the low-uncertainty condition ($M = 5.21$, $SD = 1.33$), $F(1, 111) = 5.91$, $p < .02$. There was no difference in confidence based on goal type ($M_{Learning} = 4.84$, $SD_{Learning} = 1.32$; $M_{Performance} = 5.04$, $SD_{Performance} = 1.09$), $F < 1$, nor was there an interaction between goal type and uncertainty, $F < 1$.

As expected, participants rated the objective of answering questions correctly to be more reflective of a performance goal relative to a learning goal ($M = 5.78$, $SD = 1.66$) than the objective of increasing knowledge about legal issues ($M = 2.51$, $SD = 1.97$), $t(114) = 10.54$, $p < .0001$.

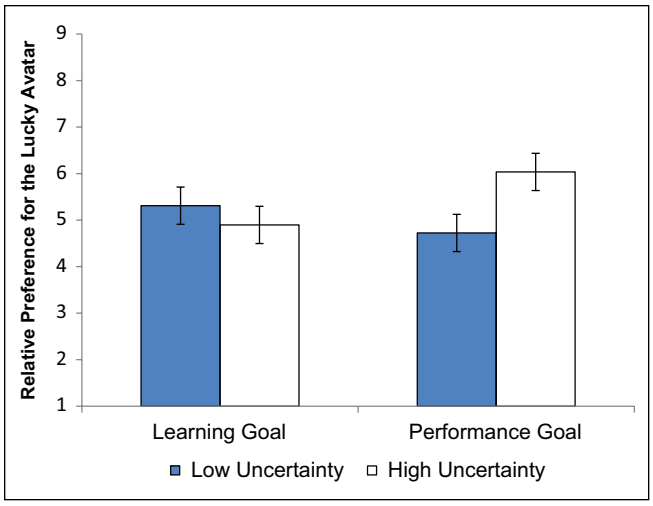

Figure 5. Uncertainty of goal achievement influenced avatar preference among participants pursuing a performance goal but not for those pursuing a learning goal in Study 5.

Relative preference. Submitting avatar preferences to a 2 (goal type: performance, learning) × 2 (uncertainty: low, high) between-subjects ANOVA (Figure 5) yielded no significant main effects of goal type, $F < 1$, or uncertainty, $F(1, 111) = 1.24$, $p = .27$. However, it did yield the predicted Goal-type × Uncertainty interaction, $F(1, 111) = 4.57$, $p < .04$, $\eta_p^2 = .04$, 95% CI = [0.000, 0.128].[2] Within performance goal conditions, participants exhibited a stronger preference for the lucky teenage avatar in the high-uncertainty condition ($M = 6.04$, $SD = 2.31$) than in the low-uncertainty condition ($M = 4.72$, $SD = 2.07$), $F(1, 111) = 5.23$, $p < .03$, $\eta_p^2 = .04$, 95% CI = [0.0001, 0.1366]. For participants pursuing learning goals, there was no difference in avatar preference in the high-uncertainty ($M = 4.90$, $SD = 2.23$) or low-uncertainty conditions ($M = 5.31$, $SD = 2.04$), $F < 1$.

Choice. A similar pattern of results was obtained when measuring dichotomous choice. A logistic regression with factors of goal type and uncertainty found no main effect of goal type, $\chi^2(1, N = 115) < 1$, or uncertainty, $\chi^2(1, N = 115) < 1$. However, a marginally significant interaction occurred between goal type and uncertainty, $\chi^2(1, N = 115) = 3.52$, $p = .06$. In the high-uncertainty condition, 85.7% of participants who pursued a performance goal choose the teenage avatar, versus 65.5% in the learning goal condition. For goals of low uncertainty, 69.0% of those pursuing a performance goal chose the teenage avatar, compared with 79.3% in the learning goal condition.

It should be noted that the large majority (74.8%) of participants chose the teenage avatar over the lawyer avatar, even though the lawyer was more semantically related to legal issues. Given that the teenage avatar was closer in age to the participants, it is perhaps not surprising that this occurred. Despite this unanticipated ceiling effect, the

interaction between factors of goal type and uncertainty was marginally significant for choice, and mirrored the significant pattern of results found in the more sensitive continuous measure of preference.

Study 6: Confidence and Effort

We suggest that people are more likely to resort to superstitious behavior to facilitate performance goals than learning goals, because performance goals are perceived to be more susceptible to external forces. As the most direct test of our proposed mechanism, in Study 6, we assigned participants to use an item that was previously associated with either success or failure in the pursuit of a goal related to either performance or learning objectives. We predicted that assignment to the lucky item would boost the confidence of participants pursuing a performance goal, but would not affect the confidence of participants pursuing a learning goal.

Method

Participants. Two hundred sixty-three Americans (105 women, M_{Age} = 31.05, SD = 10.00) completed an online questionnaire on AMT in exchange for 35 cents.

Design. This was a 2 (avatar: lucky, unlucky) × 2 (goal type: performance, learning) between-subjects experiment.

Procedure. Participants were informed that they would play four games of chance against the computer. These included (a) War, in which two opponents draw a playing card at random, with the highest card winning; (b) Evens-Odds, in which two opponents each choose a number, with the winner based on whether they add up to an odd or even figure; (c) a dice game, in which two opponents simulate a dice roll, with the high roll winning; and (d) RPS.

Each game was played using either the teenager or the scientist avatar described in Study 4. Participants were given false feedback that they won two "best-of-five" competitions in games with the teen avatar (War and Evens-Odds), and lost two "best-of-five" competitions in games with the scientist avatar (dice game and RPS). Participants then completed one of two blackjack exercises. Participants in the performance-goal condition were instructed to play blackjack against the computer, with the goal of winning the game. Participants in the learning-goal condition were instructed to read a passage about blackjack strategy as part of a "learning exercise" with a goal to attain a "sense of competence and mastery when it comes to blackjack strategy."

Next, participants were assigned to use the (lucky) teen avatar or the (unlucky) scientist avatar in their blackjack exercise. Before engaging in the blackjack exercise, participants answered three questions that served as the primary dependent variables: "how likely do you think it is that you will accomplish your goal," "how confident are you that you will accomplish your goal," and "to what extent do you think it's likely that you will accomplish your goal?" Each response was reported on a 7-point scale with endpoints, *not at all* (1) and *very likely/confident* (7). Participants then answered two questions related to their predicted effort expenditure, "how much effort do you think you would have to expend" and "to what extent do you think you will need to concentrate hard in order to accomplish your goal?" on 7-point scales with endpoints, *low effort/not at all* (1) and *high effort/very strongly* (7).

Next, participants in the performance goal condition played one hand of blackjack, whereas participants in the learning goal condition read a passage describing blackjack strategy. Participants then responded to one comprehension check (indicating that they understood the rules for each game), provided demographic information, and were dismissed.

Results

Confidence and effort. As expected, the three dependent variable items were highly correlated (α = .95), and were averaged into an index of goal achievement confidence. Analyzing this index in a 2 (avatar: lucky, unlucky) × 2 (goal type: performance, learning) ANOVA revealed a main effect of goal type, $F(1, 259) = 8.20$, $p < .01$, $\eta_p^2 = .03$, and a main effect of avatar, $F(1, 259) = 14.79$, $p < .001$, $\eta_p^2 = .05$, which were qualified by a Goal-type × Avatar interaction, $F(1, 259) = 3.95$, $p < .05$, $\eta_p^2 = .02$, 95% CI = [0.000, 0.056].[3] Planned contrasts (Figure 6) revealed that participants assigned the lucky avatar (M = 4.57, SD = 1.48) were more confident than participants assigned to the unlucky avatar (M = 3.48, SD = 1.47) that they would achieve the performance goal, $F(1, 259) = 17.07$, $p < .0001$, $\eta_p^2 = .06$, 95% CI = [0.017, 0.125]. However, participants did not differ in their confidence of achieving the learning goal based on being assigned the lucky (M = 4.73, SD = 1.47) or unlucky avatar (M = 4.38, SD = 1.57), $F(1, 259) = 1.72$, $p = .19$.

The two effort-related items were strongly correlated, r = .68, $p < .0001$, and combined into one index. A parallel ANOVA analyzing the effort index revealed a significant main effect for goal type, $F(1, 259) = 18.84$, $p < .0001$, but not for avatar, $F < 1$. More importantly, the interaction between these factors was not significant, $F < 1$.

Discussion

The results elucidate the use of superstition to facilitate achievement goals, supporting our hypothesis that people perceive superstitious behaviors to facilitate the achievement of performance goals but not learning goals. In addition, they rule out an effort-based explanation for our findings. Participants anticipated expending the same amount of effort regardless of the avatar they were assigned. This is consistent with a conceptualization of superstition as an attempt to

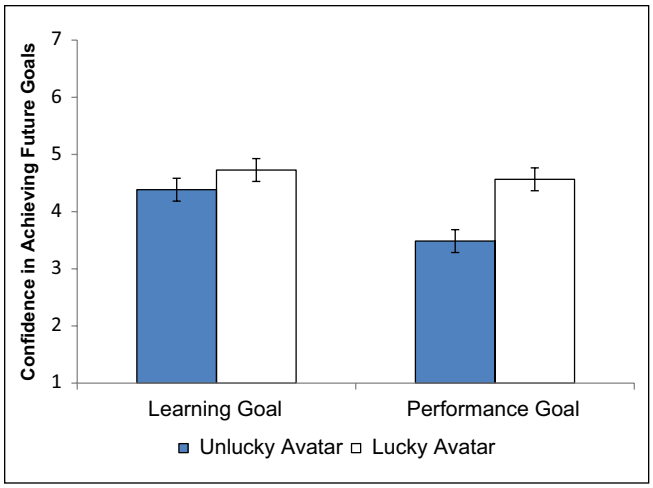

Figure 6. Assignment to a lucky or unlucky avatar in Study 6 affected confidence in goal achievement for participants pursuing a performance goal, but not for participants pursuing a learning goal.

maximize the return on effort, rather than reducing the need to expend it.

General Discussion

People exhibit specificity with respect to the type of achievement goals they believe are facilitated by superstitious behavior. This specificity was found in tests of chronic goal orientation and superstitious behavior conducted in Studies 1 and 2. Participants were more likely to use superstition—established through conditioning trials and by referencing culturally relevant symbols—to facilitate goal achievement if they were high than low in chronic performance orientation. In contrast, their reliance on superstition to facilitate goal achievement was not affected by chronic learning orientation.

Studies 3 and 4 primed achievement goals and examined the extent to which participants exhibited goal specificity in their use of superstitious behavior. Participants in Study 3 primed to pursue a performance goal before taking a quiz had a stronger preference for a lucky pen than a pen positively associated with intelligence, whereas participants primed to pursue a learning goal did not exhibit a stronger preference for either pen. Study 4 found the same specificity effect, and showed that superstitious goal facilitation was perceived to extend to domains other than the domain in which the luck of the stimulus was established.

Experiments 5 and 6 elucidated why performance goals elicit superstitious behavior. Study 5 showed that this specificity effect was not due to differences in the degree of goal uncertainty between performance and learning goals. Greater uncertainty—known to increase superstitious behavior—only increased superstitious behavior for participants who pursued performance goals but not learning goals. This perception that superstition facilitates goal achievement for performance goals but not learning goals even appeared to mitigate the potent influence of uncertainty on superstitious behavior. Study 6 found that participants assigned to use a lucky rather than an unlucky avatar exhibited increased confidence in achieving a performance goal but not a learning goal. These results imply that the goal specificity exhibited is not due to differences in the uncertainty of achieving performance and learning goals. Rather, the goal specificity is due to the perception that superstitious behavior will facilitate the achievement of performance goals but not learning goals.

Taken as a whole (see Appendix for power analysis), these results are consistent with the conceptualization of performance goals as extrinsically motivated and learning goals as intrinsically motivated. Because the attainment of performance goals heavily relies on external factors, people pursuing performance goals should be more likely to rely on help from external sources and perceive that assistance will facilitate goal achievement. Indeed, our results suggest that people pursuing a performance goal seek out and believe they will benefit from the assistance of external help that might result from engaging in superstitious behavior. Whereas the achievement of performance goals is a means of gaining favor in the eyes of an outside judge (Covington, 2000), those who pursue learning goals seek to maximize their self-evaluations of competence (Ames, 1992). Therefore, people pursuing learning goals should be more likely to believe that their own effort is critical to their success, not intervention from an external source (Nicholls, 1984).

It should be noted that the superstitious behavior we examine is not related to performance outcomes. Indeed, the items featured in our experiments could not be reasonably expected to influence outcomes. A computer avatar should not improve a quiz score, viewing a good luck charm should not improve performance in a card game, nor should a pen influence the quality of a homework assignment. People often ignore rationality and perceive illusory control, however, believing their private thoughts and decisions exert influence on other people and the environment (e.g., Pronin, Wegner, Rodriguez, & McCarthy, 2006). Despite this perception, we make no claim that superstitious behavior is in fact efficacious or can enhance performance. Rather, we consider the important finding to be that participants were more likely to resort to superstition to facilitate performance goals than learning goals.

Prior research on whether superstition truly facilitates performance is mixed. Superstitious behavior can increase performance expectancies (Block & Kramer, 2009). This increased confidence—manifested as increased task-specific self-efficacy—has been shown to improve performance (Damisch et al., 2010). However, not all tasks are affected by performance expectancies. For example, when answering multiple-choice trivia questions, performance is contingent on whether participants are familiar or unfamiliar with the topic. Therefore, increased confidence should not translate

into improved performance. Indeed, there was no performance improvement based on propensity for superstition for scores on the trivia quizzes in Studies 1, 4, and 5.

Throughout this article, superstition was manifested as preference for lucky items to facilitate achievement of performance goals but not learning goals. An open question is whether engaging in superstition would affect the actual experience of goal pursuit, including both persistence and enjoyment. People who seek out learning goals tend to enjoy persisting in the pursuit of mastery even in the face of obstacles (Ames & Archer, 1988; Dweck, 1986), whereas people who seek out performance goals tend to limit themselves to less challenging and more easily attainable tasks to ensure success (Ames, 1992). Further research may investigate whether the increased confidence instilled by the use of superstition for performance goals may increase the level of persistence demonstrated and effort expended, as well as the actual enjoyment of the goal pursuit itself, such that persistence and enjoyment approaches levels seen for learning goals.

Using superstition to achieve performance goals seems emblematic of a win-at-all-cost mentality. Many people pursue achievement goals to enhance their self-esteem, with learning merely "a means to performance outcomes" (Crocker & Park, 2004). Dweck (2010) suggests people would benefit from adopting "growth mindsets," seeking out challenges related to learning rather than allowing themselves to be judged by others on objective performance measures. While performance outcomes remain the critical index of achievement in many prominent domains (e.g., grades in education, financial return for investments, victory in elections and sports), successful practitioners in these fields commonly reframe their objectives as learning goals to focus on the process rather than the results. For these individuals, a good decision-making process that leads to a negative result is merely a "bad break" that will even out over time (Russo & Schoemaker, 2002). This research also points to greater hedonic benefits of adopting such a growth mindset. Relying on superstition reduces the uncertainty associated with performance goals, but it may also reduce attributions to the self for successful outcomes that one was responsible for. In short, greater resilience and hedonic benefits may stem from framing achievement goals as opportunities to learn, rather than relying on superstitious behavior.

Appendix

Power analyses were conducted for each study using the procedure outlined in Cohen (1988). The statistical power for each study was as follows: 0.76 (Study 1), 0.79 (Study 2), 0.97 (Study 3), 0.95 (Study 4), 0.54 (Study 5), and 0.99 (Study 6).

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Notes

1. There was a marginally significant difference between superstition and control conditions in performance orientation ($M_{Superstition}$ = 5.56, $SD_{Superstition}$ = 0.78; $M_{Controls}$ = 5.38, $SD_{Controls}$ = 0.90), $F(1, 246) = 2.92$, $p = .09$, and a significant difference in learning orientation ($M_{Superstition}$ = 5.43, $SD_{Superstition}$ = 0.89; $M_{Controls}$ = 5.70, $SD_{Controls}$ = 0.80), $F(1, 246) = 5.94$, $p < .02$. However, with appropriate correction for the number of manipulation checks across all six studies, neither of these effects reaches significance. To further ensure that measurement order did not influence the results, Study 2 measured performance and learning orientation before superstitious behavior was elicited.
2. Because η_p^2 is bounded at zero, a 90% confidence interval for η_p^2 may be considered appropriate (cf. Lakens, 2013; Steiger, 2004): 90% CI = [0.0015, 0.1113].
3. 90% CI = [0.0001, 0.0479].

Supplemental Material

The online supplemental material is available at http://pspb.sagepub.com/supplemental.

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